CONSULTANT REPORT

ON ESTIMATION OF EQUITY RISK PREMIUM (TASK 2 AND 3)

MOLDOVA ENERGY REGULATORY PARTNERSHIP

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MOLDOVA ENERGY REGULATORY PARTNERSHIP

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Executive Summary

This Report sets out to provide answers for Task 2 and 3 of the Terms of Reference. Task 2 is assistance in establishment of the rate of return for electricity supply at regulated tariffs activity and task 3 is to illustrate different methods of establishing the rate of return for electricity distribution activity (WACC and other alternative methods). Although not obvious at first, the answer lies in estimating the Equity Risk Premium (ERP) for Moldova. The following section on Objectives provides the basis for that conclusion.

To estimate the ERP nine different methods were utilized. Such methods are commonly accepted within the financial community. The methods are Survey, Country Sovereign Credit Rating, Country Risks Scores, Bond Default Spread, Credit Default Spread (two variations), Equity Market Volatility (two variations) and the Contingent Claims Approach.

Under ordinary circumstances the approach above would be straightforward. Data for most of these are commonly available in the academic literature and it is just a matter of computation. The issue is Moldova has no data to be utilized. Many of these approaches required specific country data. For example, some approaches require an active and liquid stock market. Moldova does have a stock market, but it is so small and illiquid that using statistics based on it would render the calculation inaccurate. The issue then is to find available data that meet the criteria set out by the formulas and are equivalent to Moldova in terms of risk profile. This was a difficult task. From equivalent data on other emerging economies, proxies could be developed and utilized for estimation.

In addition to the above, the basis of the risk free rate needs to be both decided and calculated. It was decided that they US Treasury Bill was the instrument and two periods were calculated using historical data. The first was the long term rate from 1928 to 2014. The second was a ten year rate from 2005 to 2014. The two estimates were 3.5% and 1.4%. The second period is significantly lower than the first and most likely is due to the global economic downturn experience during that period.

The results of the ERP estimation are included within Table 1.

Table 1. Summary of Estimations of Equity Risk Premium

Estimation Model	Equity Risk Premium[1]	Equity Risk Premium[2]	Equity Risk Premium[3]
Survey	19.1%	17.1%	
Country Sovereign Credit	18.8%	16.7%	
Country Risk Scores			15.8%
Bond Default Spread			15.9%
Credit Default Spread (Proxy)	18.5%	16.4%	
Credit Default Spread (Bond Class)	17.5%	15.1%	
Equity Market Volatility[4] (using ERP)			11.9%
Equity Market Volatility[5] (Using US returns)	20.4%	16.8%	
Contingent Claims Approach	23.6%	16.5%	

1. This estimate 1928 to 2014 historical long term US averages.
2. This estimate 2005 to 2014 historical long term US averages.
3. This measure has no clear distinctions as to underlying assumptions and a base.
4. This estimate is problematic. See discussion in section on calculation.
5. An alternative method

The answer for **Task 2** would be simply the following equation

If we take an average of the above table at 17%, then the answer to task 2 is as follows:

$$\textbf{Equity Risk}_m = R_f + R_f + ERP_m$$

Where
R_f = risk free rate in US (1.4%)
R_f= risky rate in US (8.0 %)
ERP_m =equity risk premium for Moldova (table 1) =17%

$$\textbf{Equity Risk}_m = 1.4\% + 8.0\% + 17\% = 26.4\%$$

As to the answer of **Task 3** the following formula applies:

$$\textbf{WACC}_m = .65\% * (\textbf{Equity Required Rate of Return}_m) + .35\% * (\textbf{Cost of Debt (7.5\%)})$$

Where
Equity Required Rate of Return_m = 26.4%.

Objectives

Within this Report will be the answers to Task 2 and 3 of the Terms of Reference. As it read the tasks are

> **Task 2: Assistance in establishment of the rate of return for electricity supply at regulated tariffs activity.**
>
> **Task 3. Different methods of establishing the rate of return for electricity distribution activity (WACC and other alternative methods).**

At first glance these two tasks appear to be disparate. In reality, the Weighted Average Cost of Capital. (WACC) is just a simple average of numbers. It is both common financial knowledge and written within the Tariff Methodology of ANRE. Using the exact formula of ANRE, the following illustration will demonstrate.

$WACC_m$ = .65% * (Equity Required Rate of $Return_m$) + .35% * (Cost of Debt (7.5%))

Within this equation a couple of points should be noted. First, there are only two types of funding within any given company: the equity and the debt. Within equity you can have different components and likewise with debt you can have different types. Second, all sides have agreed that the cost of debt is 7.5%. The only variable left is the Equity Required Rate of Return.

For Moldova, the Equity Required Rate of Return is defined as the following;

Equity Required Rate of $Return_m$ = Equity Required Rate of $Return_d$ + Equity Risk $Premium_m$

Where

Equity Required Rate of $Return_d$ the return found in develop countries (around 9.4%)

Equity Risk $Premium_m$ is the additional rate of return required to compensate an investor to accept the additional risk of investing in Moldova.

The common theme to both tasks is that unknown is the Moldovan Equity Rate of Return which to achieve you need to estimate the Moldovan Equity Risk Premium (ERP). The bulk of the work for these two tasks is in fact the estimation of the ERP. What is important is that once estimated the required rate of return within Moldova can be applied to everything that ANRE regulates. It is an important number.

Key Findings

Finding an equity risk premium for Moldova is a critical issue for ANRE. It is a direct input into the tariff methodology used and is the most subjective input as well. Because of the ongoing tariff debate with Union Fenosa, the result will be highly scrutinized by some very capable people at the privately owned

distribution network. Because this factor ANRE requested an answer as soon as possible and make sure it was completely definable in the public area. The way to accomplish such a task is to present many variations of estimate. This was accomplished and the results are included within table 1.

The decision of how to interpret the table will be left to ANRE. On average the ERP seems to center around 17%, but enough information has been provided for ANRE to decide what method they would like to use.

Types of Risk

The economic risk in equities as a class comes from more general concerns about the health and predictability of the overall economy. Put in more intuitive terms, the equity risk premium should be lower in an economy with predicable inflation, interest rates and economic growth that in one where these variables are volatile. When you invest in equities, the risk in the underlying economy is manifested in volatility in the earnings and cash flows reported by individual firms in that economy. Information about these changes is transmitted to markets in multiple ways.

A second type of risk is informational differences. In emerging markets, there may be limitations to the amount of information that reaches investors. Such limitations are another reason investors demand larger risk premiums. After all, markets vary widely in terms of transparency and information disclosure requirements. Markets like Russia, where firms provide little (and often flawed) information about operations and corporate governance, should have higher risk premiums than markets like India, where information on firms is not only more reliable but also much more easily accessible to investors.

A third type of risk is lack of liquidity. In addition to the risk from the underlying real economy and imprecise information from firms, equity investors also have to consider the additional risk created by illiquidity. If investors have to accept large discounts on estimated value or pay high transaction costs to liquidate equity positions, they will be pay less for equities today (and thus demand a large risk premium). A case of this was on May 10, 2010 the US stock market experience a "flash crash" that suddenly created a trillion dollar loss in market value in 36 minutes.

