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SOME PRACTICAL ASPECTS OF EQUITY RISK PREMIUM VALUATION

An attempt to find a method of equity risk premium calculation in a newly emerged economy and specific issues, which are to appear in such case. Based on the Polish capital market data.

Keywords

Equity risk premium, equity estimation models, risk-free rate, national market indexes, capitalization, bond price, coupon rate, real rate, bond yield, Polish capital market, volatility, forecast evaluation.

The processes of globalization and new market economies emergence change the world economy perspective. Capital becomes much more liquid and is looking for further perspectives on the international level. In such situation, value of business can differ from one place to another and regional indicator can make the difference between success and failure. Equity risk premium is one of such indicators. It shows the return on investments excluding its riskless part, and therefore is vital for evaluation of capital investments.

Till this time the problem of direct market investigation of ERP was not to be done in countries with young market economy. It was said that data arrays are too short for drawing any conclusions and forecasts; local equity markets are not liquid enough and still emerging. Polish national equity market is an object of the research as being the main source of useful data

This work is dedicated to finding possibility of calculating risk premium in a newly emerged economy and specific issues, which are to appear in such case. Its goal is estimation of ERP calculation possibility, calculation specifics and different forecasts credibility. The expected equity risk premium can be defined as the additional return an investor expects to receive to compensate for the additional risk associated with investing in equities as opposed to investing in riskless assets. It is an essential component in several costs of equity estimation models, including the buildup method, the capital asset pricing model (CAPM), and the Fama-French three factor model. It is important to note that the expected equity risk premium, as it is used in discount rates and cost of capital analysis, is a forward-looking concept. That is, the equity risk premium that is used in the discount rate should be reflective of what investors think the risk premium will be going forward.

Unfortunately, the expected equity risk premium is unobservable in the market and therefore must be estimated. Typically, this estimation is arrived at through the use of historical data. The historical equity risk premium can be calculated by subtracting the long-term average of the income return on the riskless asset (Treasuries) from the long-term average stock market return (measured over the same period as that of the riskless asset) [7].

In using a historical measure of the equity risk premium, one assumes that what has happened in the past is representative of what might be expected in the future. In other words, the assumption one makes when using historical data to measure the expected equity risk premium is that the relationship between the returns of the risky asset (equities) and the riskless asset (Treasuries) is stable.

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Since the expected equity risk premium must be estimated, there is much controversy regarding how the estimation should be conducted.

A variety of different approaches to calculating the equity risk premium have been utilized over the years. Such studies can be categorized into four groups based on the approaches they have taken. The first group of studies tries to derive the equity risk premium from historical returns between stocks and bonds as was mentioned above. The second group, embracing a supply side model, uses fundamental information such as earnings, dividends, or overall economic productivity to measure the expected equity risk premium. A third group adopts demand side models that derive the expected returns of equities through the payoff demanded by investors for bearing the risk of equity investments. The opinions of financial professionals through broad surveys are relied upon by the fourth and final group [1].

The range of equity risk premium estimates used in practice is surprisingly large. Using a low equity risk premium estimate as opposed to a high estimate can have a significant impact on the estimated value of a stream of cash flows. This chapter addresses many of the controversies surrounding estimation of the equity risk premium and focuses primarily on the historical calculation but also discusses the supply side model [7].

In measuring the historical equity risk premium one must make a number of decisions that can impact the resulting figure; some decisions have a greater impact than others. These decisions include selecting the stock market benchmark, the risk-free asset, either arithmetic or a geometric average, and the time period for measurement. Each of these factors has an impact on the resulting equity risk premium estimate.

The stock market benchmark chosen should be a broad index that reflects the behavior of the market as a whole. Two examples of commonly used indexes are the S&P 500 and the New York Stock Exchange Composite Index. Although the Dow Jones Industrial Average is a popular index, it would be inappropriate for calculating the equity risk premium because it is too narrow [10].

