COUNTRY RISK ANALYSIS

Country Analysis

• Active allocation strategy requires the forecast of changes in macroeconomic variables: currencies, interest rates, & stock markets.

  Key variable: Choice of a country (currency).
  ⇒ But currency forecasting is difficult.

• Q: How do we select a country?
To help this process, economists monitor a large number of variables:
  - anticipated real growth (probably major influence on a national mkt.)
  - monetary and fiscal policy
  - wage and employment rigidities
  - social and political situations
  - competitiveness
• Investment banks and consulting firms produce “Country Reports,” trying to summarize all the relevant information that an investor/firm needs to make an investment decision in a given country.

• Country reports are brief and they give an investor an overall idea of the business, political, and economic climate.

• This is the Class Project: Write a professional country report.

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**Country Risk**

**Definition: Country Risk**
Country risk (CR) is the risk attached to a borrower by virtue of its location in a particular country.

**Q: Why do we care about CR?**
- MNCs make decisions on DFI projects on the basis of NPVs.
- MNCs use discount rates to establish NPV for projects (the higher the discount rate, the lower the chances of a project to have a NPV > 0).

Q: Where do discount rates come from?
A: For projects abroad, a key element is Country risk (CR)
Note: CR is different than FX risk. CR risk can be zero and FX can be huge for a given country. The reverse, though unusual, can also happen.

CR reflects the (potentially) negative impact of a country’s economic and political situation on an MNC’s or an investor’s cash flows.

• Situations that can affect MNC’s Cash flows:
  - Nationalization of subsidiaries or joint ventures.
  - Labor strikes in an industry.
  - A political scandal that introduces new laws or regulations.
  - New trade restrictions, limiting imports or exports.

Q: Does country risk analysis matter?
A: Look at companies investing in Ukraine and Russia in 2014! Value of Russian assets went down significantly. Global investors, MNCs, bondholders realize the relevance of country risk analysis.

International Defaults are not rare

Graph X.1
Sovereign External Debt 1800 - 2006 – Taken from Reinhart and Rogoff (2011)
• Measures to reduce country risk:
  - A cap on the total amount invested in a particular country.
  - Diversification.
  - Credit/Political Risk Derivatives

**Diversification and Country Risk** *(From The Economist, Sep 20, 2014)*

After China’s revolution in 1949 HSBC, then a purely Asian bank, lost half its business. Iran’s nationalization in 1951 of the Anglo-Iranian Oil Company’s assets devastated the firm, a precursor of BP.

Modern episodes:
• Repsol (Spain), fell in love with Argentina, leaving it vulnerable when YPF, the firm it bought there, was nationalized in 2012.
• First Quantum, (Canada), had made a third of its profits from a mine that the Democratic Republic of Congo nationalized in 2009.

*Remark:* Ben van Beurden, the boss of Royal Dutch Shell, recently said *diversification* is “the only way to inoculate yourself”.

**Simple Idea**

There are many factors that can influence a country’s economic policies: political, economic, social, etc.

We want to create a global indicator that assesses the likelihood of a (negative) change in a given country’s economic policy.

This indicator, reported as a single number, is called *country risk* (CR).

• Similar to *credit risk* ratings, CR is usually measured (and reported) as a letter (A=excellent, C=bad) ⇒ Letter = Grade

• Ideally, CR gives companies and lenders a very good indicator of a country’s likelihood of default.
• **Credit and Interest Rate Risk for Bonds: Brief Review**

Bonds are subject to two types of risk:

1) *Interest rate risk* (risk associated to changes in interest rates)
2) *Credit/default risk* (risk associated to the probability of default combined with the probability of not receiving principal and interest in arrears after default)

Credit rating agencies describe (measure) the risk with a credit rating (a letter grade).

**Rule:** The higher the grade, the lower the yield of the bond (measured as a spread over risk-free rate). (For us, the risk-free rate is the yield of government bonds).

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• **General Idea**

From a big data set (with a lot of economic, socioeconomic and political variables and observations), we come up with a single measure (a letter).