There is the probability of catastrophic risk. When investing in equities, there is always the potential for catastrophic risk, i.e. events that occur infrequently but can cause dramatic drops or total elimination of wealth. Examples include wars, long term economic depressions, nationalization of the private sector, public unrest, government overthrows, and natural and manmade disasters. Moldova's next door neighbor Ukraine provides an excellent example. Starting with Chernobyl in 1986, the fall of Communism in 1991 (which impacted all FSU countries, the economic instability including periodic disruption in gas flows, the Orange Revolution, the invasion of Crimean by Russia and now the ongoing war in the East, Ukraine has seen a host of change. The possibility of catastrophic events occurring may be low, but they cannot be ruled out and the equity risk premium has to reflect that risk.

The prevailing wisdom, at least until 2008, was that while government policy affected equity risk premiums in emerging markets, it was not a major factor in determining equity risk premiums in developed markets. The banking crisis of 2008 and the government responses to it have changed some minds, as both the US government and European governments have made policy changes that at times have calmed markets and at other times roiled them, potentially affecting equity risk premiums.

Finally, there is the age old factor of irrational behavior. Investors do not always behave rationally, and there are some who argue that equity risk premiums are determined, at least partially, by quirks in

human behavior. An example of this was "Black Friday" when in October 1986 the US market lost 23% of its value in one afternoon and trading was halted until a more rational mindset could be established.

Importance to a Utility

Regulated monopolies, such as utility companies, are often restricted in terms of the prices that they charge for their products and services. The regulatory commissions that determine "reasonable" prices base them on the assumption that these companies have the opportunity to earn a fair rate of return for their equity investors. To come up with this fair rate of return, they need estimates of equity risk premiums; using higher equity risk premiums will translate into higher prices for the customers in these companies.

Risk Free Rate

In the rest of the Report, many references will be made to the risk free rate. In most academic research related to the estimating of Equity Risk Premiums the results from the US Treasury bill and bond market are used. Such a rate has been calculated for the benefit of the reader. Two different versions have been presented in table 2. The first version is from 1928 to 2014. Such a long period normally accounts for many business cycles. The yields are 3.53% for treasury bills and 5.53% for treasury bonds.

ANRE assumes a ten year period for estimation purposes. That represents the period 2005 to 2014. The average yields are 1.44% and 7.54%. The large difference between the two estimates (1928 to 2014 vs. 2005 to 2014) implies a steeper yield curve in the last decade. From an analytical standpoint and given the length of business cycles, the most conservative estimate would lean towards using the lower term yield curve estimation. The issue is that during the 2005-2014 period, the yield on treasuries experience very rapid and extreme behavior. The yields went from 1.96% (2006) to 20.16% (2008) and then to negative 9.10% (2013). This excess volatility in such short time period leads one to believe the economic period underlying the estimation period was an aberration. Having said that, increased globalization during that period could represent a structure shift from the global economy as debt yields adapt to the information age. From a conservative aspect it is recommended to revert to the mean reversion model so that long term trends would prevail.

Table 2. Estimated Risk Free Rates

Period	US Treasury Bill	US Treasury Bond
1928-2014 Mean	3.53%	5.53%
1928-2014 High	14.30%	32.81%
1928-2014 Low	0.03%	32.81%
2005-2014 Mean	1.44%	7.54%
2005-2014 High	4.68%	20.10%
2005-2014 Low	0.03%	-9.10%

Estimation Approaches[1]

Survey Premiums

If the equity risk premium is what investors demand for investing in risky assets today, the most logical way to estimate it is to ask these investors what they require as expected returns. Since investors in equity markets number in the millions, the challenge is often finding a subset of investors that best reflects the aggregate market. In practice, peoples' opinions are responsive to recent economic news and with survey estimates generally increase after positive economic periods and decrease after declines.

As a point of reference with surveys, appendix table 1 lists one survey that included 56 countries and was completed in 2013. Most countries are highly developed. However, relating some of them to their actual country ratings reveals some interesting points. Table 3 does the comparison. Although no country is rated at Moldova's B3 Moody's rating, 4 are slightly higher and 4 are lower. This provides valuable information as to where Moldova may lie with its ERP. As for the four countries that are higher, the country risk premium averages around 7.4%. For the 4 countries that are actually lower than Moldova the country risk premium averages 7.8%. The overall average is 7.6%.

The calculation is performed to determine the ERP. The ERP in this case is simply the estimated ERP plus equity returns in the US. Starting with the historical long term average equity returns (11.5%), the equity required rate of return for the four countries with slightly better risk profiles in the range of 18.4 to 19.2%. For the countries with lower credit rating the ranging is 17.8 to 21.4%. As to using the 10 year average according to ANRE regulatory process, the upper four countries range from 16.3 to 17.1%. The lower countries range from 15.7 to 19.3%. The specific averages are 19.1% and 17%.

Table 3. Estimated Risk Premium for Subset of 56 Countries

Country	Moody Country Rating	Country Risk Premium	Equity Risk Premium (Long Term)[1]	Equity Risk Premium (10 Year)[2]
Kazakhstan	Baa1	7.5%	19.0%	16.9%
Brazil	Baa2	7.7%	19.2%	17.1%
Russia	Ba1	7.5%	19.0%	16.9%
Nigeria	Ba3	6.9%	18.4%	16.3%
Moldova	B3			
Argentina	Caa1	9.9%	21.4%	19.3%
Egypt	Caa1	7.6%	19.1%	17.0%
Greece	Caa1	7.4%	18.9%	16.8%
Pakistan	Caa1	6.3%	17.8%	15.7%

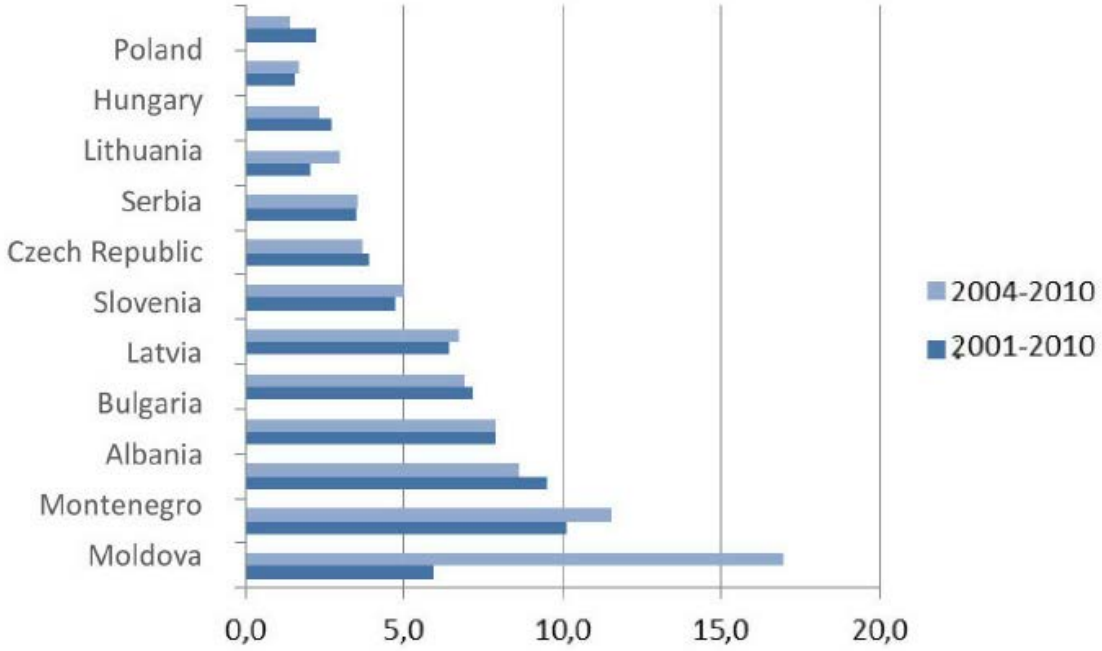
[1] There is a general criticism of all measures of country risk. Saying that they assume that the country risk is the same for all firms and for all projects. The truth is that the country risk is not the same for all firms and all projects. Some segments of the economy can be less risky than others, and some parts of the project may not be exposed to risk.