The equity risk premium can be calculated for a variety of time horizons when given the choice of risk-free asset to be used in the calculation. Usually calculations are done for short-, intermediate-, and long-term horizon equity risk premia. The short-, intermediate-, and long-horizon equity risk premia are calculated using the income return from a 30-day Treasury bill, a 5-year Treasury bond, and a 20-year Treasury bond, respectively [3].

Although the equity risk premia of several horizons are available, the long-horizon equity risk premium is preferable for use in most business-valuation settings, even if an investor has a shorter time horizon. Companies are entities that generally have no defined life span; when determining a company's value, it is important to use a long-term discount rate because the life of the company is assumed to be infinite. For this reason, it is appropriate in most cases to use the long-horizon equity risk premium for business valuation.

The US equity risk premium data usually calculated by historical method are arithmetic average risk premia as opposed to geometric average risk premia. The arithmetic average equity risk premium can be demonstrated to be most appropriate when discounting future cash flows. The geometric average is more appropriate for reporting past performance, since it represents the compound average return.

The argument for using the arithmetic average is quite straightforward. In looking at projected cash flows, the equity risk premium that should be employed is the equity risk premium that is expected to be actually incurred over the future time periods. There is considerable volatility in the year-by-year statistics. At times the realized equity risk premium is even negative.

The estimate of the equity risk premium depends on the length of the data series studied. A proper estimate of the equity risk premium requires a data series long enough to give a reliable average without being unduly influenced by very good and very poor short-term returns. When calculated using a long data series, the historical equity risk premium is relatively stable. Furthermore, because an average of the realized equity risk premium is quite volatile when calculated using a short history, using a long series makes it less likely that the analyst can justify any number he or she wants. The magnitude of how shorter periods can affect the result will be explored later in this chapter.

Some analysts estimate the expected equity risk premium using a shorter, more recent time period on the basis that recent events are more likely to be repeated in the near future; furthermore, they believe that the 1925, 1935, and 1945 contain too many unusual events. This view is suspect because all periods contain "unusual" events. Some of the most unusual events of the last hundred years took place quite recently, including the inflation of the late 1970 and early 1980, the October 1987 stock market crash, the collapse of the high-yield bond market, the major contraction and consolidation of the thrift industry, the collapse of the Soviet Union, the development of the European Economic Community, the attacks of September 11, 2001 and the latter so-called "financial crisis" [7].

It is even difficult for economists to predict the economic environment of the future. For example, if one were analyzing the stock market in 1987 before the crash, it would be statistically improbable to predict the impending short-term volatility without considering the stock market crash and market volatility of the 1929-1931 period.

Without a depreciation of the 1920 and 1930, no one would believe that such events could happen. The 80-year period starting with 1926 is representative of what can happen: it includes high and low returns, volatile and quiet markets, war and peace, inflation and deflation, and prosperity and depression. Restricting attention to a shorter historical period underestimates the amount of change that could occur in a long future

period. Finally, because historical event-types (not specific events) tend to repeat themselves, long-run capital market return studies can reveal a great deal about the future. Investors probably expect "unusual" events to occur from time to time, and their return expectations reflect this [7].

A relatively stable US market ERP mean is being easily calculated and receives a small adjustment from year to year. Some analytical companies, like Ibbotson Associates and Damodaran Studies issue annual publications on risk premia forecasts for different horizons and capitalization levels. Professional services companies and business analytics in purposes of financial valuation and management are globally using this information.

The ERP of local market can be calculated in the same way, but in many cases a number of problems can be encountered. Local equity market can be too small and not liquid, it can be too young and still emerging or there would be no way of defining a riskless rate.

To deal with this issue a country-spread model is utilized. It is based on the spread between the yield on 20-year U.S. Treasury bonds in USD and the 20-year yield on local currency.

Sometimes country ratings of institutional investor or other agencies are used. These ratings capture the political, economic, financial and other risks very well. However, they rank these risks on their own scale. It is hard to justify the way the country risk was derived from this scale and the range of the country risk premium. For example, the Institutional Investor Magazine begins with the rank 100 having a risk factor equal to zero and ends theoretically at 0.14 Institutional Investor assigns a zero country risk premium for the countries ranking 100-95, 1% for the countries ranking 95-90, 2% for the countries ranking 90-80, etc. The lowest rank of 15-0 assumes a country risk of 10%. Thus these ratings assess the risks in detail but fail to explain the determinants of the selected level of country risk premium [10].