• **Two approaches to measure CR (and get a grade)**

1) *Qualitative* – collect data, get an opinion from “experts,” form a “consensus” grade.
2) *Quantitative* – collect data, process the data with a computer model, get a grade.

(1) *Qualitative Approach:* Talk to experts (politicians, union members, economists, etc) to form a consensus opinion about the risk of a country. The consensus opinion becomes the grade.

(2) *Quantitative Approach:* Start with some quantifiable factors that affect CR. Use a formula to determine numerical scores for each factor. Calculate a weighted average of the factors’ numerical scores. This weighted average determines the final grade.
Qualitative Approach is considered “subjective.”
Quantitative Approach is considered (or seems more) “objective.”

We will emphasize the Quantitative Approach.

• Pros
  - It is simple
  - It allows cross-country and across time comparison.

• Cons
  - It is too simple.
  - In practice, ratings tend to converge (herding).
  - Not a lot of predictive power.

Note: Ideally, rating companies are independent. But, they have incentives to accommodate clients (countries).

CR: Is it really a good indicator of economic problems/default?
The lack of predictive power for many crisis is a major criticism.

For example, a month before the 1997 Asia crisis, South Korea was rated as Italy and Sweden. Then, Fitch went from rating Korea as AA- (investment grade) to B- (junk) in one month. Other rating agencies replicated the same dramatic sudden change in Korea’s CR rating.

In early 1998, Fitch justified the situation:
“There were no early warnings about Korea from us or, to the best of our knowledge, from other market participants, and our customers should expect a better job from us.”

Similar sudden downgrades occurred during the 2009-2013 European debt crisis with Greece, Ireland, Italy, Portugal, and Spain (PIIGS).
• **Practical use of CR**
  
  We will associate CR to the spread over a base, risk-free rate, say U.S. T-bills. That is, CR influences the interest on the debt issued by a government of a country (and the discount rate on foreign projects!).

**Example**: Setting yields for Mexico (actually, the Mexican government)

Yield\(_{\text{Mex}}\) = US Treasuries + spread (risk premium, a function of CR)

Data:

Mexico’s grade: BBB -a spread of 140 bps (1.40%) over US Treasuries

Yield\(_{\text{Mex}}\) (US Treasuries yield): 4%

\[
\text{Yield}_{\text{Mex}} = 4\% + 1.40\% = 5.40\%
\]

Note: This is a USD yield. To translate it to MXN, we use linear IFE:

\[
\text{Yield}_{\text{Mex}} \text{(MXN)} \approx \text{Yield}_{\text{Mex}} \text{(USD)} + E[\text{s}_{t+T}].
\]

**Example (continuation)**:

Yield\(_{\text{Mex}}\) (MXN) \approx \text{Yield}_{\text{Mex}} \text{(USD)} + E[\text{s}_{t+T}].

To calculate \(E[\text{s}_{t+T}]\), we can use linearized PPP. Data:

\[
\begin{align*}
E[I_{\text{MEX}}] &= 7\% \\
E[I_{\text{US}}] &= 2\%.
\end{align*}
\]

\[
\Rightarrow \text{Yield}_{\text{Mex}} \text{(MXN)} \approx 5.40\% + 5\% = 10.40\%.
\]

• \(\text{Yield}_{\text{Mex}}\) (MXN) becomes the risk-free rate for projects in Mexico, used to the discount CFs in MXN. That is:

\[
\text{Discount Rate Project}_{\text{Mex}} = \text{Yield}_{\text{Mex}} + \text{project’s risk premium}.
\]

Suppose an oil company is investing in a project in Mexico and sets a 3% project’s risk premium. Then,

\[
\text{Discount Rate Oil Project}_{\text{Mex}} = 10.40\% + 3\% = 13.40\%.
\]

The MXN CFs will be discounted using **13.40%** as the discount rate.
Very different yields. Since all countries share the same currency: FX Risk plays no role in explaining the different yields.


