

COST OF CAPITAL STUDY

**YIELD CAPITALIZATION
 2018 ASSESSMENT YEAR**

APPENDIX C

Railroads

EQUITY RATE					12.00%	
CAPITAL ASSET PRICING MODEL						PAGE
	CAPM Ex Ante		8.21%			6
DIVIDEND GROWTH MODELS (Single Stage)						
	Value Line, based on Dividends Growth		11.00%			7
	Value Line, based on Earnings Growth		13.00%			8
	Value Line, based on Return on Equity		9.75%			9
	FCFE GROWTH MODEL (Multi Stage)		11.00%			10
				RANGE	8.2125% - 13%	
DEBT RATE					4.25%	11
SECURED DEBT (LEASE) RATE					3.75%	11
MARKET CAPITAL STRUCTURE						
	Equity	78%	x	12.00%	=	9.36%
	Debt	22%	x	4.25%	=	0.94%
	Marginal Tax Rate	24%	=	(1-.24)	x	0.94%
						<u>0.71%</u>
WEIGHTED AVERAGE COST OF CAPITAL					10.1%	

rounded

SUPPORT FOR GUIDELINE COMPANIES

WASHINGTON STATE DEPARTMENT OF REVENUE

2018 ASSESSMENT YEAR

RAILROADS

Capital Structure at Book Value

Company	Ticker	Beta	Fin'l Strength	Operating Margin	P/E Ratio	Div'd Yield	Common Stock	%	Preferred Stock	%	Long Term Debt	%	Total Debt & Equity
Union Pacific Corp.	UNP	1.05	A++	47.5%	17.4	2.19%	24,913,867,200	60.7%	-	0.0%	16,144,000,000	39.3%	41,057,867,200
Norfolk Southern Corp.	NSC	1.15	A	42.0%	16.6	2.00%	16,003,230,950	63.7%	-	0.0%	9,136,000,000	36.3%	25,139,230,950
CSX Corp.	CSX	1.25	B++	43.5%	17.7	1.61%	14,701,743,350	55.5%	-	0.0%	11,790,000,000	44.5%	26,491,743,350
Kansas City Southern	KSU	1.15	A	48.1%	16.7	1.37%	4,533,301,470	67.0%	-	0.0%	2,236,000,000	33.0%	6,769,301,470
Genesee & Wyoming	GWR	1.50	B+	29.5%	20.7	0.00%	3,843,014,400	62.5%	-	0.0%	2,303,000,000	37.5%	6,146,014,400
Canadian National	CNI	1.05	A	53.0%	19.2	1.73%	13,275,000,000	65.8%	-	0.0%	6,910,920,000	34.2%	20,185,920,000
Canadian Pacific	CP	1.20	B++	52.0%	17.4	0.93%	5,089,500,000	46.5%	-	0.0%	5,856,270,000	53.5%	10,945,770,000
Mean		1.19		45.1%	18.0	1.40%	11,765,665,339	60.2%		0.0%	7,768,027,143	39.8%	
Weighted Mean							82,359,657,370	60.2%	-	0.00%	54,376,190,000	39.8%	136,735,847,370
Median		1.15			17.4	1.61%		62.5%		0.0%			37.5%
Std Dev		0.15			1.49	0.7%		7.1%		-			7.1%
Coeff Var		0.13			0.08	0.53		11.8%		-			17.9%
Harmonic Mean		1.18			17.86	#NUM!		59.4%		-			38.8%
Max		1.50			20.72	2.19%		67.0%		0.0%			53.5%
Min		1.05			16.58	0.00%		46.5%		0.0%			33.0%