In that way we receive so-called Country Risk Premium, which tends to be dependable on political stability and economical perspectives of a country.

Country risk premium method seems to be suitable to some extend but is being indirect and therefore less reliable and reflective towards local market specifics. Determining local ERP via direct historical method can bring benefit in more precise business pricing, more accurate discount rate and business forecast. In many ways we can speak that ERP of a local national market can reflect the market premia of a whole global region. For instance, Poland can represent the whole Central Europe.

While emerging to market economy Poland has suffered from severe recession in 1989-1991, around 1000% inflation in 1993, but generally managed to increase GDP 15 times till 2008 ($632 billion, $17,500 per capita), and today is one of the most powerful economies in the region [4]. It is one of the best examples of well-developed post-centralized market economy.

The main source of capital market information is the stock market, which is represented by the Warsaw Stock Exchange (WSE). It was found in 1991 and listed only 5 companies in the first year, but experienced a period of exponential growth. Today it counts 373 companies in total with common capitalization of 279479 mil PLN and 331316 mil PLN share turnover [9]. While comparing to western capital market it seems rather small both in absolute measure and comparing to national GDP, but has been described as of comparatively high liquidity since 1996. Therefore, WSE suits being a source of regional capital market data.

While defining a long-period riskless rate, a long-term governmental bond (10, 15, 20, 30 years to maturity) is usually taken and its yield is being calculated by adjusting value of the bond to its annual mean.

Methodological problems, which have occurred in Poland, can be described in following short milestone [2]:

- 10 year floating rate bonds are available since 1995 but are not issued 2002;
- 10 year fixed rate bonds are available since 1999;
- 20 year fixed rate bonds are available since 2002.

The floating rate in Poland is determined as a weighted average of 52-week bond yield + 1% and is rather inappropriate as a riskless rate, because of its more volatile income [3].

In the table 1 and table 2 the difference between the returns on floating (dz series) and fixed (ds series) rate bonds is observed. Financial market imperative says that additional yield represents additional risk.

Table 1. **Fixed rate bond yield**

As at	Bond Series	Bond Price [3]	Coupon Rate [2], %	Real rate,%
31.12.1999	DS0509	800	6,00	7,50
31.12.2000	DS1109	734	6,00	8,17
31.12.2001	DS1110	832	6,00	7,21
31.12.2002	DS1110	1026	6,00	5,85
31.12.2003	DS1113	894	5,00	5,59
31.12.2004	DS1113	945	5,00	5,29
31.12.2005	DS1115	1094	6,25	5,71
31.12.2006	DS1115	1070	6,25	5,84
31.12.2007	DS1117	950	5,25	5,53
31.12.2008	DS1117	990	5,25	5,30

Table 2. **Floating rate bong yield**

As at	Bond Series	Bond Price [3]	Coupon Rate [5],%	Real rate,%
31.12.1998	DZ0708	996	22,13	22,22
31.12.1999	DZ0109	973	13,36	13,73
31.12.2000	DZ0110	999,9	19,12	19,12
31.12.2001	DZ0811	1027	17,19	16,74
31.12.2002	DZ0811	1003	10,12	10,09

A stock market benchmark should represent the behaviour of the whole market. Methodology used in counting American ERP is based on large-stock industry-weighted indexes, like S&P 500 or simply the largest deciles [7].

Polish specifics can be observed by the fact that there is only one quoted equity market (WSE) and the presence of less than 400 companies even in the best periods of development. There are two major indexes, WIG and WIG20, which can be used to define market ERP. WIG is a "Total stock exchange" index, while WIG 20 is composed only from 20 most liquid and capitalized companies. On the table 3 total annual returns on indexes are shown, which resemble a slight difference and high level of relativity. Choosing WIG20 index seems to be more appropriate, so ERP received could be compared to large-cap calculated US ERP and estimation of a local company size premium in the future.

