
UNIDAD II

INSUMOS PARA LA EVALUACIÓN DE PROYECTOS

2.4. COSTOS DE CAPITAL

2.4.1. COSTO DE CAPITAL PROPIO EN MERCADO DESARROLLADO

Modelo CAPM

Tasa Libre de Riesgo, R_f

- Risk free es la tasa de rendimiento que se puede obtener libre de riesgo de cumplimiento, default risk.
- “es la rentabilidad obtenida por invertir en un activo libre de riesgo y se caracteriza por ser un activo de renta fija con mínima fluctuación en el mercado que está respaldada por un emisor con gran solvencia” (tamariz&Ojeda,2019,p.15)

Modelo CAPM

Donde se obtiene la Tasa Libre de Riesgo, R_f

- Se utiliza como referencia el rendimiento que otorgan los bonos del Tesoro Americano, pues estos bonos no han sido objeto de incumplimiento en mas de 180 años de historia y también debido a que, en teoría, la Reserva Federal de los Estados Unidos podría emitir mas billetes para el cumplimiento de sus obligaciones.
- La Reserva Federal de Estados Unidos emite tres principales bonos soberanos: T-Bills (al corto y mediano plazo), T-Bonds (largo plazo), se utiliza el promedio geométrico

Estimando la Tasa Libre de Riesgo.

- Importante ! ➡ Consistencia entre la tasa libre de riesgo y el flujo de caja a descontar.

- Tomar en cuenta para la tasa libre de riesgo
 - Moneda con la que se evalúa
 - Términos reales o nominales?

Pagina web Damodaran

Aswath
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My name is Aswath Damodaran and I teach corporate finance and valuation at the Stern School of Business at New York University. I describe myself as a teacher first, who also happens to love untangling the puzzles of corporate finance and valuation, and writing about my experiences. As a result, I happen to be at the intersection of three businesses, education, publishing and financial services, that are all big, inefficiently run and deserve to be disrupted. I may not have the power to change the status quo in any of these businesses, but I can stir the pot, and this website is my attempt to do so.

Pagina web Damodaran



Website to my data page. This page contains links to show everything you ever wanted to know about the data that is available on my site (and trust, I have broken the page down into five consistent parts to make it more navigable).

1. [About Data](#): This outlines the [history](#), [background](#), the [types](#) of the data, the [sources](#) I use, and some [recommendations](#) for their usage.
2. [Data breakdown](#): I explain how I break the data down by [variable](#), by [industry](#), by [region](#), by [time](#) and by [company](#).
3. [Current Data](#): This is where the data reader, broken down into corporate finance, valuation and portfolio management sections.
4. [Archived Data](#): If you need the data from prior years, you will find it here. I have broken into corporate finance, valuation and portfolio management sections.
5. [Website Guide](#): There are [updates](#), [links](#), [recommendations](#), [how to use](#) and [updates](#) about data analysis.

The data is updated on the first two weeks of every year and the next new corporate data on January 1st. The new macro updates will be in early January. I'll find out if I'm through a day after the first and will be updated more frequently. The data is broken down by an industry, and portfolio that is not even, but I hope to add more industry data in the future. While I would love to share the complete data (like I used to), I am afraid that I am no longer allowed to do so by the data provider.



Data: Current

Most Data | Data Breakdown | **Current Data** | Archived Data | Website Guide

Date of last update: January 5, 2017

Topic	Current Data (as of Jan. 1, 2017 US)	Regional datasets (domestic/foreign)	Description
Corporate	Income and institutional holdings by company, industry, sector	1. US 2. Europe 3. Japan 4. Emerging Markets 5. Global	Market holdings and institutional holdings as a percent of market value, classified by industry
	International Return on Assets, Stocks and Bonds - Global Stocks	1. Global	Historical returns on stocks, bonds and bills for the United States from 1925 to the most recent year. If you would like to see the returns for other countries, please contact me.
	Income, Equity Risk Premiums, United States	1. Global	These risk returns are an attempt to break down the returns into the risk premium which would result from the current level of the interest rate, the default risk, expected growth in earnings and the level of the long term bond rate.