Say **1.15**

**SUPPORT FOR CAPITAL STRUCTURE
MARKET VALUE**

WASHINGTON STATE DEPARTMENT OF REVENUE

2018 ASSESSMENT YEAR

RAILROADS

Capital Structure at Market Value

Company	Ticker	Stock Price	Common Shares	Common Stock	%	Preferred Stock	%	Operating Lease	%	Long Term Debt	%	Total Debt & Equity
Union Pacific Corp.	UNP	133.39	787,168,000	105,000,339,520	80.6%	-	0.0%	7,140,075,465	5.5%	18,200,000,000	14.0%	130,340,414,985
Norfolk Southern Corp.	NSC	144.21	283,997,000	40,955,207,370	73.9%	-	0.0%	2,700,905,140	4.9%	11,771,000,000	21.2%	55,427,112,510
CSX Corp.	CSX	54.79	893,723,000	48,967,083,170	77.3%	-	0.0%	1,161,268,999	1.8%	13,220,000,000	20.9%	63,348,352,169
Kansas City Southern	KSU	105.22	103,053,000	10,843,236,660	76.8%	242,170	0.0%	888,908,297	6.3%	2,377,800,000	16.9%	14,110,187,127
Genesee & Wyoming	GWR	78.73	62,336,000	4,907,713,280	66.0%	-	0.0%	242,707,477	3.3%	2,279,907,000	30.7%	7,430,327,757
Canadian National	CNI	82.50	750,000,000	61,875,000,000	83.8%	-	0.0%	2,328,715,012	3.2%	9,609,560,000	13.0%	73,813,275,012
Canadian Pacific	CP	182.76	145,000,000	26,500,200,000	74.8%	-	0.0%	1,272,850,424	3.6%	7,647,200,000	21.6%	35,420,250,424
			Mean		76.2%		0.0%		4.1%		19.7%	
			Weighted Mean	299,048,780,000	78.7%	242,170	0.00%	15,735,430,814	4.14%	65,105,467,000	17.1%	379,889,919,984
			Median		76.8%		0.00%		3.59%		20.9%	
			Harmonic Mean		75.8%		#NUM!		3.5%		18.3%	
			Std Dev		5.6%		0.0%		1.5%		6.0%	
			Coeff Var		13.57		0.38		2.64		3.31	
			Max		83.8%		0.0%		6.3%		30.7%	
			Min		66.0%		0.0%		1.8%		13.0%	

Source:

Stock Price: Yahoo

Market Value Debt: Bond Analysis

Target 78% 0% 4% 18% 100%

SUPPORT FOR MARKET MULTIPLES

WASHINGTON STATE DEPARTMENT OF REVENUE

2018 ASSESSMENT YEAR

RAILROADS

Company	Ticker	Stock Price	Revenues	Multiple	Cash Flow	Multiple	Earnings	Multiple	Book Value	Multiple
Union Pacific Corp.	UNP	133.39	27.05	4.9	8.60	15.5	5.80	23.0	31.65	4.2
Norfolk Southern Corp.	NSC	144.21	36.35	4.0	10.15	14.2	6.54	22.1	56.35	2.6
CSX Corp.	CSX	54.79	12.75	4.3	3.80	14.4	2.30	23.8	16.45	3.33
Kansas City Southern	KSU	105.22	25.07	4.20	8.60	12.2	5.17	20.4	43.99	2.4
Genesee & Wyoming	GWR	78.73	34.95	2.3	6.85	11.5	2.91	27.1	61.65	1.28
Canadian National	CNI	82.50	13.55	6.1	5.20	15.9	3.82	21.6	17.70	4.66
Canadian Pacific	CP	182.76	34.85	5.2	12.15	15.0	8.70	21.0	35.10	5.21
		Mean		4.4		14.1		22.7		3.4
		Median		4.3		14.4		22.1		3.3
		Harmonic Mean		4.1		13.9		22.5		2.8
		Max		6.1		15.9		27.1		5.2
		Min		2.3		11.5		20.4		1.28
		Std Dev		1.2		1.7		2.2		1.4
		Coefficient of Variation		0.3		0.1		0.1		0.4
		Percentile .25		4.1		13.2		21.3		2.5
		Percentile .75		5.1		15.3		23.4		4.4
		Say		4.25		14.00		22.25		3.25