6. This estimate is calculated by adding the (1928-2014) equity premium of the US (11.5%).
7. This estimate is calculated by us the (10 year) equity premium of the US (9.4%).

Source. Appendix Table XX and authors calculations.

The World Bank/IMF estimated the ERPs for a number of countries within the region. Results are included within table 4. Examining only the most recent estimate 2004-2010 we find that Moldova has the highest estimate regionally with an ERP approaching 17%. The next highest is Montenegro at 10%. As to the reasons why there is such a large difference, that would require a lengthy and in-depth analysis of the economy relative to the others countries and that is beyond the purpose of this Report. It is important to note that both the IMF's estimate and the estimates calculated below in table 3 are similar. This serves as a validation of the estimate's calculation.

Table 4. Estimated Risk Premiums for the World Bank/IMF



Source: Joint Staff Advisory Note on the Poverty Reduction Strategy Paper (National Development Strategy: "Moldova 2020"). 2012-2020. August 2013

Country's Sovereign Credit Rating (S&P, Moody's, Fitch)[2]

Moody's assessment of Moldova is the country has very low economic strength which is driven by (i) very low GDP per capita; (ii) the small scale of the economy; (iii) high dependence on workers' remittances; and (iv) limited future growth potential. Moldova's low institutional strength reflects (i)

[2] Naumoski, Aleksandar. Estimating the Country Risk Premium in Emerging Markets. The Case of Macedonia in Financial Theory and Practice. 36 (4) 413-434 (2012)

weak government effectiveness; (ii) corruption; (iii) lack of transparency and (iv) country-specific factors. The latter is mainly the unresolved Transnistria conflict and weaknesses in the political system.

Moldova's moderate level of government financial strength reflects relatively sound fiscal metrics such as a low government debt-to-GDP ratio, low debt servicing costs as well as the positive momentum for financial reform. However, Moody's notes that government financial strength is constrained by the country's limited access to external liquidity.

The sovereign credit rating of a country that is assigned by the credit rating agencies can be converted into a country risk premium. See appendix table 2 for the various rating services and comparisons. For each sovereign credit rating, there is a typical default spread implied by Moody's sovereign rating. This is a measure of the country credit risk rather than equity risk. But considering that both risks are to some extent influenced by the same factors (currency stability, budget and trade balance, political stability), this measure can be considered as the approximate correct measure of country risk if adjust following a similar procedure as the survey methodology. This measure is focused on default risk and ignores the rest of the factors that could influence the equity market.

For Moldova, with Moody's Investor Services the rating is B3. Table 5 presents the relationships. If one looks at it from a corporate bond approach, the answer lies within the premium of 7.34% above the risky return. To get to the ERP one needs to add back in the developing market risky rate. We are using two estimates within the Report, 1928-2014 historical US equity returns (11.5%) and 2005-2015 historical US equity returns (9.4%). The estimate for ERP becomes 18.8% and 16.7%

The other two rating services do not provide a rating for Moldova. There exists the possibility to convert the rating to Standard and Poor and Fitchs, but little will be gained as the answer will remain the same. The rating implies that Moldova is a risky investment (similar to junk bond type) and little manipulation into different ratings services will change that fact.

Table 5. Default Spreads by Ratings Class – Sovereign vs. Corporate in January 2013

Moody's rating	*Sovereign Bonds/CDS*	Corporate Bonds
Aaa/AAA	0.00%	0.40%
Aa1/AA+	0.25%	0.57%
Aa2/AA	0.50%	0.73%
Aa3/AA-	0.70%	0.78%
A1/A+	0.85%	0.82%
A2/A	1.00%	0.95%
A3/A-	1.15%	1.31%
Baa1/BBB+	1.50%	1.55%
Baa2/BBB	1.75%	1.84%
Baa3/BBB-	2.00%	2.28%
Ba1/BB+	2.40%	3.12%
Ba2/BB	2.75%	3.97%
Ba3/BB-	3.25%	4.81%
B1/B+	4.00%	5.65%
B2/B	5.00%	6.49%
B3/B-	6.00%	7.34%
Caa1/ CCC+	7.00%	7.75%
Caa2/CCC	8.50%	8.75%
Caa3/ CCC-	10.00%	10.00%

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Source: Damodaran, A., 2013. Equity Risk Premiums (ERP): Determinants, Estimation and Implications – The 2013 Edition. [http://ssrn.com/abstract=1769064].

Country Risk Scores

Specialized firms and agencies provide comprehensive numerical country risk scores. They evaluate the degree of risk for each country using a methodology that aims at developing a holistic approach to country risk. They assess the general investment climate for any kind of foreign investor and rank the countries based on their respective degree of risk. Examples include the Geneva-based firm, Business Environment Risk Intelligence (BERI), Nord Sud Export (NSE), Political Risk Services (PRS), which publishes its International Country Risk Guide (ICRG), and the Economist Intelligence Unit (EIU). The country risk score provided by these services is a comprehensive measure of the country risk considering the economic fundamentals of each country.

Thus, Political Risk Service (PRS group) takes into consideration political, economic and financial risk indicators to construct a composite measure of country risk. These services express country risk

numerically, usually on a scale from 0 to 100. Moldova currently scores within the 62-65 range. Table 6 provided the details of several countries risk scores.

In a research paper[3] an equation was developed to estimate the cost of capital based on the ranking of the country. The statistics relationship is as follows;

$$ERP = .3125 - .0025(Rating)$$
$$R^2 = .43$$

Using a score of 65 the estimated ERP in Moldova is 15.75%.

Table 6. Country Risk Scores from the PRS Group – 2014

[3] Harvey, C.R., *Country Risk Components, the Cost of Capital, and Returns in Emerging Markets*, Working paper, Duke University. (2004)

Risk range	Countries
<45	Sudan
	Somalia
	Guinea
45-50	Syria
50-53	Zimbabwe
	Congo, DR
	Niger
53-56	Korea, DPR
	Malawi
	Pakistan
	Uganda
56-59	Venezuela
	Egypt
	Belarus
	Ethiopia
	Iran
	Liberia
59-62	Yemen
	Haiti
	Mozambique
	Serbia
	Gambia
	Ivory Coast
	Iraq
	Kenya
	Togo
	Lebanon
	Mali
	Guinea-Bissau
	Sri Lanka
62-65	Bangladesh
	Nicaragua
	Burkina Faso
	Tunisia
	Guyana
	Sierra Leone
	Nigeria
	Armenia
	Jamaica
	Paraguay
	Papua New Guinea
	Senegal
	Greece
	Moldova
	Turkey

Risk range	Countries
65-68	Myanmar
	Honduras
	Albania
	Tanzania
	Latvia
	India
	Indonesia
	Cuba
	Ecuador
	Madagascar
	Cameroon
	Croatia
	Vietnam
	Cyprus
	Slovenia
	Spain
	Dominican Republic
	Jordan
	Mongolia
	Ukraine
	Guatemala
68-71	Argentina
	Congo
	Ghana
	Hungary
	Portugal
	South Africa
	El Salvador
	Colombia
	Morocco
	Romania
	Bahrain
	Bulgaria
	Estonia
	Thailand
	Bolivia
	Italy
	Portugal