- **Risk Rating Method (Check list)**
  - Weighted average of grades for four major aspects of a country:
    - Economic Indicators (financial condition)
    - Debt management (ability to repay debt)
    - Political factors (political stability)
    - Structural factors (socioeconomic conditions)

  The grades (between 0 and 100) for each factor are a function of “fundamental data.” For example, the economic indicator’s grade depends on GDP per capita, GDP growth, inflation, interest rates, etc.

  A specific formula is used to compute the grades. For example,

  \[
  \text{Score}(EI) = \alpha_0 + \alpha_1 \text{ GDP growth} + \alpha_2 \text{ Inflation} + \alpha_3 \text{ Productivity} + \ldots.
  \]

  Regressions and experience will determine the coefficients (\(\alpha_0, \alpha_1, \alpha_2,\ldots\)).
• **Risk Rating Method (Check list)**

We expect better GDP growth and lower inflation to have a positive and negative coefficient, respectively.

• Final score (the CR letter) will be determined by a weighted average:

\[
\text{Final Score} = w_{EI} \text{Score}(EI) + w_{DM} \text{Score}(DM) + w_{PF} \text{Score}(PF) + w_{SF} \text{Score}(SF)
\]

Note: Weights should be non-negative and add up to 1:
\[
\sum_j w_j = 1, \quad \text{i.e., } w_{EI} + w_{DM} + w_{PF} + w_{SF} = 1.
\]

Q: Where are the weights and the formulae for the grades coming from?  
A: This method seems more “objective,” because it is based on hard economic data, but weights and formula for grades may be “subjective.”  
   \[\Rightarrow\] CR is more an art, than a science.

• The model can deliver different forecasts:  
  - Short-term  
  - Medium-term  
  - Long-term  
   \[\Rightarrow\] Weights and grades can change depending on your horizon.

For example:  
(a) Short-term: More weight to debt management and political factors.  
(b) Long-term: More weight to economic indicators and structural factor.

• Each grade is associated with a spread in basis points (bps) over base rate, usually a risk free rate.
Note I: A rating of BBB or better is considered “investment grade.”

Note II: A rating of BB or less is considered “junk.” In the U.S., the usual spread of junk debt is between 400 to 600 bps over 1-yr T-bills. Range is very wide: Spreads can go over 2600 bps.

Note III: As time to maturity increases, the spread (in bps) also increases.

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**TABLE 16.1**

Conversion Table of a Country's Grade into a Rating and Spreads over US Treasuries

<table>
<thead>
<tr>
<th>Overall grade</th>
<th>Rating</th>
<th>Interpretation</th>
<th>Spread (in bps)</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>91-100</td>
<td>AAA</td>
<td>Excellent</td>
<td>10-70</td>
<td>50</td>
</tr>
<tr>
<td>81-90</td>
<td>AA</td>
<td></td>
<td>50-100</td>
<td>70</td>
</tr>
<tr>
<td><strong>71-80</strong></td>
<td>A</td>
<td></td>
<td><strong>80-130</strong></td>
<td>100</td>
</tr>
<tr>
<td>61-70</td>
<td>BBB</td>
<td>Average risk</td>
<td>110-220</td>
<td>160</td>
</tr>
<tr>
<td>51-60</td>
<td>BB</td>
<td></td>
<td>190-300</td>
<td>240</td>
</tr>
<tr>
<td>41-50</td>
<td>B</td>
<td></td>
<td>270-410</td>
<td>350</td>
</tr>
<tr>
<td>31-40</td>
<td>CCC</td>
<td>Excessive risk</td>
<td>360-490</td>
<td>450</td>
</tr>
<tr>
<td>21-30</td>
<td>CC</td>
<td></td>
<td>450-700</td>
<td>570</td>
</tr>
<tr>
<td>10-20</td>
<td>C</td>
<td></td>
<td>700+</td>
<td>800</td>
</tr>
<tr>
<td>0-10</td>
<td>D</td>
<td>In Default</td>
<td>(debt in arrears)</td>
<td></td>
</tr>
</tbody>
</table>

---

**Example:** Spread on government European bonds: Nov 11. 2014.

Higher risk (PIIGS), higher spread! 

