



2017 Capitalization Rate Study

Appendix and Supporting Documents

S&P 500, 3 Stage Dividend Growth Model

Developed by the Montana Department of Revenue
 To Be Used in Conjunction with the 2017 Capitalization Rate Studies

*Determines The Implied Risk Premium Using Macroeconomic Data
 This type of calculation can also be found in Chapter 9 of Ibbotson's (MorningStar) SBBI, Supply Side Model*

3 Stage Dividend Growth Model

Assumptions:

Stages	Years	Growth	Model 1
1st Stage	1-5 years	Constant @:	12.72%
2nd Stage	6-15 years	Linear from:	11.96% to 4.37%
			Real Growth
3rd Stage	15 years -perpetuity	GDP Growth: Real and Inflation	1.60% to 2.80%
		GDP Growth*: Real + Inflation	4.37%

Model 2	
12.09%	S & P Dow Jones Indices Index Earnings, January 2017
11.28% to 3.17%	Linear from 1st Stage to 3rd Stage
	Inflation
1.57% to 1.57%	Inflation Range = Federal Reserve, Treasuries
3.17%	*GDP Growth = Real growth + Inflation First Quarter 2016 Survey of Professional Forecasters - Philadelphia Federal Reserve Release Date Livingston Survey Release Date December 9, 2016

Model 1

Year	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Starting Industry	Start Price	Expected Dividends	1st Stage Growth Rates					2nd Stage Growth Rates									
S & P 500	\$ (2,238.83)	\$ 49.09	12.720%	12.720%	12.720%	12.720%	12.720%	11.96%	11.201%	10.442%	9.682%	8.923%	8.163%	7.404%	6.644%	5.885%	5.125%
			\$ 55.33	\$ 62.37	\$ 70.31	\$ 79.25	\$ 89.33	\$ 100.01	\$ 111.22	\$ 122.83	\$ 134.72	\$ 146.74	\$ 158.72	\$ 170.47	\$ 181.80	\$ 192.50	\$ 202.36
			Implied Market Return = 8.50%														

Model 2

Year	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Starting Industry	Start Price	Expected Dividends	1st Stage Growth Rates					2nd Stage Growth Rates									
S & P 500	\$ (2,238.83)	\$ 49.09	12.090%	12.090%	12.090%	12.090%	12.090%	11.28%	10.468%	9.657%	8.846%	8.035%	7.224%	6.413%	5.602%	4.791%	3.980%
			\$ 55.02	\$ 61.68	\$ 69.13	\$ 77.49	\$ 86.86	\$ 96.66	\$ 106.78	\$ 117.09	\$ 127.45	\$ 137.69	\$ 147.63	\$ 157.10	\$ 165.90	\$ 173.85	\$ 180.77
			Implied Market Return = 7.50%														

Conclusions:

Implied Market Rate Range = 7.50% to 8.50%

Mean 8.00%
 Market Rate Selected 8.00%

2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%
\$ 211.20	\$ 220.42	\$ 230.04	\$ 240.08	\$ 250.56	\$ 261.50	\$ 272.92	\$ 284.83	\$ 297.27	\$ 310.25	\$ 323.79	\$ 337.93	\$ 352.68	\$ 368.08	\$ 384.15	\$ 400.92	\$ 418.42	\$ 436.69

2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%
\$ 186.50	\$ 192.41	\$ 198.51	\$ 204.80	\$ 211.29	\$ 217.99	\$ 224.90	\$ 232.03	\$ 239.38	\$ 246.97	\$ 254.80	\$ 262.87	\$ 271.20	\$ 279.80	\$ 288.67	\$ 297.82	\$ 307.26	\$ 316.99

2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068
4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%
\$ 455.75	\$ 475.65	\$ 496.41	\$ 518.08	\$ 540.70	\$ 564.31	\$ 588.94	\$ 614.65	\$ 641.49	\$ 669.49	\$ 698.72	\$ 729.22	\$ 761.06	\$ 794.28	\$ 828.96	\$ 865.15	\$ 902.92	\$ 942.34