Risk range	Countries
71-74	Algeria
	Azerbaijan
	Ireland
	Namibia
	Zambia
	Angola
	Israel
	Kazakhstan
	Panama
	Brazil
	France
	Russia
	Philippines
	Lithuania
	Slovakia
	Costa Rica
	Peru
	Czech Republic
	Suriname
	United Kingdom
74-77	Mexico
	Libya
	China
	Bahamas
	Malta
	Poland
	Uruguay
	United States
	Belgium
	Gabon
	Malaysia
77-80	Chile
	Austria
	Australia
	Botswana
	Iceland
	Trinidad & Tobago
	Japan

Risk range	Countries
80-83	Hong Kong
	Netherlands
	Finland
	Korea, South
	Denmark
	Kuwait
	Saudi Arabia
	New Zealand
	Taiwan
	UAE
	Qatar
	Oman
83-86	Canada
	Germany
	Sweden
86-89	Singapore
	Brunei
	Luxembourg
89-92	Switzerland
	Norway

Source: **Political Risk Service (PRS)**

Bond Default Spread

In contrast to sovereign credit by agencies, market based measures instantly reflect market changes and have a wider scope. Market-based spreads of bonds openly traded within liquid markets will reflect the risk associated with them instantly. The concept is to calculate the spread between the yield to maturity of an emerging market sovereign bond denominated in USA dollars or Euros, and the yield of a comparable USA or Euro bond, respectively. Both securities must be issued in the same currency and have equal maturity. Sovereign bond spreads are widely considered a comprehensive measure of a country's overall risk premium, stemming from market, credit, liquidity, and other risks. The biggest problem related with both measures is the lack of data as most emerging countries have not issued such bonds.

Given that is the situation in Moldova, a different approach using proxies was applied. Table 7 provides the raw data. The proxy is the bond spread for different risk levels of publically traded bonds. Moldova country risk was rated B3 by Moody's. In this estimation it is implied that country risk is equivalent to bond risk. To calculate the risk one takes the ratio of the rate of return on the risky bond (for Moldova this is 6.5%) to the estimate of the highest grade (AAA which is .4%).

$$ERP = (1 + \text{Risky Bond Yield} / 1 + \text{AAA Bond Yield}) - 1$$

The results are again in line with previous levels and methods. B3 rated bonds required a yield of 15.9%.

Table 7. Bond Default Spreads – 2014

Bond Rating	Spread	Ratio of Risk Bond to AAA Rated Bonds	Equity Risk Premium (Ratio less 1)
Aaa/AAA	0.40%	1.00	0.0%
Aa2/AA	0.70%	1.75	0.8%
A1/A+	0.80%	2.00	1.0%
A2/A	0.90%	2.25	1.3%
A3/A-	1.00%	2.50	1.5%
Baa2/BBB	1.50%	3.75	2.8%
Ba1/BB+	2.60%	6.50	5.5%
Ba2/BB	3.50%	8.75	7.8%
B1/B+	5.00%	12.50	11.5%
B2/B	5.75%	14.38	13.4%
B3/B-	6.75%	16.88	15.9%
Caa/CCC	8.00%	20.00	19.0%
Ca2/CC	9.00%	22.50	21.5%
C2/C	10.00%	25.00	24.0%
D2/D	12.00%	30.00	29.0%

Source. BondsOnline (http://www.bondsonline.com); FT Interactive Data and authors calculations.

Credit Default Swap Spread

The credit default swap spread (CDS) market has grown rapidly in recent years. The default spreads driven from the CDS markets are more updated and more precise than bond default spreads. But they are also more vulnerable and sensitive to market information and in some cases they move irrationally. Under normal market conditions, CDS spreads are a very useful source of information on country risk as they are flexible enough to capture changes in the relevant set of information and seem to do so earlier than changes in country credit ratings.

There are two ways to use the CDS to estimate risk. The first to find a representative set of countries with similar country risk and use a proxy. That approach is used in table 8. The second approach is the average CDS spreads across a relative bond class. That approach is demonstrated in table 9. In both cases, the CDS are added to the equity return of the US. Two periods are used for the equity returns – 1928-2014 and 2005-2014.

Table 8 examines the proxy method. The CDS spreads on the proxy countries are highly variable. In addition only one country – Cyprus – has the same rating as Moldova. The best approach to calculating the ERP for Moldova is to take an average. The results are 18.5% for 1928-2014 average US equity return and 16.4% for the 2005 -2014 average US equity return. Once again we achieve comparable results as previous estimates.

The second approach to examine average bond classes. Given that Moldova is rated B3 by Moody's, the estimated ERP are 15.5% and 13.4%. These results are lower and may reflect the averaging technique used by bond class to get the CDS estimate.

Table 8. Credit Default Spreads Using Proxy – 2014

Country	Moody's Bond Rating	Credit Default Premium	ERP[1]	ERP[2]
Argentina	Caa1	13.1%	24.6%	22.5%
Cyprus	B3	6.6%	18.1%	16.0%
Egypt	Caa1	5.8%	17.3%	15.2%
Lebanon	Caa1	4.7%	16.2%	14.1%
Pakistan	Caa1	7.9%	19.4%	17.3%
Tunisia	Ba3	4.2%	15.7%	13.6%
Venezuela	Caa3	6.6%	18.1%	16.0%

1. This estimate is calculated by adding the (1928-2014) equity premium of the US (11.5%).
2. This estimate is calculated by adding the (10 year) equity premium of the US (9.4%).

Source. Appendix Table 3 and authors calculations

Table 9. Credit Default Spreads Using Bond Class - 2014

Moody's Bond Rating	**Credit Default Premium**	**ERP[1]**	**ERP[2]**
Aaa	0.00%	11.5%	9.4%
Aa1	0.25%	11.8%	9.7%
Aa2	0.50%	12.0%	9.9%
Aa3	0.70%	12.2%	10.1%
A1	0.85%	12.4%	10.3%
A2	1.00%	12.5%	10.4%
A3	1.15%	12.7%	10.6%
Baa1	1.50%	13.0%	10.9%
Baa2	1.75%	13.3%	11.2%
Baa3	2.00%	13.5%	11.4%
Ba1	2.40%	13.9%	11.8%
Ba2	2.75%	14.3%	12.2%

Ba3	3.25%	14.8%	12.7%
B1	4.00%	15.5%	13.4%
B2	5.00%	16.5%	14.4%
B3	6.00%	17.5%	15.4%
Caa1	7.00%	18.5%	16.4%
Caa2	8.50%	20.0%	17.9%
Caa3	10.00%	21.5%	19.4%

1. This estimate is calculated by adding the (1928-2014) equity premium of the US (11.5%).
2. This estimate is calculated by adding the (10 year) equity premium of the US (9.4%).
   Source. Damodaran, Aswath, Equity Rick Premium (ERP):Determinants, Estimation and Implications – 2014 Edition (March 23, 2014) and authors calculations.

Equity Market Volatility

Equity market volatility can be considered a good measure of country risk. Thus, emerging markets have higher volatility than developed markets. This is correct, but there is another problem related to the liquidity of emerging equity markets. That is, market volatility is to a large extent a function of market liquidity. Markets that are risky and illiquid often have low volatility.

One market could be very risky, but due to low liquidity in some period, volatility could be understated and, by contrast, volatility could be overstated in a period of great liquidity.