Example: But, not always.
10-year government bonds: Q4 2016 (from Euromoney).

<table>
<thead>
<tr>
<th>ECR score</th>
<th>ECR rank</th>
<th>10-yr bond (%)</th>
<th>Fitch</th>
<th>Moody's</th>
<th>S&amp;P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Romania (↑)</td>
<td>53.18</td>
<td>59</td>
<td>3.48</td>
<td>BBB-</td>
<td>Baa3</td>
</tr>
<tr>
<td>Bulgaria (↑)</td>
<td>52.26</td>
<td>60</td>
<td>2.26</td>
<td>BBB-</td>
<td>Baa2</td>
</tr>
<tr>
<td>South Africa (↓)</td>
<td>52.26</td>
<td>61</td>
<td>8.90</td>
<td>BBB-</td>
<td>Baa2</td>
</tr>
<tr>
<td>Hungary (↓)</td>
<td>51.93</td>
<td>62</td>
<td>3.51</td>
<td>BBB-</td>
<td>Baa3</td>
</tr>
<tr>
<td>Turkey (↓)</td>
<td>51.90</td>
<td>63</td>
<td>10.80</td>
<td>BBB-</td>
<td>Ba1</td>
</tr>
</tbody>
</table>

Note: ECR = Euromoney country risk.

- Ratings tend to converge (herding?); but they do not necessarily have
the same impact on yields.

Example: Bertoni Bank evaluates the country risk of country DX.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Short-term Horizon</th>
<th>Medium-term Horizon</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Weight</td>
<td>Grade</td>
</tr>
<tr>
<td>Economic</td>
<td>.3</td>
<td>80</td>
</tr>
<tr>
<td>Debt managt</td>
<td>.3</td>
<td>90</td>
</tr>
<tr>
<td>Political</td>
<td>.3</td>
<td>67</td>
</tr>
<tr>
<td>Structural</td>
<td>.1</td>
<td>75</td>
</tr>
<tr>
<td>Total</td>
<td>78.6</td>
<td></td>
</tr>
</tbody>
</table>

Short-term ranking: A
Medium-term ranking: BBB

That is, the short-term debt of country DX will get a spread in the 80-130 bps range, say 93 bps over US Treasuries; while the medium-term debt will get a higher spread, say 128 bps.

Suppose the short-term US Treasuries yield 4% (s.a.). Then, the short-term debt of country DX yields 4% (s.a.) + 0.93% (s.a.) = 4.93% (s.a.). ¶
Example: Country Risk in Practice

Euromoney produces semi-annual CR analysis of 189 countries using a panel of 400+ experts. Euromoney rates 6 categories with a score (ECR, from 0 to 100).

- Categories and weights:
  - Economic performance -30%
  - Political Risk -30%
  - Structural assessment -10%
  - Debt indicators: Debt/GDP; Debt service/X; & X-M/GDP -10%
  - Credit rating: Moody’s or S&P’s or Fitch IBCA’s rating -10%
  - Access to bank finance/Capital markets: Grade from 0 to 10 -10%

The first three categories are (mainly) qualitative and the last three categories are (mainly) quantitative.

Based on the weighted average for each country, each country is placed on a Tier, with Tier 1 = AAA (80 - 100); and Tier 5 = C (0 - 35.9). ¶

Example: Country Risk in Practice

Euromoney’s experts evaluate each category for each country and grade them from 0 to 100. For example, they look at the category: Debt Indicator (10% weight) and grade it:

<table>
<thead>
<tr>
<th>Country</th>
<th>Debt Indicator (10% weight)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IRELAND</td>
<td>&lt;= Very Good, high score</td>
</tr>
<tr>
<td>TALY</td>
<td>&lt;= Very Bad, low score</td>
</tr>
<tr>
<td>BELGIUM</td>
<td></td>
</tr>
<tr>
<td>RELAND</td>
<td></td>
</tr>
<tr>
<td>PORTUGAL</td>
<td></td>
</tr>
<tr>
<td>JERMANY</td>
<td></td>
</tr>
<tr>
<td>RANCE</td>
<td></td>
</tr>
<tr>
<td>AUSTRIA</td>
<td></td>
</tr>
<tr>
<td>JETHERLANDS</td>
<td></td>
</tr>
<tr>
<td>SPAIN</td>
<td></td>
</tr>
<tr>
<td>INLAND</td>
<td></td>
</tr>
<tr>
<td>EURO-ZONE AVG</td>
<td></td>
</tr>
<tr>
<td>US</td>
<td></td>
</tr>
</tbody>
</table>

Safety in Numbers

The possible solution to the euro-zone debt crisis is for the 17 euro-zone countries to raise money through joint, euro-zone wide bonds. The currency bloc’s overall debt ratio is less than that of the U.S.

Debt as a percentage of GDP, selected countries, 2010:

<table>
<thead>
<tr>
<th>Country</th>
<th>Debt as a percentage of GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>IRELAND</td>
<td>144.9%</td>
</tr>
<tr>
<td>TALY</td>
<td>118.4%</td>
</tr>
<tr>
<td>BELGIUM</td>
<td>96.2%</td>
</tr>
<tr>
<td>RELAND</td>
<td>94.9%</td>
</tr>
<tr>
<td>PORTUGAL</td>
<td>93.3%</td>
</tr>
<tr>
<td>JERMANY</td>
<td>83.2%</td>
</tr>
<tr>
<td>RANCE</td>
<td>82.3%</td>
</tr>
<tr>
<td>AUSTRIA</td>
<td>71.8%</td>
</tr>
<tr>
<td>JETHERLANDS</td>
<td>62.9%</td>
</tr>
<tr>
<td>SPAIN</td>
<td>61.0%</td>
</tr>
<tr>
<td>INLAND</td>
<td>48.3%</td>
</tr>
<tr>
<td>EURO-ZONE AVG</td>
<td>85.4%</td>
</tr>
<tr>
<td>US</td>
<td>94.4%</td>
</tr>
</tbody>
</table>

Source: Eurostat
Example: *Euromoney, World Country Risk* February 21, 2018
World Country Risk weighted average: 42.77 (B rating or Tier 4)

Example: *World Composite Risk* 1986
Example: World Composite Risk 1997

Example: World Composite Risk 2007
Example: Country Risk in Practice

- Euromoney CR ratings

- Congo (2017: 29.31)

- Romania (2017: 53.18 – World Ranking: 59)
  2011: 49.09 (World ranking: 72. In 2001, Romania ranked 89th.)

- China (2017: 58.50 - World Ranking: 43)
  2011: 63.55 (World ranking: 40. In 2001, China ranked 45th.)

- Taiwan (2017: 73.40)

- Singapore (2017: 88.53 - World Ranking: 1)

- As expected, there is a wide dispersion of CR across countries. Ratings, however, tend to be persistent over time.
• Other Maps: Coface 2017

COUNTRY RISK ASSESSMENT MAP • 3rd QUARTER 2017

160 COUNTRIES UNDER THE MAGNIFYING GLASS

A UNIQUE METHODOLOGY
- Comprehensive 10-country matrix for each country
- Definitions of business environment
- Comprehensive data analysis over 15 years
- Credit experience

UPGRADES

MALAYSIA
- Economic growth expected to remain strong, with GDP growth seen at 6.7% in 2018 and 6.5% in 2019. The central bank has been keeping interest rates low.

CYPRESS
- The inflow of foreign direct investment is slowing, with GDP growth expected to be around 2.5% in 2018 and 2019.

FINLAND
- The economy is expected to continue growing, with GDP growth forecast to be around 2.5% in 2018 and 2019.

HUNGARY
- GDP growth is expected to remain strong, with GDP growth forecast to be around 3.5% in 2018 and 2019.

DENMARK
- The economy is expected to continue growing, with GDP growth forecast to be around 2.5% in 2018 and 2019.