Table 3. **Return on stock indexes [8]**

Year	WIG (%)	WIG20 (%)
1995	1,50	8,20
1996	89,00	82,10
1997	2,30	1,10
1998	-12,80	-16,20
1999	41,30	43,80
2000	-1,30	3,40
2001	-21,99	-33,60
2002	3,19	-2,70
2003	44,92	33,90
2004	27,94	24,56
2005	33,66	35,42
2006	41,60	23,75
2007	10,39	5,19
2008	-51,07	-48,21

While speaking of historical representativeness of an index, we have to take into account the forces, which pull the desired period length in different directions. It can be distorted throughout being too small to represent the market, including events not likely to happen in the future or being unsustainable as a sample. From another point of view, the whole calculation becomes statistically less reliable with a smaller period investigated. If the conveniences of representativeness are suited, the period should be as long as possible.

Warsaw Stock Exchange has experienced the lowest returns in 2008 (-51,3%) and the highest in 1993 (1095%, nominal value caused by hyperinflation). It shows many aspects of still being merged. Nevertheless, analysts tend to speak of it as of being highly liquid and well capitalized, so it can generally represent all Polish capital market.

Due to the fact that first long-term fixed rate treasury bonds were issued in 1999 there is no methodology to estimate ERP for the earlier periods. Further checking of index representativeness is being based on statistical approach. We can generally assume that index has no internal specific and use it as a sample. After calculating standard deviation of its companies capitalization-weighted returns, the level of statistical error can be seen.

The investigation has shown that means are approaching normal distribution. As you can see in the table 4, the error is at minimum.

Having this data, we can calculate historical ERP by subtracting riskless rate from WIG20 returns. As it is seen in the table 5, the realized equity risk premium seems to deviate in the range between -55% and 40% without any time tendencies.

Making a further forecast depends of criteria chosen. Most reasonable are listed below:

1. Arithmetical average as being regarded to be the best in discounting future cash flows [7].
2. Geometric mean as being regarded to be better for the past performance evaluation [7].
3. Linear trend can be an issue for the country with economy still developing

4. Last year as possible alternative for a short-term prognosis. It has been reported that next year ERP is correlated to previous year [7].
5. Other criteria, including hybrids and adjustments.

Table 4. **Standard deviation of Returns on WIG20 shares**

Year	Standard Deviation, %	Error, %
2001	3,31	0,74
2002	1,58	0,35
2003	2,09	0,47
2004	2,66	0,59
2005	2,99	0,67
2006	2,78	0,62
2007	1,06	0,24
2008	2,12	0,47

Table 5. **Historical ERP Data**

Year	Returns,% [8]	LT Treasury Bond Yield,%	ERP,%	Deviation,%
1999	43,80	7,50	36,30	-
2000	3,40	8,20	-4,80	8,00
2001	-33,50	7,20	-40,70	15,00
2002	-2,70	5,80	-8,50	10,00
2003	33,90	5,60	28,30	10,00
2004	24,60	5,30	19,30	8,00
2005	35,40	5,70	29,70	8,00
2006	23,80	5,80	17,90	7,00
2007	5,20	5,50	-0,30	6,00
2008	-48,20	5,30	-53,50	9,00

To evaluate the most credible prognosis, the forecasts presumably done by this method are compared (subtracted) to the result of next period. The difference received is being summed up and divided by the number of years in order to receive and average of an error. The prognosis with the smallest error is the most credible. In order to receive more precise data first four year prognoses are not taken into account as containing statistically useless amount of data.

Chart 1 shows the credibility of different forecast methods. As it can be seen, arithmetic average has the largest error and therefore can seldom be used as a tool of forecast for the next year. In fact, the most precise method was to assume that ERP is going to be around its last year meaning. But even better results were obtained from having an average of an arithmetic mean and previous year forecasts (adjusted mean). The adjusted mean 2 is a credibility weighted forecast, which is a sophistication of a simple previous year adjusted mean. While making this prognosis the previous year forecast error is used as a weight in order to draw it to empirically proved real level of credibility. However, such sophistication did not give positive result.