If we assume a linear relationship between market risk premium and standard deviation of returns on the stock market, then the country risk premium of emerging countries can be written as:

$$ERP_{country\ X} = ERP_{USA} * \sigma_{country\ X}/\sigma_{USA}$$

Here, $ERP_{country\ X}$ is a equity risk premium for an emerging country, ERP_{USA} is the market risk premium in the USA as representative of a mature market, $\sigma_{country\ X}$ and σ_{USA} are the measures of the volatility of the stock markets in the emerging market and developed market respectively, and $\sigma_{country}$ / σ_{USA} is the relative standard deviation which should reflect the difference that would correct the risk premium in a developed country; here a benchmark is the USA stock market, to get the risk premium in emerging market.

Since Moldova's stock market is uncertain due to its low volume one has to develop proxies with countries of similar risk. Table 10 presents such a table. There are some serious issues with the data. The subset of countries used are all rated Caa1 by Moody's. They are in default on government issued debt. With this existing situation, their stock markets are probably illiquid due to lack of international investor interest. Such a situation implies a low volatility in stock prices. In addition, three of the countries either are or have experienced an internal war. Cyprus and Egypt were recent and Ukraine is ongoing.

I have provided an estimate and it averages 11.9%. When compared to other estimates it is an outlier and I would disregard.

Table 10. Equity Market Estimation

Country	Standard Deviation of Stock Market ($\sigma_{country\ X}$)	Ratio to US Market $\sigma_{country\ X}/\sigma_{USA}$[1]	ERP[2]
Argentina	31.0%	1.76	9.5
Cyprus	67.8%	3.83	20.7
Egypt	25.18%	1.43	7.7
Greece	37.7%	2.13	11.5
Ukraine	32.3%	1.83	9.9

1. US is estimated at 17.67%
2. Estimated ERP for US is 5.4 (2014). See Fernadez, Linares and Acin. IESE Business School (2014).

Source of Data: Appendix table 4 and authors calculations.

By working with the data there is an alternative method I would use that would give acceptable answers. The alternative is as follows;

$$ERP_{country\ X} = Stock\ Market\ Return_{USA} * \sigma_{country\ X}/\sigma_{USA}$$

Removing Cyprus and changing the formula we get table 11. The ERP using the long term (1928-2014) US stock returns yields (11.5%) an ERP average of 20.4% and using the ten year average in US stock returns (9.4%) gives an ERP average of 16.8%. This is more in line with previous estimates.

Table 11. Adjusted Equity Market Estimation

Country	Standard Deviation of Stock Market ($\sigma_{country\ X}$)	Ratio to US Market $\sigma_{country\ X}/\sigma_{USA}$[1]	ERP[1]	ERP[2]
Argentina	31.0%	1.76	20.1	16.5
Egypt	25.18%	1.43	16.3	13.4
Greece	37.7%	2.13	24.3	20.0
Ukraine	32.3%	1.83	20.9	17.2

1. US is estimated at 17.67%.
2. This estimate is calculated by adding the (1928-2014) equity premium of the US (11.5%).
3. This estimate is calculated by adding the (10 year) equity premium of the US (9.4%).

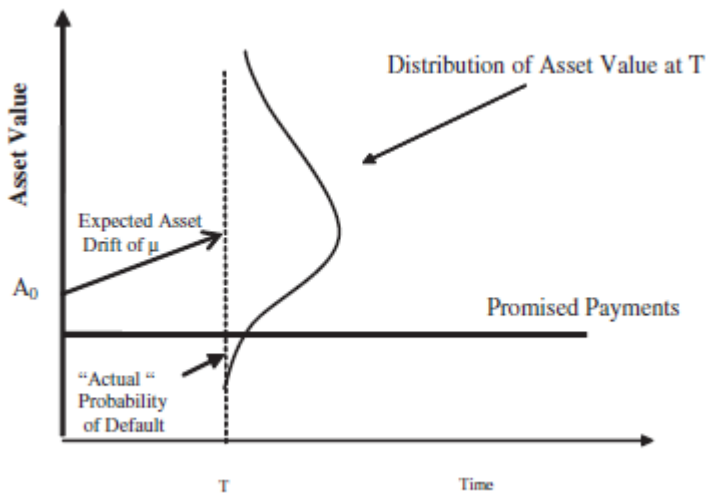
Source of Data: Appendix table 5 and authors calculations.

Contingent Claims

The ability of a country to service foreign debt obligations is based mostly on its fundamentals, such as the relative size of its debt, its expected future revenues, its expected GDP growth rates and many other variables including inflation, exchange rates and domestic interest rates. Therefore, implicit in our analysis is that fact that if a country is able to pay its obligations, it will be willing to do so.

Before examining the details of the calculation, it would be first helpful to examine the intuitive background of the approach. Figure 1 examines this question. The value of the debt depends on four variables; the asset value of the firm, the value of the debt, the time until the debt is due to be paid and the volatility of the value of the over time. In order for the Company to pay the debt we assume that the value of the firm exceeds the value of the debt. Otherwise the Company will default and the lender gets nothing. We assume the value of the Company will follow a normal distribution over time and the spread of that normal distribution is determined by the volatility.

Figure 1. Probability Distribution of Asset Value in Relation to the Promised Payments



Source: Gray, D., R. Merton and Z. Bodie. Contingent Claims Approach to Measuring and Managing Sovereign Credit Risk. Journal of Investment Management, Vol. 5, No. 4 (2007)

The value of the debt will the book value of the loan assuming full payment less a default risk premium the assets the assets will fall below the face value of the debt and default will occur. The critical point is to measure the default risk premium for that will be the measure of the equity risk premium. The value of the default risk premium will be the value of an option called a European put.

Having present the logic behind the valuation the next step is to present the mathematics. The total market value of assets at any time, t , is equal to the market value of the claims on the assets, equity and risky debt maturing at time T :

$$\text{Assets} = \text{Equity} + \text{Risky Debt}$$
$$A(t) = J(t) + D(t)$$

Company value *A(t)* is stochastic and in the future may decline below the point where debt payments on scheduled dates cannot be made. The equity can be modeled and calculated as an implicit put option on the assets, with an exercise price equal to the promised payments, *B*, maturing in $T - t$ periods. The risky debt is equivalent in value to default-free debt minus a default risk premium. This guarantee can be calculated as the value of a put on the assets with an exercise price equal to *B*.

$$\text{Risky Debt} = \text{Default-Free Debt} - \text{Debt Guarantee}$$
$$D(t) = Be^{-r(T-t)} - P(t)$$

Where
D(t) = Value of the Debt
B is the promised payment at time T
P(t) is the default risk premium

The value of the equity is computed using the Black-Scholes-Merton formula for the value of a put:

$$J = AN(d_1) - Be^{-rT}N(d_2)$$

Where

$$N(d_1) = \frac{\ln(A/B) + (r + \sigma/2)(T-t)}{\sigma\sqrt{T}}$$

$$N(d_2) = \frac{\ln(A/B) + (r - \sigma/2)(T-t)}{\sigma\sqrt{T}}$$

$$= d_1 - \sigma\sqrt{T}$$

r is the risk-free rate.
σ is the value of the Company's volatility.
$N(d_1)$ is the cumulative probability of the standard normal density function below *d*.
$N(-d_2)$ is the "risk-neutral" or "risk-adjusted" default probability.
$N(d_1) - \sigma\sqrt{T}$ is the formula for the "delta" of the put option.
(A is also called the spot price and B the strike price).

The next step is to translate this into an equity risk premium of the country. The following table defines the parameters according country wide scenario.