Tasa libre de riesgo (T Bond a 10 años)

← → ⓘ people.stern.nyu.edu/~adamodar/

Annual Returns on Stock, T.Bonds and T.Bills: 1928 - Current

The raw data for treasury bond and bill returns is obtained from the Federal Reserve database in St. Louis (FRED). The treasury bill rate is a 3-month rate and the 10-year bond, but the treasury bond return includes coupon and price appreciation. It will not match the treasury bond rate each period. For more details, download the data.

You can get the excel spreadsheet that contains all of this data and more here: <http://www.stern.nyu.edu/~adamodar/pd/datasets/tlistretSP.xls>

Annual Returns on Investments in				Compounded Value of \$ 100				
Year	S&P 500	3-month T.Bill	10-year T. Bond	Stocks	T.Bills	T.Bonds	Stocks - Bills	Stocks - Bonds
1928	43.81%	3.08%	0.84%	\$143.81	\$103.08	\$100.84	40.73%	42.98%
1929	-8.30%	3.16%	4.20%	\$131.88	\$100.34	\$105.07	-11.46%	-12.50%
1930	-25.12%	4.55%	4.54%	\$98.75	\$111.18	\$100.85	-20.67%	-29.86%
2015	1.38%	0.21%	1.28%	\$294,115.79	\$1,977.91	\$7,061.89	1.17%	0.09%
2016	11.74%	0.51%	0.69%	\$328,645.87	\$1,988.00	\$7,110.65	11.23%	11.05%

Arithmetic Average			
1928-2016	11.42%	3.46%	5.18%
1967-2016	11.45%	4.88%	7.08%
2007-2016	8.65%	0.74%	5.03%

Geometric Average			
1928-2016	9.53%	3.42%	4.91%
1967-2016	10.09%	4.83%	6.66%
2007-2016	6.88%	0.74%	4.58%

Risk Premium		Standard Error	
Stocks - T.Bills	Stocks - T.Bonds	Stocks - T.Bills	Stocks - T.Bonds
7.96%	6.24%	2.13%	2.28%
6.57%	4.37%	2.42%	2.74%
7.91%	3.62%	6.06%	8.66%

Risk Premium	
Stocks - T.Bills	Stocks - T.Bonds
6.11%	4.62%
5.26%	3.42%
6.15%	2.30%

ST: Short term (3-month Treasury bill)
LT: Long term (10-year Treasury bond)

Last updated: January 5, 2017

Tasa libre de riesgo (T Bond a 10 años)

Retornos históricos anuales de bonos del tesoro de EE. UU., 2020

Year	Annual Returns on Investments in			
	S&P 500	3-month T Bill	US T. Bond	Baa Corporate Bond
<u>Arithmetic Average Historical Return</u>				
1928-2019	11.57%	3.40%	5.15%	7.22%
1970-2019	11.89%	4.64%	7.39%	9.46%
2010-2019	14.02%	0.52%	4.35%	7.23%
<u>Geometric Average Historical Return</u>				
1928-2019	9.71%	3.35%	4.88%	6.96%
1970-2019	10.51%	4.58%	6.99%	9.18%
2010-2019	13.44%	0.51%	4.13%	7.06%

Fuente: Damodaran (<http://people.stern.nyu.edu>)

Modelo CAPM

¿Como se obtiene la Tasa de Retorno del Mercado, R_m ?

- Es lógico suponer que un inversionista racional solo invertirá sus fondos en un negocio con riesgo si de por medio existe la expectativa de obtener una rentabilidad superior a la tasa libre de riesgo.
- Es la rentabilidad adicional exigida por un inversionista por colocar sus fondos en un negocio con riesgo. Es una medida de carácter general que busca reflejar, en promedio, la rentabilidad adicional que, sobre la tasa libre de riesgo, esperan todos los inversionistas del mercado.

Modelo CAPM

¿Como se obtiene directamente la Prima por Riesgo de Mercado?