On the *Chart 1* ERP forecasts compared to the ERP results in a graphical view. Average becomes more stable in longer periods, while ERP tends to cross average line twice, rather being closer to previous means than to the average. This tendency is going to be eliminated if the periods are to be enlarged (for example 2-year ERP result would generally approach average).

With this information, it is assumed that previous year adjustment is to be done for the next year forecast.

However, we can't find the same tendency on the S&P500. Chart 3 shows totally reverted credibility error data, which can be explained either non-credibility of Polish research or the difference in market behaviour.

By taking a look at Chart 4 it is visible that S&P500 market tends to act more volatile, usually crossing or approaching average line in each period.

Another problem to be faced is inclusion of the year 2008. Economical breakdown, which appeared in the second part of the year, was concluded as the worst in last 50 years. Although it is highly important to include al phases of financial cycle, many analytics point this crisis to be a highly exclusive event, which is not likely to happen in near future. [4]. It would positively adjust 50-year long observation but would critically distort one, which has only nine years. Table 6 shows crucial difference between 1999-2007 and 1999-2008 data.

As the last argument already mentioned country risk premium based method can be used. Poland seems to be quite stable and perspective country (group A bond security), still not as reliable as United States of America (group AAA). Additional risk premia derived from the bond spread is 0,9% which together with 7,6% of US market ERP (arithmetic average) [7]. It gives a result closer to the average excluding year 2008 rather than

for the whole period.