• Other Maps: Euler Hermes 2017

5 changes in country risk ratings
4th Quarter 2017

3 countries with upgraded ratings:
Lithuania (A+ to A) - Economic growth is expected to remain strong, with GDP growth forecast to be around 3.5% in 2018 and 2019.
Slovenia (B to B+) - Inflation rates are expected to remain low, with inflation forecast to be around 1.5% in 2018 and 2019.
Albania (B to B+) - Economic growth is expected to remain strong, with GDP growth forecast to be around 3.5% in 2018 and 2019.

2 countries with downgraded ratings:
Namibia (B to B-) - Economic growth is expected to be around 3% in 2018 and 2019, with inflation forecast to be around 3% in 2018 and 2019.
Bahrain (B to B-) - Economic growth is expected to be around 1% in 2018 and 2019, with inflation forecast to be around 3% in 2018 and 2019.
• Other Country Risk Indicators

• Given the lack of predictive power of CR, a single indicator may not be enough. There are other indexes that may be also signal the true riskiness of a country –i.e., they can be correlated with the CR.

• Popular indicators
  - A.T. Kearny: *Globalizaton Index* (it measures a country’s global links)
  - A.T. Kearny: *FDI confidence index* (survey of MNFs indicating the likelihood of investment in specific markets).
  - World Economic Forum: *Global competitiveness index* (it uses to indexes to rate growth environment and opportunities).
  - Institute for Management Development *World Competitiveness index*.
  - PWC: *Opacity Index* (it measures the adverse impact of opacity of capital -the cost of borrowing funds- in different countries).
**Other Country Risk Indicators**

- Popular indicators
  - Fraser Institute: *Index of Economic Freedom*
  - UNDP: *Human Development Index* (HDI is a composite index measuring average achievement in life expectancy, education, and standard of living).
  - Nord Sud Export (NSE) index (market potential assessment for foreign investor)

### Other Country Risk Indicators

- Popular indicators: Summary

In general, we see countries’ rankings moving in a similar range (say, Japan is between 9 and 28; USA between 1 and 15); but not always.

The economic freedom rankings of Brazil and China create huge intervals for these countries, far away from the others.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Brazil</td>
<td>41</td>
<td>67</td>
<td>53</td>
<td>44</td>
<td>28</td>
<td>99</td>
</tr>
<tr>
<td>China</td>
<td>40</td>
<td>66</td>
<td>26</td>
<td>19</td>
<td>45</td>
<td>138</td>
</tr>
<tr>
<td>Japan</td>
<td>25</td>
<td>28</td>
<td>9</td>
<td>26</td>
<td>16</td>
<td>22</td>
</tr>
<tr>
<td>UK</td>
<td>17</td>
<td>12</td>
<td>10</td>
<td>20</td>
<td>2</td>
<td>14</td>
</tr>
<tr>
<td>USA</td>
<td>15</td>
<td>7</td>
<td>5</td>
<td>1</td>
<td>6</td>
<td>10</td>
</tr>
</tbody>
</table>
**Country Risk: Implications**

- Country/Political risk affects the expected cash flows of an investment. MNCs need to account for this type of political risk when evaluating international projects.

- In general, companies try to adjust the expected cash flows by decreasing them by an amount that reflects the probability of a loss due to country/political risk.

- It is complicated how to calculate the probability distribution associated with country/political risk.

**Example:** Suppose a U.S. MNC is considering a project in Hong Kong with an initial investment of USD 10 million and a duration of 4 years with the following expected cash flows (in USD):

<table>
<thead>
<tr>
<th>Year</th>
<th>Free CF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 1</td>
<td>1.114M</td>
</tr>
<tr>
<td>Year 2</td>
<td>1.486M</td>
</tr>
<tr>
<td>Year 3</td>
<td>1.811M</td>
</tr>
<tr>
<td>Year 4</td>
<td>13.524M</td>
</tr>
</tbody>
</table>