- La prima por riesgo de mercado será la diferencia entre la tasa de retorno del mercado (R_m) y la tasa libre de riesgo (R_f).
- Damodaran ya tiene la diferencia entre el rendimiento del mercado R_m (S&P 500) y de los T bond (R_f) y se encuentra en su pagina Web
- P.e., la prima por riesgo de mercado promedio aritmético (Acciones –T Bonds) entre 1928-2016 es de 6.24%

Modelo CAPM

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Prima de riesgo de mercado (Stocks – T Bond)

Damodaran Online: Home

pages.stern.nyu.edu/~adamodar/

Year	Stocks	T-Bills	T-Bonds	Stocks - T-Bills	Stocks - T-Bonds	Stocks - T-Bills	Stocks - T-Bonds
2003	28.36%	1.03%	0.38%	\$125,824.39	\$1,693.22	\$4,145.15	27.33%
2004	10.74%	1.23%	4.49%	\$139,341.42	\$1,714.00	\$4,331.30	9.52%
2005	4.83%	3.01%	2.87%	\$146,077.85	\$1,765.59	\$4,455.50	1.82%
2006	15.61%	4.68%	1.96%	\$168,884.34	\$1,848.18	\$4,542.87	10.94%
2007	5.48%	4.64%	10.21%	\$178,147.20	\$1,933.98	\$5,006.69	0.84%
2008	-36.55%	1.59%	20.10%	\$113,030.22	\$1,964.64	\$6,013.10	-38.14%
2009	25.94%	0.14%	-11.12%	\$142,344.87	\$1,967.29	\$5,344.65	25.80%
2010	14.82%	0.13%	8.46%	\$163,441.94	\$1,969.84	\$5,796.96	14.69%
2011	2.10%	0.03%	16.04%	\$166,871.56	\$1,970.44	\$6,726.52	2.07%
2012	15.89%	0.05%	2.97%	\$193,388.43	\$1,971.42	\$6,926.40	15.84%
2013	32.15%	0.07%	-9.10%	\$255,553.31	\$1,972.72	\$6,295.79	32.08%
2014	13.52%	0.05%	10.75%	\$290,115.42	\$1,973.77	\$6,972.34	13.47%
2015	1.38%	0.21%	1.28%	\$294,115.79	\$1,977.91	\$7,061.89	1.17%
2016	11.74%	0.51%	0.69%	\$328,645.87	\$1,988.00	\$7,110.65	11.23%

Period	Stocks	T-Bills	T-Bonds
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Prima de riesgo de mercado (Stocks – T Bond)

Prima de Riesgo del Mercado de EE. UU., 2020

<u>Year</u>	<u>Annual Risk Premium</u>			
	<u>Risk Premium</u>		<u>Standard Error</u>	
	<u>Stocks - T Bills</u>	<u>Stocks - T Bonds</u>	<u>Stocks - T Bills</u>	<u>Stocks - T Bonds</u>
1928-2019	8.18%	6.43%	2.08%	2.20%
1970-2019	7.26%	4.50%	2.38%	2.73%
2010-2019	13.51%	9.67%	3.85%	4.87%
	<u>Risk Premium</u>			
	<u>Stocks - T Bills</u>	<u>Stocks - T Bonds</u>		
1928-2019	6.35%	4.83%		
1970-2019	5.93%	3.52%		
2010-2019	12.93%	9.31%		

Fuente: Damodaran (<http://people.stern.nyu.edu>)

COK DES APALANCADO K_u

Utilizando la ecuación base , y para una empresa en marcha o un proyecto nuevo en el sector de vestido, con datos de 10 años y promedio geométrico, calculamos el costo de capital propio des apalancado (K_u), con la fórmula:

$$\mathbf{K_u = R_f + S_u * (R_m - R_f)}$$

Reemplazando en la ecuación (6) los valores de las tablas anteriores , obtenemos:

$$K_u = 4.13\% + 0.77*(9.31\%) = 11.30\%$$

COK APALANCADO K_e

Asimismo, se puede calcular el costo de capital propio apalancado (K_e) con la siguiente formula:

$$K_e = R_f + Sl * (R_m - R_f)$$

$$K_e = 4.13\% + 1.06*(9.31\%) = 14.00 \%$$

El modelo CAPM es fácil de aplicar en mercados desarrollados como Estados Unidos, pero ¿Qué sucede en economías emergentes, como es el caso de Perú? Veamos.