Financial Management (ECON F315)
Assignment-2

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Q-1) Calculate Equity Risk Premium in 6 Countries using Credit Default Swap (CDS) and Sovereign Ratings given by International Rating agencies.

(Benchmark: USA Risk Free Rate)

Formula, Notations and Constraints:

Equity Risk Premium of a Country **(ERP) = x+{a (or) b} * g**

- x= Mature Market Risk Premium (S&P 500 Based)
- a= CDS Spread of the Country with respect to US CDS
- b= Sovereign Spread of Country with respect to US (Moody's Rating Based)
- $g = \frac{\text{Standard Deviation of Equity in the Country}}{\text{Standard Deviation of Government Bonds in the Country}}$
- Weren't able to find CDS Spread of Singapore. Hence we left the Risk Premium calculation (w.r.t CDS Spread) as NA for the same.
- 'g' scales the default spread up to reflect the higher risk of Equity in the market, relative to Default Spread. Moreover, the parameter 'g' for some nations could not be found, so we have set 'g' as 1.5 to depict that default spread obtained is not able to completely reflect higher risk of Equities in Market and some scaling is necessary.

Equity Risk Premium for Countries

A) 2013

x=5%

	Developing Countries			Developed Countries		
	India	**China**	**Brazil**	**U.S.A**	**Singapore**	**Norway**
Moody's sovereign rating	Baa3	Aa3	Baa2	Aaa	Aaa	Aaa
S&P sovereign rating	BBB-	AA-	A-	AA+	AAA	AAA
CDS spread	3.51%	1.33%	2.53%	0.46%	NA	0.29%
Excess CDS spread (over US CDS)	3.05%	0.87%	2.07%	0.00%	NA	-0.17%
Country Risk Premium (Rating)=(b)*g	3.30%	0.90%	2.85%	0.00%	0.00%	0.00%
Equity Risk Premium (Rating)	8.30%	5.90%	7.85%	5.00%	5.00%	5.00%
Country Risk Premium (CDS)=(a)*g	4.58%	1.31%	3.11%	0.00%	NA	-0.26%
Equity Risk Premium (CDS)	9.58%	6.31%	8.11%	5.00%	NA	4.75%

B) 2014
x=5.75%

	Developing Countries			Developed Countries		
	India	China	Brazil	U.S.A	Singapore	Norway
Moody's sovereign rating	Baa3	Aa3	Baa2	Aaa	Aaa	Aaa
S&P sovereign rating	BBB-	AA-	BBB+	AA+	AAA	AAA
CDS spread	2.64%	1.78%	3.17%	0.31%	NA	0.61%
Excess CDS spread (over US CDS)	2.33%	1.47%	2.86%	0.00%	NA	0.30%
Country Risk Premium (Rating)=(b)*g	3.30%	0.90%	2.85%	0.00%	0.00%	0.00%
Equity Risk Premium (Rating)	9.05%	6.65%	8.60%	5.75%	5.75%	5.75%
Country Risk Premium (CDS)=(a)*g	3.25%	2.21%	4.29%	0.00%	NA	0.45%
Equity Risk Premium (CDS)	9.25%	7.96%	10.04%	5.75%	NA	4.75%

C) 2015
x= 6.25%

	Developing Countries			Developed Countries		
	India	China	Brazil	U.S.A	Singapore	Norway
Moody's sovereign rating	Baa3	Aa3	Ba2	Aaa	Aaa	Aaa
S&P sovereign rating	BBB-	AA-	BB	AA+	AAA	AAA
CDS spread	2.34%	1.66%	3.94%	0.44%	NA	0.43%
Excess CDS spread (over US CDS)	1.90%	1.22%	3.50%	0.00%	NA	0.00%
Country Risk Premium (Rating)=(b)*g	3.46%	0.95%	4.72%	0.00%	0.00%	0.00%
Equity Risk Premium (Rating)	9.71%	7.20%	10.97%	6.25%	6.25%	6.25%
Country Risk Premium (CDS)=(a)*g	2.66%	1.71%	4.90%	0.00%	NA	0.00%
Equity Risk Premium (CDS)	8.91%	7.96%	11.15%	6.25%	NA	6.25%