ENTERPRISE VALUE MULTIPLES

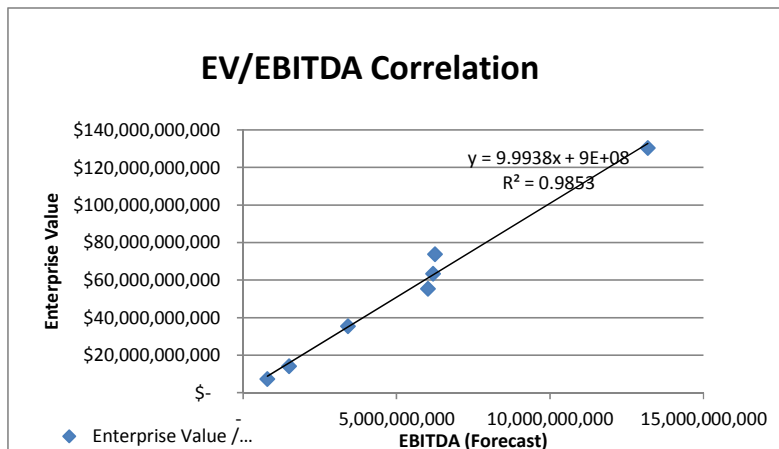
WASHINGTON STATE DEPARTMENT OF REVENUE

2018 ASSESSMENT YEAR

RAILROADS

Guideline Companies	Ticker	EV+OL	EBITDA + OL	EV / EBITDA	Annual Cash Flow Rate Change VL	EBITDA	EV / EBITDA	Revenue	EV/Sales	Cash Flow	Debt Service	EV / CF
			historic	historic	forecast	forecast	forecast	Forecast	Forecast	Forecast	Forecast	
Union Pacific Corp.	UNP	\$ 130,273,414,985	10,646,000,000	12.24	23.84%	13,183,709,302	9.88	22,268,000,000	5.85	8,094,000,000	773,500,000	14.69
Norfolk Southern Corp.	NSC	\$ 55,427,112,510	4,814,000,000	11.51	25.12%	6,023,428,571	9.20	10,998,600,000	5.04	3,505,200,000	500,267,500	13.84
CSX Corp.	CSX	\$ 63,327,352,169	5,060,000,000	12.52	22.37%	6,191,842,105	10.23	11,616,000,000	5.45	4,092,000,000	561,850,000	13.61
Kansas City Southern	KSU	\$ 14,110,187,127	1,302,500,000	10.83	14.53%	1,491,816,860	9.46	2,701,750,000	5.22	994,850,000	101,056,500	12.88
Genesee & Wyoming	GWR	\$ 7,308,327,757	665,730,000	10.98	18.98%	792,072,920	9.23	2,376,320,000	3.08	515,080,000	96,896,048	11.94
Canadian National	CNI	\$ 73,813,275,012	5,553,700,000	13.29	12.50%	6,247,912,500	11.81	11,016,600,000	6.70	4,282,200,000	408,406,300	15.74
Canadian Pacific	CP	\$ 35,420,250,424	2,810,820,000	12.60	21.40%	3,412,312,346	10.38	5,601,600,000	6.32	2,124,000,000	325,006,000	14.46
Mean							10.03					
Median							9.88			3,372,475,714		13.88
Max							11.81			5,850,000,000		
Min							9.20					
Std Dev							0.92					
Coefficient of Variation							0.09					
Harmonic Mean							9.96		5.08	1,626,327,822		13.78
Say							10.00		5.25			14.00

9.50 put in income direct excluding IPP
 10.75 put in income direct including IPP



Forecast EV/EBITDA By Rank

Guideline Companies	EV/EBITDA forecast		
Norfolk Southern Corp.	9.20	9.44	Low Average
Genesee & Wyoming	9.23	9.34	Low Median
Kansas City Southern	9.46	9.50	Say
Union Pacific Corp.	9.88		
CSX Corp.	10.23	10.81	Average
Canadian Pacific	10.38	10.38	Median
Canadian National	11.81	10.75	Say