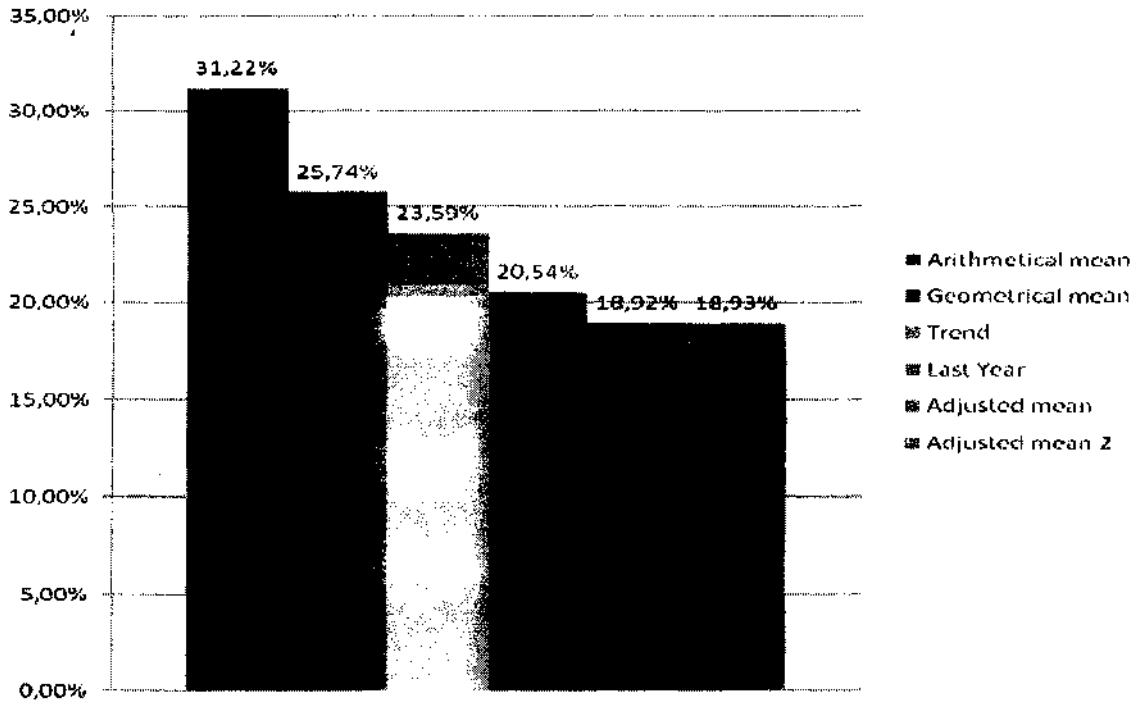

Chart 1. **Level of Forecast Error**

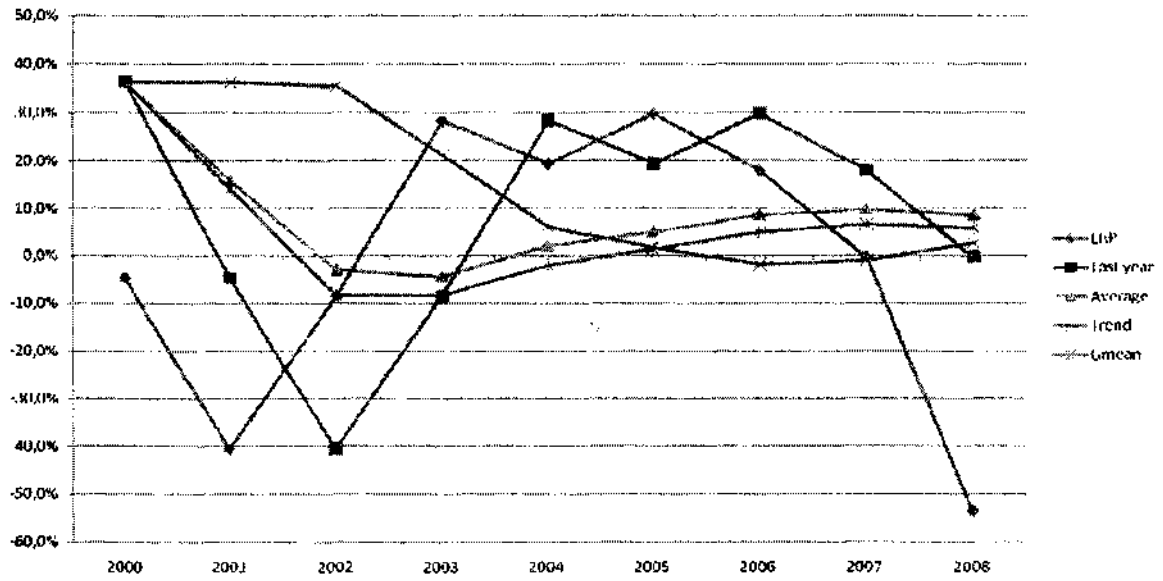

Chart 2. **Real ERP in comparison to the forecast**

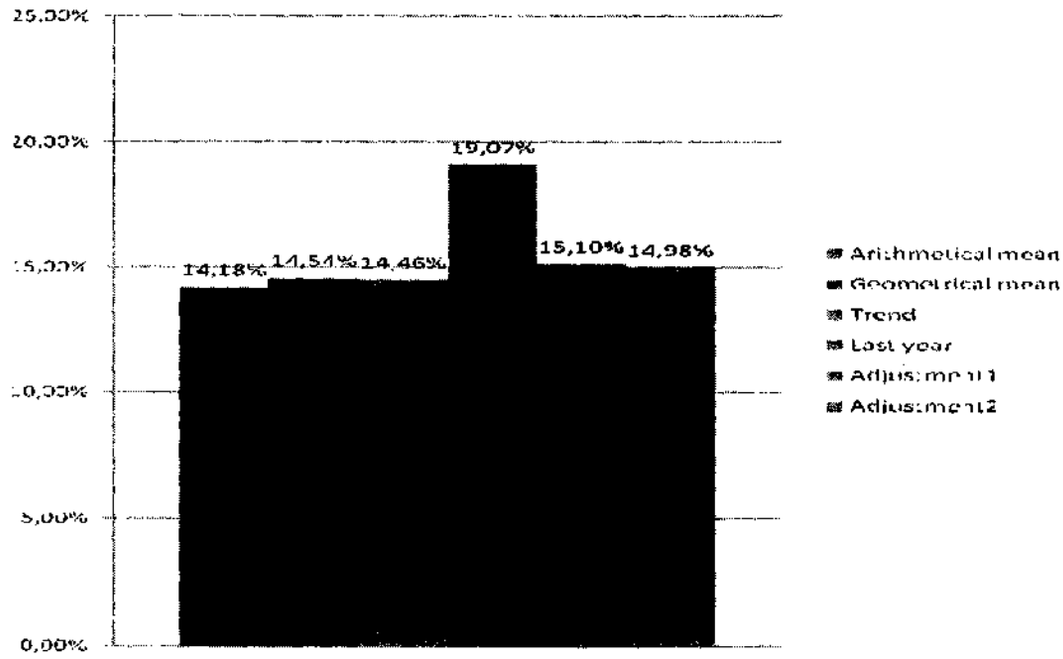

Chart 3. **S&P500 Forecast Volatility**

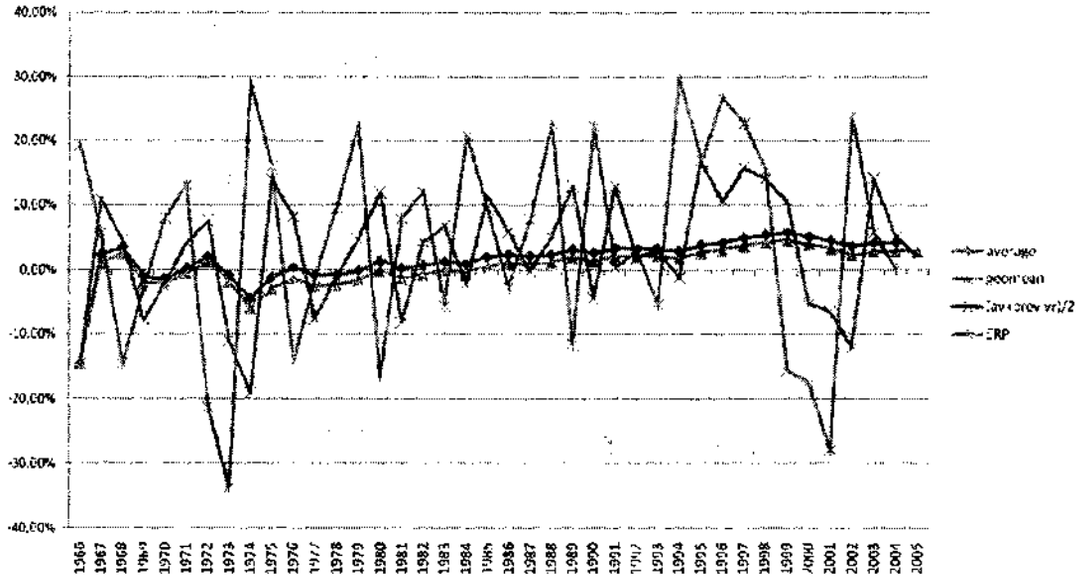

Chart 4. **S&P 500 comparison to the forecast**

Table 6. **Different period results comparison, (%)**

Indicators	1999-2007	1999-2008
Arithmetic average	8,57	2,36
Geometric average	5,67	-2,66
Previous year adjusted average	4,05	-25,57

In conclusion we can summarise that:

1. Equity risk premium is a forward-looking concept of what an investor expects to be a return for taking market risk. This concept is important for business valuation and can also be used for characterizing and comparing different equity markets both in time and

space.