The MNC uses a 15% discount rate. Then,

\[
NPV = 10 - \left\{ \frac{1.114}{1.15} + \frac{1.486}{1.15^2} + \frac{1.811}{1.15^3} + \frac{13.524}{1.15^4} \right\} = \text{USD 1.0155 M} > 0 \Rightarrow \text{Yes, the MNC undertakes the project.}
\]

But, we have ignored political risk. Suppose the MNC thinks there is a probability of expropriation every year. Assume for simplicity that after expropriation the CFs = 0—that is, there is no recovery.
CFS for the next 4 years are given by the following diagram:

![Decision Tree Diagram]

Assume that $P_i = P$—that is, it is constant—and set equal to $P=5\%$. Then,

$$\text{NPV} = -10 + \frac{1.114}{1.15} \cdot (1 - p_{BE}) + \frac{1.486}{1.15^2} \cdot (1 - p_{BE})^2 + \frac{1.811}{1.15^3} \cdot (1 - p_{BE})^3 + \frac{13.524}{1.15^4} \cdot (1 - p_{BE})^4 = 0.$$  

**Example:** Using trial and error (or Excel or R), the MNC determines $p_{BE} = 0.027964$.

MNC’s rule: If $p_{BE} < .03 \Rightarrow$ The U.S. MNC undertakes the project. 

In practice, it is difficult to compute the $P_i$’s in the previous example.

Sometimes, it is easier to calculate break-even probabilities and, then, compare them with other the probabilities used in other projects or with the experience of a company or expert.

In the previous example, the break-even probabilities, $p_{BE}$, can be derived from solving the following equation:

$$\text{NPV} = -10 + \frac{1.114}{1.15} \cdot (1 - p_{BE}) + \frac{1.486}{1.15^2} \cdot (1 - p_{BE})^2 + \frac{1.811}{1.15^3} \cdot (1 - p_{BE})^3 + \frac{13.524}{1.15^4} \cdot (1 - p_{BE})^4 = 0.$$  

**Example:** Using trial and error (or Excel or R), the MNC determines $p_{BE} = 0.027964$.

MNC’s rule: If $p_{BE} < .03 \Rightarrow$ The U.S. MNC undertakes the project. 


• **Country Risk: Insurance**
  - NPV calculations are easier if there is insurance: MNC just adjust the expected cash flows by the cost of insurance and proceed as usual.

  - There is an active market for Country Risk Insurance.
    - Sovereign Risk can be insured by the private market or CDS.
    - Political Risk can be insured by international organizations (World Bank), governments and private insurance companies (AIG, Zurich, etc.)

  - Political risk is available for different events:
    - Political violence: revolution, civil unrest, terrorism, war, etc.
    - Expropriation or confiscation of assets.
    - Repudiation of contracts.
    - Cancellation of credit or guarantees.
    - Business interruptions.
    - Currency inconvertibility, blockage of funds

  - Political risk insurance policies tend to be standardized, but can be adapted for specific situations. For larger investments or complex situations, tailor-made policies are common, with a syndicate of several insurers providing coverage.

  - The private market is usually used for complex investments that require a great deal of customization.

  - The U.S. government, through the *Overseas Private Investment Corporation* (OPIC) has been providing political risk insurance to U.S. international investors since 1971.

  - The World Bank also offers political risk insurance through its *Multilateral Investment Guarantee Agency* (MIGA), which was established in 1988.
**Country Risk Insurance: Insurance**

**Example:** In the previous Example, we assumed that the U.S. MNC gets fully insured against political risk. It insured the full amount for each year. The premium is 1.4% annual. That is,

\[
\text{NPV (USD M)} = -10 + \{1.114 \times 0.986 /1.15 + 1.486 \times 0.986 /1.15^2 +
+ 1.811 \times 0.986/1.15^3 + 13.524 \times 0.986/1.15^4\}
\]

\[= \text{USD 0.86126} > 0 \implies \text{The MNC undertakes the project.} \]

**Note:** This is a very simple example. In practice, MNCs cannot get insurance for 100% of cash flows, usually they can get covered from 50% to 90%. In many situations, once expropriation happens, the company files a claim and the company gets a one-time payment.