D) 2016

x=5.69%

	Developing Countries			Developed Countries		
	India	**China**	**Brazil**	**U.S.A**	**Singapore**	**Norway**
Moody's sovereign rating	Baa3	Aa3	Ba2	Aaa	Aaa	Aaa
S&P sovereign rating	BBB-	AA-	BB-	AA+	AAA	AAA
CDS spread	1.76%	1.65%	3.59%	0.38%	NA	0.34%
Excess CDS spread (over US CDS)	1.38%	0.27%	3.21%	0.00%	NA	0.00%
Country Risk Premium (Rating)=(b)*g	3.13%	0.86%	4.27%	0.00%	0.00%	0.00%
Equity Risk Premium (Rating)	8.82%	6.50%	9.96%	5.69%	5.69%	5.69%
Country Risk Premium (CDS)=(a)*g	1.70%	1.56%	3.95%	0.00%	NA	0.00%
Equity Risk Premium (CDS)	7.39%	7.25%	9.64%	5.69%	NA	5.69%

E) 2017

x=5.08%

	Developing Countries			Developed Countries		
	India	**China**	**Brazil**	**U.S.A**	**Singapore**	**Norway**
Moody's sovereign rating	Baa2	A!	Ba2	Aaa	Aaa	Aaa
S&P sovereign rating	BBB-	A+	BB	AA+	AAA	AAA
CDS spread	1.26%	0.97%	2.53%	0.39%	NA	0.32%
Excess CDS spread (over US CDS)	0.87%	0.58%	2.07%	0.00%	NA	0.00%
Country Risk Premium (Rating)=(b)*g	2.19%	0.81%	3.46%	0.00%	0.00%	0.00%
Equity Risk Premium (Rating)	7.27%	5.89%	8.54%	5.08%	5.08%	5.08%
Country Risk Premium (CDS)=(a)*g	0.98%	0.65%	2.54%	0.00%	NA	0.00%
Equity Risk Premium (CDS)	6.06%	5.73%	7.26%	5.08%	NA	5.08%

F) 2018

x= 5.96%

	Developing Countries			Developed Countries		
	India	**China**	**Brazil**	**U.S.A**	**Singapore**	**Norway**
Moody's sovereign rating	Baa2	A1	Ba2	Aaa	Aaa	Aaa
S&P sovereign rating	BBB-	A+	BB-	AA+	AAA	AAA
CDS spread	1.85%	1.14%	2.87%	0.30%	NA	0.26%
Excess CDS spread (over US CDS)	1.55%	0.84%	2.57%	0.00%	NA	0.00%
Country Risk Premium (Rating)=(b)*g	2.64%	0.98%	4.17%	0.00%	0.00%	0.00%
Equity Risk Premium (Rating)	8.60%	6.94%	10.13%	5.96%	5.96%	5.96%
Country Risk Premium (CDS)=(a)*g	1.91%	1.03%	3.16%	0.00%	NA	0.00%
Equity Risk Premium (CDS)	7.87%	6.99%	9.12%	5.96%	NA	5.96%

Factors on which ERP depends

In this section, we will attempt to quantify how some Economic factors influence Equity Risk Premium in the USA through Regression.

I. Interest Rates (Average Interest Closing Rate of 1 Year T-Bill)
II. Volatility in GDP Growth Rates
III. Income Equality in the Economy (Gini Coefficient)

United States of America				
Year	**Closing Interest rate of 1-year T-bill (Avg Value)**	**Volatility in GDP Growth Rate**	**Gini Coeff.**	**Equity Risk Premium**
2010	0.32%	5.40%	45.60%	4.50%
2011	1.80%	-1.00%	46.30%	5.00%
2012	1.70%	0.60%	46.30%	6.00%
2013	1.30%	-0.40%	45.90%	5.80%
2014	1.20%	0.70%	45.61%	5.00%
2015	3.20%	0.40%	45.41%	5.75%

Note:

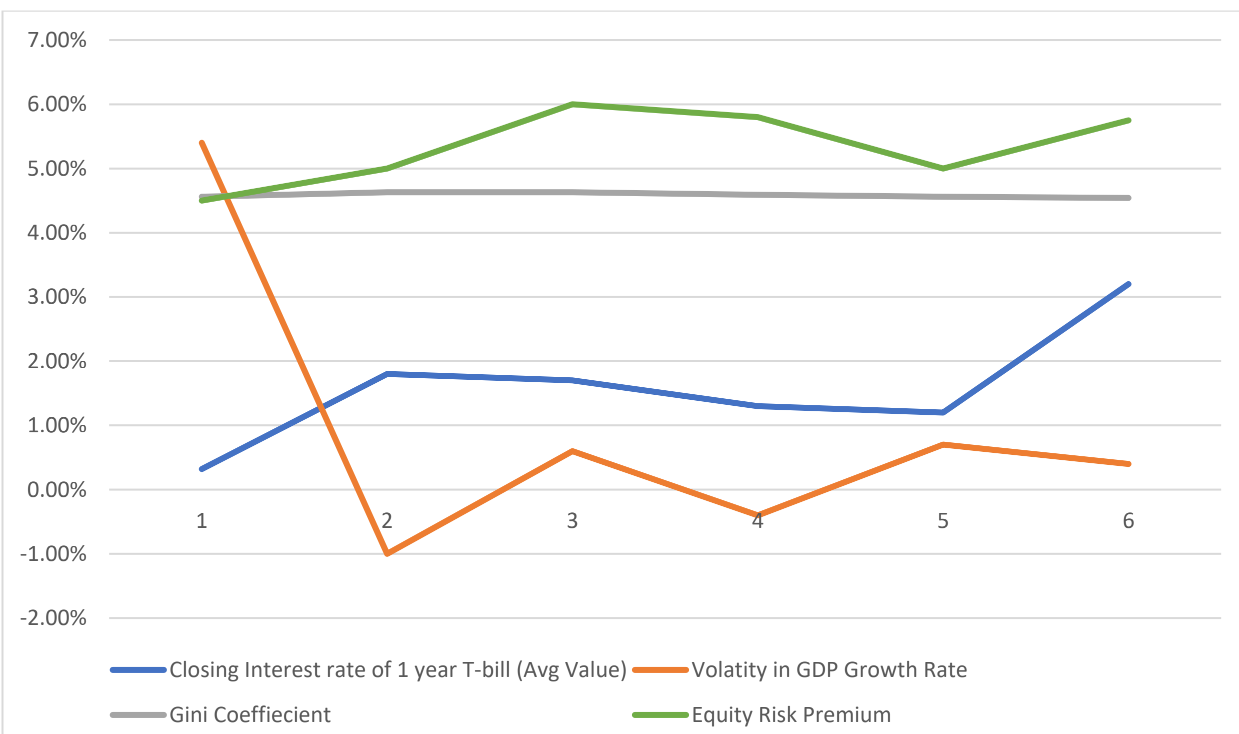
For better visualization and analysis of the influence of Gini Coefficient on ERP, we have normalized the Gini Variable such that

$$New\ Gini\ Variable = \frac{Gini\ Coefficient}{10}$$

Regression Result

Regression Statistics	
Multiple R	0.699230741
R Square	0.48892363
Adjusted R Square	-0.277690926
Standard Error	0.00669122
Observations	6

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	-0.096515182	0.470741713	-0.205027894	0.856523
Closing interest rate of 1-year T bill (Avg value)	0.318223311	0.456699066	0.696789933	0.558029
Volatility in GDP Growth Rate	-0.053781188	0.211234184	-0.254604569	0.822816
New Gini Variable	0.317084095	1.015809873	0.312149058	0.784465



Interpretation:

- As expected, there is a positive correlation between Interest Rates and Equity Risk Premium.
- Similarly, a negative correlation between volatility in the GDP Growth Rate and Equity Risk Premium is observed as per expectations. It means that the Equity Risk Premium will be lower in an economy with predictable inflation, interest rates and Economic Growth Rates.
- Similarly, Gini Coefficient and the Equity Risk Premium are positively correlated in accordance with our expectations. Thus, Equity Risk Premium is higher in an Economy where the Income distribution is not uniform.