2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068
3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%
\$ 327.04	\$ 337.41	\$ 348.10	\$ 359.13	\$ 370.52	\$ 382.26	\$ 394.37	\$ 406.87	\$ 419.77	\$ 433.07	\$ 446.80	\$ 460.96	\$ 475.57	\$ 490.64	\$ 506.19	\$ 522.24	\$ 538.79	\$ 555.87

2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086
3rd Stage Growth Rates																	
4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%
\$ 983.48	\$ 1,026.41	\$ 1,071.22	\$ 1,117.99	\$ 1,166.79	\$ 1,217.73	\$ 1,270.90	\$ 1,326.38	\$ 1,384.28	\$ 1,444.72	\$ 1,507.79	\$ 1,573.61	\$ 1,642.31	\$ 1,714.01	\$ 1,788.84	\$ 1,866.93	\$ 1,948.44	\$ 2,033.50

2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086
3rd Stage Growth Rates																	
3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%
\$ 573.48	\$ 591.66	\$ 610.41	\$ 629.76	\$ 649.72	\$ 670.31	\$ 691.56	\$ 713.47	\$ 736.09	\$ 759.42	\$ 783.49	\$ 808.32	\$ 833.94	\$ 860.37	\$ 887.64	\$ 915.77	\$ 944.79	\$ 974.74

2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104
4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%
\$ 2,122.27	\$ 2,214.92	\$ 2,311.62	\$ 2,412.54	\$ 2,517.86	\$ 2,627.78	\$ 2,742.50	\$ 2,862.23	\$ 2,987.19	\$ 3,117.60	\$ 3,253.70	\$ 3,395.75	\$ 3,543.99	\$ 3,698.71	\$ 3,860.18	\$ 4,028.71	\$ 4,204.59	\$ 4,388.14

2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104
3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%
\$ 1,005.63	\$ 1,037.51	\$ 1,070.39	\$ 1,104.31	\$ 1,139.31	\$ 1,175.42	\$ 1,212.68	\$ 1,251.11	\$ 1,290.77	\$ 1,331.68	\$ 1,373.88	\$ 1,417.43	\$ 1,462.35	\$ 1,508.70	\$ 1,556.52	\$ 1,605.85	\$ 1,656.75	\$ 1,709.26

2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122
4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%
\$ 4,579.72	\$ 4,779.65	\$ 4,988.31	\$ 5,206.09	\$ 5,433.37	\$ 5,670.57	\$ 5,918.13	\$ 6,176.49	\$ 6,446.14	\$ 6,727.55	\$ 7,021.25	\$ 7,327.78	\$ 7,647.68	\$ 7,981.56	\$ 8,330.00	\$ 8,693.66	\$ 9,073.20	\$ 9,469.30

2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122
3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%
\$ 1,763.43	\$ 1,819.32	\$ 1,876.98	\$ 1,936.47	\$ 1,997.85	\$ 2,061.17	\$ 2,126.50	\$ 2,193.89	\$ 2,263.43	\$ 2,335.17	\$ 2,409.18	\$ 2,485.54	\$ 2,564.31	\$ 2,645.59	\$ 2,729.44	\$ 2,815.94	\$ 2,905.19	\$ 2,997.27

2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133
4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%	4.366%
\$ 9,882.70	\$ 10,314.15	\$ 10,764.43	\$ 11,234.37	\$ 11,724.82	\$ 12,236.69	\$ 12,770.90	\$ 13,328.43	\$ 13,910.31	\$ 14,517.58	\$ 15,151.37

2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133
3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%	3.169%
\$ 3,092.27	\$ 3,190.28	\$ 3,291.39	\$ 3,395.71	\$ 3,503.33	\$ 3,614.37	\$ 3,728.92	\$ 3,847.11	\$ 3,969.04	\$ 4,094.84	\$ 4,224.62