Table 12. Black Schole's Inputs

Black Scholes Variable	Country Parameter	Estimate
Spot Price (A)	Value Discounted fiscal surpluses	US$ 3.6 billion[1]
Strike Price (B)	Foreign net government debt	US$ 1.9 billion [2]
Volatility (σ)	Implied 1 year call options on reference currency	20% [3]
Maturity (T – t)	Weighted Average Duration of the Debt	3 years [4]
Risk Free Rate	Equivalent maturity US Treasury yield	3% [5]

[1] Growth in GDP estimated at 3% and government surplus estimated at 3% of GDP. Discount rate is 8%.
[2] International Monetary Fund and National Bank of Moldova.
[3] Calculated as the standard deviation on the 2014 changes in the Moldova currency.
[4] National Bank of Moldova.
[5] Long Run average of US Treasury.

Source. Ades, D. Determining Country Risk Premiums for Emerging Market Countries: A Modified Contingent Claim Analysis. Master's Thesis (2003).

To make this estimate work, the GOM has to have positive cash flow and surpluses to fund repayment of the debt. Currently the GOM is operating at a deficit of 1.5% and the National Debt is growing. To overcome this problem we have just assumed starting next year the fiscal situation with the GOM will change and in its place growth in GDP estimated at 3% and GOM surplus 3% of GDP. Two scenarios. The first is using long term 1928-2014 risk free rate of 3.5% and the second using 2005-2014 risk free rate of 1.4%.

Using a Black Schole's calculator available on the internet (www.mystockoptions.com/black-sholes.cfm) the estimate using 1928-2014 average risk free rate is 23.6%. If the 10 years averages are used, then the estimate is 16.5%.

Conclusion and Next Steps

Table 1 provides the conclusion for ANRE. The body of the paper provides the details of how the estimates for the ERP were calculated. ANRE is welcome to use any scenario or a combination that fits their needs.

One of the critical factors underlying many of these estimations is the Moody's Bond Rating. Using various countries as proxies there was a pattern developed on similar countries. Most of the proxies countries tended to have either major financial issues (such as a default on debt or corruption) or major conflicts they are either involved with or within the region. Moldova's rating was B3. Although the issues with both Transnistria and the regional political instability inside eastern Ukraine play a role, there are a number of indicators that Moldova should be ranked higher than the B3. To establish this fact would require a significant analytical work beyond the scope of this Task. However, there is a strong case to be made that Moldova's is progressive on many fronts within the economy and the achievement

are not reflected in the B3 rating. This is just an observation from the analytic work within the scope Task 2 and 3.

What is important to understand is the ERP can be extended to any investment in Moldova, not just electricity. The estimations provided will help ANRE in other aspects of their regulatory activity. This would include gas and CHP's.

As for next steps the current methodology for tariffs needs to be evaluated. ANRE has more options under the CAPM model for which they currently utilize. These options should be investigated into more detail and the options presented to ANRE tariff staff and management.

Appendices

Appendix Table 1. Estimated Credit Risk Premium for 56 Countries

	Average	Median	St. Dev.	Q1	Q3	P10%	P90%	Max.	Min.	Number of answers
United States	5.5	5.0	1.7	4.5	6.0	4.0	7.0	15.0	1.5	1,503
Spain	5.9	5.5	1.6	5.0	6.0	4.5	8.0	15.0	1.5	930
United Kingdom	5.3	5.0	2.2	4.0	6.0	4.0	7.2	22.0	1.5	112
Italy	5.5	5.0	1.4	4.6	6.1	4.0	7.2	10.0	2.0	76
Germany	5.4	5.0	1.4	4.5	6.1	4.0	7.2	12.4	3.0	71
Mexico	7.3	6.4	2.7	5.9	9.1	5.0	10.2	16.0	1.4	56
Netherlands	5.5	5.0	1.9	4.4	6.2	3.9	7.2	12.5	2.5	48
France	6.0	6.0	1.5	5.0	7.0	4.8	7.2	11.4	2.0	45
Switzerland	5.7	5.5	1.3	5.0	6.6	4.0	7.2	9.6	3.8	44
Australia	5.8	5.2	1.9	5.0	6.0	4.0	7.1	14.0	3.0	40
Colombia	7.5	7.0	4.3	5.5	8.0	2.0	14.6	20.5	2.0	38
Sweden	5.9	5.5	1.4	5.0	7.2	4.8	7.2	10.6	3.9	38
Russia	7.5	6.5	3.7	5.5	8.0	5.0	11.0	25.0	1.3	37
Canada	5.9	5.0	2.1	5.0	6.0	4.0	8.0	14.5	3.5	36
Brazil	7.7	7.0	4.6	5.3	8.0	4.3	10.5	30.0	1.5	35
Greece	7.4	7.2	2.7	5.0	8.3	5.0	11.7	15.0	3.0	34
South Africa	6.3	6.0	1.5	5.6	6.5	5.0	7.0	11.8	4.5	34
Argentina	9.9	9.0	3.4	8.0	11.0	7.2	14.6	20.0	5.0	33
Portugal	6.5	6.1	1.7	5.0	7.2	5.0	7.2	14.0	4.5	33
Austria	6.0	5.7	1.8	5.0	7.2	4.6	7.2	14.3	3.5	32
Belgium	6.1	6.1	1.0	5.0	7.2	5.0	7.2	8.0	5.0	31
Chile	5.7	5.3	2.1	5.0	6.0	5.0	6.5	15.0	1.3	31
China	9.4	7.8	5.1	6.5	10.7	6.0	14.5	30.0	4.0	31
Norway	5.5	5.0	1.6	4.5	6.0	4.0	7.0	11.7	3.5	30
India	8.5	7.8	2.8	6.8	9.3	6.0	13.1	16.0	5.0	28
Poland	6.2	6.0	1.1	5.2	7.5	4.9	7.5	8.0	4.5	28
Turkey	8.1	8.2	3.0	5.5	10.0	5.0	11.2	15.0	2.5	25
Luxembourg	6.1	6.1	1.3	5.0	7.2	4.5	7.2	8.7	4.5	21
Czech Republic	6.1	6.0	0.9	5.5	6.5	5.0	7.3	8.0	5.0	19
Peru	7.8	7.5	2.8	6.6	7.7	5.4	10.0	15.0	3.5	19
Finland	5.4	4.7	2.0	4.5	5.0	4.5	7.4	12.0	3.5	18
Israel	5.6	5.0	1.7	4.5	6.0	4.3	7.4	10.0	3.0	17
New Zealand	6.0	6.0	1.0	5.0	6.8	5.0	7.2	7.5	5.0	17
Taiwan	8.9	8.0	3.8	6.0	10.0	6.0	13.4	20.0	5.8	17
Indonesia	7.3	7.5	2.3	5.6	7.5	5.0	10.8	12.0	4.5	14
Japan	5.0	3.5	3.7	3.5	5.0	3.2	7.1	16.7	2.0	14
Korea (South)	6.4	6.5	2.5	6.5	7.0	2.6	8.8	11.1	2.0	13
Denmark	5.4	4.5	3.3	4.4	4.5	3.1	9.3	14.0	2.0	12
Egypt	7.6	7.0	2.3	7.0	7.6	6.6	10.4	13.0	3.5	12
Ireland	6.0	5.1	2.2	5.0	5.6	5.0	7.8	12.3	5.0	12
Singapore	5.7	5.0	1.5	5.0	5.8	5.0	7.3	9.6	4.5	11
Hong Kong	6.4	5.0	2.6	5.0	6.0	5.0	10.4	11.9	5.0	9
Hungary	8.0	8.0	2.4	6.0	8.0	6.0	9.2	13.8	6.0	9
Malaysia	4.5	3.5	2.2	3.5	6.0	3.1	6.8	8.8	1.5	9
Thailand	7.9	6.5	2.8	6.5	7.5	6.5	10.2	15.1	6.5	9
Saudi Arabia	6.3	6.0	0.4	6.0	6.6	6.0	6.8	7.0	6.0	8
Nigeria	6.9	6.0	1.6	6.0	7.1	6.0	8.9	10.0	6.0	7
Pakistan	6.3	7.5	2.3	6.3	7.5	3.6	7.5	7.5	1.5	7
Iran	22.9	19.5	17.8	12.0	24.0	8.5	40.8	56.5	7.0	6
Kazakhstan	7.5	7.5	0.1	7.5	7.5	7.5	7.6	7.6	7.5	6
Kenya	6.2	5.0	2.9	5.0	5.0	5.0	8.5	12.0	5.0	6
Kuwait	6.6	6.5	0.2	6.5	6.5	6.5	6.8	7.0	6.5	6
Philippines	5.6	5.5	0.2	5.5	5.5	5.5	5.8	6.0	5.5	6
UAE	9.7	10.0	0.8	10.0	10.0	9.0	10.0	10.0	8.0	6
Zambia	6.6	6.0	1.6	6.0	6.0	6.0	7.9	9.8	6.0	6
Zimbabwe	6.5	5.5	2.4	5.5	5.5	5.5	8.5	11.4	5.5	6