SUPPORT FOR YIELD CAPITALIZATION EQUITY COMPONENT CAPITAL ASSET PRICING MODEL

WASHINGTON STATE DEPARTMENT OF REVENUE
2018 ASSESSMENT YEAR
RAILROADS

$$\text{Ex Ante} \\ \text{Ke} = \text{Rf} + \text{B} (\text{Rp})$$

Ke = Cost of Equity **8.21%**

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Rm =	rate of return	7.50%
Rf =	risk free rate	2.75%
Rp =	risk premium	4.75%
B =	Beta	1.15

Rp = Risk Premium **4.75%**

to above

Shannon Pratt and Roger Grabowski	3.5 - 6%	
Cost of Capital, Applications and Examples, Third Edition, 2008, Page 113		
Dr. Aswath Damodaran	5.08%	chart page 13
http://pages.stern.nyu.edu/~adamodar/	4.73%	adjusted for Rf
2016 Implied Premium		
John Graham and Campbell Harvey	7.16%	10 year expected real return
Duke CFO magazine Global Business Outlook	2.37%	Rf rate used in survey
4th Qtr 2016	6.78%	adjusted for Rf

Rf = Risk Free Rate **2.75%**

to above

Value Line Investment Survey, Selected Yields January 5, 2018, page 2573
as of 12-27-17 US Treasury Securities year end data

	5 year	2.19%
	10 year	2.41%
	30 year	2.75%
	30 year Zero	2.87%

Federal Reserve Statistical Release (<http://www.federalreserve.gov/Releases/H15/Current/>)
as of 12-29-17 Treasury Constant Maturities

	5 year	2.20%
	10 year	2.40%
	20 year	2.58%
	30 year	2.74%
	20 year TIPS	<u>0.61%</u> 1.97%
	30 year TIPS	<u>0.73%</u> 2.01%

TIPS inflation indication

Inflation **2.00%**

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Value Line Investment Survey, Economic Series January 5, 2018, page 1500
Consumer Price Index Annual Rate of Change 2020-2022 2.50%

Federal Reserve Bank of Philadelphia
The Livingston Survey, December 15, 2017 Table 3
Inflation median (measured by the CPI) over next 10 years 2.34%
<https://www.philadelphiafed.org/research-and-data/real-time-center/livingston-survey>

Gross Domestic Product (GDP) **3.80%**

Federal Reserve Projected Long Run Real GDP Growth
Median Projection Value From Dec 13, 2017 Report
<http://www.federalreserve.gov/monetarypolicy/fomccalendars.htm> 1.80%

Congressional Budget Office Real GDP Economic Projections
The Budget and Economic Outlook 2018-2028 2018-2022 Table D-1, pg 140
Average Percentage Change From Year To Year 2023-2028 2.18%
<http://www.cbo.gov/publication/53651> 1.73%

Federal Reserve Bank of Philadelphia
The Livingston Survey, December 15, 2017
Average Annual Real GDP Growth Rate for Next Ten Years pg 4
<https://www.philadelphiafed.org/research-and-data/real-time-center/livingston> 2.18%

**SUPPORT FOR YIELD CAPITALIZATION EQUITY COMPONENT
DIVIDEND GROWTH MODEL**

WASHINGTON STATE DEPARTMENT OF REVENUE
2018 ASSESSMENT YEAR
RAILROADS

Based on Dividend Growth

$$K_e = (D_1 / P_0) + G_D$$

Ke = Cost of Equity
D1 = Expected Dividends
P0 = Current Stock Price
GD = Sustainable Growth -- Dividend
assumption Sustainable growth can not exceed inflation plus real GDP