Corporate Bond Yield Averages

<u>2016</u>	Corporate by Ratings					Public Utility Bonds				Industrial Bonds				Corp. by Groups	
	Av. Corp	Aaa	Aa	A	Baa	Aaa	Aa	A	Baa	Aaa	Aa	A	Baa	P.U.	IND.
January	4.56	4.00	4.12	4.35	5.45	-	4.09	4.27	5.49	4.00	4.16	4.42	5.40	4.62	4.50
February	4.44	3.96	3.98	4.22	5.34	-	3.94	4.11	5.28	3.96	4.02	4.33	5.39	4.44	4.43
March	4.33	3.82	3.91	4.16	5.13	-	3.93	4.16	5.12	3.82	3.89	4.16	5.14	4.40	4.25
April	4.09	3.62	3.71	3.98	4.79	-	3.74	4.00	4.75	3.62	3.67	3.95	4.82	4.16	4.01
May	4.04	3.65	3.70	3.94	4.68	-	3.65	3.93	4.60	3.65	3.73	3.95	4.75	4.06	4.02
June	3.91	3.50	3.60	3.80	4.53	-	3.56	3.78	4.47	3.50	3.63	3.82	4.58	3.93	3.88
July	3.67	3.28	3.39	3.58	4.22	-	3.36	3.57	4.16	3.28	3.42	3.58	4.27	3.70	3.64
August	3.70	3.32	3.42	3.60	4.24	-	3.39	3.59	4.20	3.32	3.45	3.61	4.27	3.73	3.66
September	3.78	3.41	3.50	3.68	4.31	-	3.47	3.66	4.27	3.41	3.53	3.69	4.35	3.80	3.75
October	3.87	3.51	3.61	3.78	4.38	-	3.59	3.77	4.34	3.51	3.63	3.79	4.40	3.90	3.84
November	4.20	3.86	3.94	4.11	4.71	-	3.91	4.08	4.64	3.86	3.97	4.14	4.77	4.21	4.19
December	4.36	4.06	4.12	4.28	4.83	-	4.11	4.27	4.79	4.06	4.13	4.29	4.85	4.39	4.33
Yrly Average	4.08	3.67	3.75	3.96	4.72		3.73	3.93	4.68	3.67	3.77	3.98	4.75	4.11	4.04
Yrly Median	4.07	3.64	3.71	3.96	4.70		3.70	3.97	4.62	3.64	3.70	3.95	4.76	4.11	4.02
4th Qtr Average	4.14	3.81	3.89	4.06	4.64		3.87	4.04	4.59	3.81	3.91	4.07	4.67	4.17	4.12
4th Qtr Median	4.20	3.86	3.94	4.11	4.71		3.91	4.08	4.64	3.86	3.97	4.14	4.77	4.21	4.19

Source: *Mergent Bond Record, January 2017, p. 201*

Aaa	Obligations rated Aaa are judged to be of the highest quality, subject to the lowest level of credit risk
Aa	Obligations rated Aa are judged to be of high quality and are subject to very low credit risk.
A	Obligations rated A are judged to be upper-medium grade and are subject to low credit risk.
Baa	Obligations rated Baa are judged to be medium-grade and subject to moderate credit risk and as such
Ba	Obligations rated Ba are judged to be speculative and are subject to substantial credit risk.
B	Obligations rated B are considered speculative and are subject to high credit risk.
Caa	Obligations rated Caa are judged to be speculative of poor standing and are subject to very high credit risk
Ca	Obligations rated Ca are highly speculative and are likely in, or very near, default, with some prospect
C	Obligations rated C are the lowest rated and are typically in default, with little prospect for recovery

https://www.moodys.com/researchdocumentcontentpage.aspx?docid=PBC_79004

↳

It may possess certain speculative characteristics.

High risk.

Low probability of recovery of principal and interest.

High probability of principal or interest.