Source: Javier P. F., L. Corres and A. Avendaño Market Risk Premium Used in 56 Countries: A Survey with 6,014 Answers. IESE. April 8, 2013

Appendix Table 2. Comparison of Bond Ratings

S&P	Fitch	Moody's	Numerical Scale
		Investment Grade	
AAA	AAA	Aaa	1
AA+	AA+	Aa1	2
AA	AA	Aa2	3
AA-	AA-	Aa3	4
A+	A+	A1	5
A	A	A2	6
A-	A-	A3	7
BBB+	BBB+	Baa1	8
BBB	BBB	Baa2	9
BBB-	BBB-	Baa3	10
		Speculative Grade	
BB+	BB+	Ba1	11
BB	BB	Ba2	12
BB-	BB-	Ba3	13
B+	B+	B1	14
B	B	B2	15
B-	B-	B3	16
CCC+	CCC+	Caa1	17
CCC	CCC	Caa2	18
CCC-	CCC-	Caa3	19
CC	CC	--	20
C	C	--	21
SD[1]	DDD[3]	Ca[4]	22

Source: Moody's, Standard and Poors and Fitich

Appendix Table 3. Estimate Credit Default Spreads (2013)

Argentina	13.07%	12.40%	Lithuania	1.58%	0.91%
Australia	0.86%	0.19%	Malaysia	1.14%	0.47%
Austria	0.79%	0.12%	Mexico	1.36%	0.69%
Bahrain	2.52%	1.85%	Morocco	2.79%	2.12%
Belgium	1.24%	0.57%	Netherlands	0.83%	0.16%
Brazil	1.44%	0.77%	New Zealand	0.72%	0.05%
Bulgaria	1.41%	0.74%	Norway	0.41%	-0.26%
Chile	0.99%	0.32%	Pakistan	7.90%	7.23%
China	1.02%	0.35%	Panama	1.36%	0.69%
Colombia	1.35%	0.68%	Peru	1.38%	0.71%
Costa Rica	3.91%	3.24%	Philippines	1.59%	0.92%
Croatia	2.99%	2.32%	Poland	1.30%	0.63%
Cyprus	6.55%	5.88%	Portugal	4.93%	4.26%
Czech Republic	0.89%	0.22%	Qatar	1.28%	0.61%
Denmark	0.69%	0.02%	Romania	2.81%	2.14%
Egypt	5.76%	5.09%	Russia	1.82%	1.15%
Estonia	0.95%	0.28%	Saudi Arabia	0.78%	0.11%
Finland	0.60%	-0.07%	Slovakia	1.42%	0.75%
France	1.44%	0.77%	Slovenia	2.59%	1.92%
Germany	0.82%	0.15%	South Africa	2.03%	1.36%
Hong Kong	1.03%	0.36%	Spain	3.14%	2.47%
Hungary	3.16%	2.49%	Sweden	0.41%	-0.26%
Iceland	2.16%	1.49%	Switzerland	0.76%	0.09%
Indonesia	1.81%	1.14%	Thailand	1.43%	0.76%
Ireland	2.54%	1.87%	Tunisia	4.21%	3.54%
Israel	1.61%	0.94%	Turkey	1.79%	1.12%
Italy	3.03%	2.36%	Ukraine	6.51%	5.84%
Japan	1.32%	0.65%	United Kingdom	0.74%	0.07%
Kazakhstan	1.97%	1.30%	USA	0.67%	0.00%
Korea	1.13%	0.46%	Venezuela	6.55%	5.88%
Latvia	1.70%	1.03%	Vietnam	2.74%	2.07%
Lebanon	4.72%	4.05%			

Source: Bloomberg
Spreads are based on 10-year US $ CDS

Appendix Table 4. Country Volatility of Equity Markets

Country	*Std deviation in Equities (weekly)*	*Relative Volatility (to US)*	*Total Equity Risk Premium*	*Country risk premium*
Argentina	31.02%	1.76	10.18%	4.38%
Bahrain	7.76%	0.44	2.55%	-3.25%
Bangladesh	31.24%	1.77	10.25%	4.45%
Bosnia	12.71%	0.72	4.17%	-1.63%
Botswana	4.64%	0.26	1.52%	-4.28%
Brazil	21.62%	1.22	7.10%	1.30%
Bulgaria	13.75%	0.78	4.51%	-1.29%
Chile	14.14%	0.80	4.64%	-1.16%
China	23.79%	1.35	7.81%	2.01%
Colombia	14.31%	0.81	4.70%	-1.10%
Costa Rica	9.52%	0.54	3.12%	-2.68%
Croatia	13.30%	0.75	4.37%	-1.43%
Cyprus	67.75%	3.83	22.24%	16.44%
Czech Republic	19.61%	1.11	6.44%	0.64%
Egypt	25.18%	1.43	8.27%	2.47%
Estonia	17.21%	0.97	5.65%	-0.15%
Ghana	12.48%	0.71	4.10%	-1.70%
Greece	37.72%	2.13	12.38%	6.58%
Hungary	23.26%	1.32	7.63%	1.83%
Iceland	12.69%	0.72	4.17%	-1.63%
India	17.44%	0.99	5.72%	-0.08%
Indonesia	16.40%	0.93	5.38%	-0.42%
Ireland	18.32%	1.04	6.01%	0.21%
Israel	18.21%	1.03	5.98%	0.18%
Italy	30.14%	1.71	9.89%	4.09%
Jamaica	8.25%	0.47	2.71%	-3.09%
Jordan	7.31%	0.41	2.40%	-3.40%
Kazakhstan	23.03%	1.30	7.56%	1.76%
Kenya	13.37%	0.76	4.39%	-1.41%
Korea	19.10%	1.08	6.27%	0.47%
Kuwait	9.04%	0.51	2.97%	-2.83%
Laos	17.69%	1.00	5.81%	0.01%
Latvia	10.30%	0.58	3.38%	-2.42%
Lebanon	6.93%	0.39	2.27%	-3.53%
Lithuania	16.96%	0.96	5.57%	-0.23%
Macedonia	12.66%	0.72	4.16%	-1.64%
Malaysia	9.97%	0.56	3.27%	-2.53%
Malta	8.04%	0.46	2.64%	-3.16%