2. Traditionally ERP index is being based on a large-stock market benchmark returns and a long-horizon risk-free rate and is derived from arithmetic or geometric average. It tends to become relatively stable in large period of time.
3. While specifying an industry, company size or adjusting the index to other country specific risks can be calculated and added. This can be done directly by calculating another market or indirectly by using bond and stock spreads. Direct methods base themselves on local market behaviour and therefore are preferable; despite they are not always available.
4. Poland as a most developed representative of Central European region is a potential base of direct ERP calculation. Although having a short history of free market, it shows an estimate level of capitalization and high liquidity, has come over several economic cycles and proven itself relatively stable.
5. Due to market reasons resulted equity risk premium can be calculated only since 1999, and WIG20 index is a reliable source of market trend indication. The basing data is enough for ERP calculation via historical method.
6. Due to Polish equity market behaviour specifics, next year ERP is most likely to be between the previous year indicator and arithmetic average. Longer period forecasts would approach towards arithmetic mean.
7. The year 2008 should be temporarily excluded from contemporary calculations of Polish ERP as containing events that are not likely to happen in such a short time period.
8. Both direct and indirect approaches give close meanings of the data received, indicating average ERP in range of 8,5%-8,6% that serves a proof of a proper calculation.

Investigation and analysis of Polish equity risk premia in following years will give further information for adjustment of these issues.

List of references

1. *Anderson, P. L., Business Economics and Finance [Text] / Patrick L. Anderson,. – Chapman & Hall/CRC, 2005.*
2. *Bond issue information [Electronic resourse] / Wyniki przetargów obligacji skarbowych oraz przetargów uzupełniających, Ministerswo Finansow. – Available from : http://www.mf.gov.pl/_files_/dlug_publiczny/obligacje_hurtowe/pliki_do_pobrania/obligacjehurtowe.xls.*
3. *Bond Prices [Electronic resourse] // WSE Infospace. – Available from : http://www.wseinfospace.eu/palio/html.run?_Instance=cms_gpw.pap.pl&_PageID=2&_OID=141&_Lang=en&_CheckSum=304426945.*
4. *Economist Intelligence Unit, annual reports on Poland 1997-2008 [Electronic resourse], – Available from . http://www.eiu.com/index.asp?layout=displayIssue&publication_id=70000807*
5. *Floating rate bond statistics [Electronic resourse]. – Available from . http://aktyprawne.rp.pl/aktyprawne/akty/akt.spr?id=76964, http://aktyprawne.rp.pl/aktyprawne/akty/akt.spr?id=120773 http://aktyprawne.rp.pl/aktyprawne/akty/akt.spr?id=142974, http://aktyprawne.rp.pl/aktyprawne/akty/akt.spr?id=163978.*
6. *French, C. W. The Treynor Capital Asset Pricing Model [Text] / Craig W. French // Journal of Investment Management. – 2003. – Vol. 1. – No. 2.*
7. *SBBI Valuation [Text]. – 2007 Morningstar, NY.*
8. *Stock market annual statistics [Electronic resourse] // WSE main statistics. – Available from http://www.gpw.pl/gpw.asp?cel=e_informacje&k=1&i=/periodical_statistic/opis_statistic&sky=1&nagnaz=Information%20and%20statistics.*
9. *Stock market detailed statistics [Electronic resourse] // WSE annual bulletin. – 2001-2008. – Available from http://www.gpw.pl/gpw.asp?cel=informacje_gieldowe&k=18&i=/statystyki/roczne&sky.*
10. *Yee, K. K. Earnings Quality and the Equity Risk Premium: A Benchmark Model [Text] / Kenton K. Yee // Contemporary Accounting Research. – Fall 2006. – Vol. 23. – No. 3. – pp. 833-877.*

РЕЗЮМЕ

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Деякі прикладні аспекти визначення ринкового рівня прибутковості

Здійснено спробу визначення ринкового рівня прибутковості капіталу (премії за ризик) у новосформованій ринковій економіці. Розглядаються деякі супутні специфічні прикладні аспекти. За даними польського ринку капіталів.

РЕЗЮМЕ

Спильнык Ирина, Спильнык Павло

Некоторые прикладные аспекты определения рыночного уровня прибыльности

Предпринята попытка определения рыночного уровня прибыльности капитала (премии за риск) в новосформированной рыночной экономике. Рассматриваются некоторые сопутствующие специфические прикладные аспекты. Использованы данные польского рынка капиталов.