Appendix Table 4. Country Volatility of Equity Markets (cont)

Mexico	16.58%	0.94	5.44%	-0.36%
Mongolia	22.05%	1.25	7.24%	1.44%
Montenegro	20.23%	1.14	6.64%	0.84%
Morocco	12.08%	0.68	3.97%	-1.83%
Namibia	15.82%	0.90	5.19%	-0.61%
Nigeria	13.20%	0.75	4.33%	-1.47%
Oman	11.07%	0.63	3.63%	-2.17%
Pakistan	13.45%	0.76	4.41%	-1.39%
Palestine	8.36%	0.47	2.74%	-3.06%
Panama	4.01%	0.23	1.32%	-4.48%
Peru	23.33%	1.32	7.66%	1.86%
Philippines	14.96%	0.85	4.91%	-0.89%
Poland	17.54%	0.99	5.76%	-0.04%
Portugal	19.69%	1.11	6.46%	0.66%
Qatar	9.85%	0.56	3.23%	-2.57%
Romania	19.56%	1.11	6.42%	0.62%
Russia	22.35%	1.26	7.34%	1.54%
Saudi Arabia	20.82%	1.18	6.83%	1.03%
Serbia	13.32%	0.75	4.37%	-1.43%
Singapore	14.82%	0.84	4.86%	-0.94%
Slovakia	12.20%	0.69	4.00%	-1.80%
Slovenia	18.50%	1.05	6.07%	0.27%
South Africa	13.70%	0.78	4.50%	-1.30%
Spain	28.64%	1.62	9.40%	3.60%
Sri Lanka	16.19%	0.92	5.31%	-0.49%
Taiwan	18.70%	1.06	6.14%	0.34%
Tanzania	7.93%	0.45	2.60%	-3.20%
Thailand	16.11%	0.91	5.29%	-0.51%
Tunisia	9.27%	0.52	3.04%	-2.76%
Turkey	21.69%	1.23	7.12%	1.32%
UAE	16.99%	0.96	5.58%	-0.22%
Ukraine	32.33%	1.83	10.61%	4.81%
US	**17.67%**	**1.00**	**5.80%**	**0.00%**
Venezuela	32.34%	1.83	10.62%	4.82%
Vietnam	24.06%	1.36	7.90%	2.10%

Source: Source: Damodaran, A., 2013. Equity Risk Premiums (ERP): Determinants, Estimation and Implications – The 2013 Edition. [http://ssrn.com/abstract=1769064].

Appendix Table 5. Measures of Country Risk

Country	σ_{Equity}	σ_{Bond}	$\sigma_{Equity}/\sigma_{Bond}$	σ_{Yield}	$\sigma_{Equity}/\sigma_{Yield}$	σ_{CDS}	$\sigma_{Equity}/\sigma_{CDS}$
Argentina	31.02%	NA	NA	NA	NA	13.83%	2.38
Brazil	21.62%	10.61%	2.04	11.51%	1.88	26.64%	1.08
Bulgaria	13.75%	NA	NA	NA	NA	38.00%	0.74
Chile	14.14%	4.19%	3.37	8.16%	1.73	49.19%	0.78
China	23.79%	9.93%	2.40	NA	NA	58.73%	0.99
Colombia	14.31%	13.85%	1.03	14.14%	1.01	32.54%	0.77
Costa Rica	9.52%	NA	NA	NA	NA	17.86%	0.71
Croatia	13.30%	NA	NA	NA	NA	11.52%	1.27
Cyprus	67.75%	NA	NA	NA	NA	26.26%	2.84
Czech Republic	19.61%	16.97%	1.16	41.28%	0.48	83.60%	1.07
Egypt	25.18%	NA	NA	NA	NA	7.17%	3.58
Estonia	17.21%	NA	NA	NA	NA	64.44%	0.91
Greece	37.72%	75.70%	0.50	82.76%	0.46	4.78%	7.93
Hungary	23.26%	15.85%	1.47	25.30%	0.92	12.47%	1.99
Iceland	12.69%	NA	NA	NA	NA	15.11%	0.99
India	17.44%	3.55%	4.91	4.72%	3.69	NA	NA
Indonesia	16.40%	8.84%	1.86	13.38%	1.23	54.12%	0.84
Ireland	18.32%	NA	NA	NA	NA	33.40%	0.88
Israel	18.21%	9.69%	1.88	9.76%	1.87	24.46%	0.99
Italy	30.14%	17.26%	1.75	20.88%	1.44	22.87%	1.55
Kazakhstan	23.03%	NA	NA	NA	NA	28.59%	1.09
Korea	19.10%	7.33%	2.61	13.01%	1.47	62.56%	0.93
Latvia	10.30%	NA	NA	NA	NA	29.98%	0.64
Lebanon	6.93%	5.05%	1.37	6.80%	1.02	3.88%	1.82
Lithuania	16.96%	NA	NA	NA	NA	28.03%	0.89
Malaysia	9.97%	2.93%	3.40	10.45%	0.95	50.59%	0.70
Mexico	16.58%	8.47%	1.96	21.59%	0.77	34.60%	0.83
Morocco	12.08%	NA	NA	NA	NA	14.90%	0.96
Pakistan	13.45%	NA	NA	NA	NA	35.40%	0.73

Appendix Table 5. Measures of Country Risk (cont)

Panama	4.01%	NA	NA	NA	NA	36.61%	0.48
Peru	23.33%	9.69%	2.41	10.09%	2.31	34.64%	1.02
Philippines	14.96%	16.38%	0.91	7.99%	1.87	64.24%	0.88
Poland	17.54%	10.78%	1.63	20.53%	0.85	36.25%	0.85
Portugal	19.69%	30.65%	0.64	43.17%	0.46	17.52%	1.30
Qatar	9.85%	NA	NA	NA	NA	36.46%	0.63
Romania	19.56%	9.92%	1.97	22.85%	0.86	18.91%	1.22
Russia	22.35%	11.15%	2.00	23.52%	0.95	28.45%	1.07
Saudi Arabia	20.82%	NA	NA	NA	NA	40.92%	0.92
Slovakia	12.20%	15.35%	0.79	24.95%	0.49	47.33%	0.73
Slovenia	18.50%	NA	NA	NA	NA	21.17%	1.09
South Africa	13.70%	8.64%	1.59	11.36%	1.21	20.93%	0.86
Spain	28.64%	10.59%	2.70	16.97%	1.69	22.45%	1.50
Thailand	16.11%	5.97%	2.70	16.94%	0.95	42.57%	0.80
Tunisia	9.27%	NA	NA	NA	NA	6.67%	1.46
Turkey	21.69%	14.94%	1.45	20.39%	1.06	26.57%	1.08
Ukraine	32.33%	NA	NA	NA	NA	7.11%	4.62
Venezuela	32.34%	18.25%	1.77	23.56%	1.37	6.34%	5.16
Vietnam	24.06%	NA	NA	NA	NA	15.84%	1.68
Average			1.94		1.27		1.45
Median			1.86		1.04		0.99
Maximum			4.91		3.69		7.93
Minimum			0.50		0.46		0.48

Source: Damodaran, A., 2013. Equity Risk Premiums (ERP): Determinants, Estimation and Implications – The 2013 Edition. [http://ssrn.com/abstract=1769064].

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