Company	Ticker	Stock Price (Po)	Expected Dividend (D1)	Dividend Yield (D1/Po)	Dividend Growth (GD) VL	Ke	Forecast Dividend Growth	Ke Forecast Growth	Sustainable Dividend Growth	Ke Sustainable Growth
Union Pacific Corp.	UNP	133.39	2.92	2.19%	8.50%	10.69%	10.52%	12.71%	3.80%	5.99%
Norfolk Southern Corp.	NSC	144.21	2.88	2.00%	6.00%	8.00%	6.98%	8.97%	3.80%	5.80%
CSX Corp.	CSX	54.79	0.88	1.61%	11.00%	12.61%	14.51%	16.11%	3.80%	5.41%
Kansas City Southern	KSU	105.22	1.44	1.37%	8.50%	9.87%	10.52%	11.89%	3.80%	5.17%
Genesee & Wyoming	GWR	78.73	0.00						3.80%	
Canadian National	CNI	82.50	1.43	1.73%	11.00%	12.73%	14.51%	16.24%	3.80%	5.53%
Canadian Pacific	CP	182.76	1.70	0.93%	11.50%	12.43%	15.36%	16.29%	3.80%	4.73%
			Mean			11.05%				5.44%
			Median			11.56%				5.47%
			Harmonic Mean			10.75%				5.41%
			Std Dev			1.90%				0.45%
			Coeff Var			17.17%				8.29%
			Max			12.73%				5.99%
			Min			8.00%				4.73%

Source: Value Line Projections 14-16 to 20-22

11.00%

5.50%

Say

11.00%
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SUPPORT FOR YIELD CAPITALIZATION EQUITY COMPONENT DIVIDEND GROWTH MODEL

WASHINGTON STATE DEPARTMENT OF REVENUE
2018 ASSESSMENT YEAR
RAILROADS

Based on Earnings Growth

$$K_e = (D_1 / P_0) + G$$

Ke = Cost of Equity
D1 = Expected Dividends
P0 = Current Stock Price
G = Sustainable Growth -- Earnings
assumption Sustainable growth can not exceed inflation plus real GDP

must be hiç

Company	Ticker	Stock Price (Po)	Expected Earnings (D1)	Yield (D1/Po)	Earnings Growth (G) VL	Ke	Forecast Earnings Growth	Ke Forecast Growth	Sustainable Earnings Growth	Ke Sustainable Growth
Union Pacific Corp.	UNP	133.390	7.65	5.74%	11.00%	16.74%	14.51%	20.24%	3.80%	9.54%
Norfolk Southern Corp.	NSC	144.210	8.70	6.03%	11.50%	17.53%	15.36%	21.39%	3.80%	9.83%
CSX Corp.	CSX	54.790	3.10	5.66%	13.50%	19.16%	18.96%	24.62%	3.80%	9.46%
Kansas City Southern	KSU	105.220	6.30	5.99%	12.50%	18.49%	17.12%	23.11%	3.80%	9.79%
Genesee & Wyoming	GWR	78.730	3.80	4.83%	6.00%	10.83%	6.98%	11.80%	3.80%	8.63%
Canadian National	CNI	82.500	4.30	5.21%	10.00%	15.21%	12.86%	18.07%	3.80%	9.01%
Canadian Pacific	CP	182.760	10.50	5.75%	11.50%	17.25%	15.36%	21.10%	3.80%	9.55%
			Mean	5.60%		16.46%				9.40%
			Median	5.74%		17.25%				9.54%
			Harmonic Mean	5.57%		15.94%				9.38%
			Std Dev	0.43%		2.78%				0.43%
			Coeff Var	7.75%		16.92%				4.61%
			Max	6.03%		19.16%				9.83%
			Min	4.83%		10.83%				8.63%

Source: Value Line Projections 14-16 to 20-22

16.00%

9.50%

Say **13.00%**
to page 1

**SUPPORT FOR YIELD CAPITALIZATION EQUITY COMPONENT
DIVIDEND GROWTH MODEL**

WASHINGTON STATE DEPARTMENT OF REVENUE

2018 ASSESSMENT YEAR

RAILROADS

Based on Return on Equity

Ke = (D1 / Po) + G
Ke = Cost of Equity
D1 = Expected Dividends
E1 = Expected Earnings
Po = Current Price
G = Sustainable Growth
b = Retained Earnings % (plowback)
ROE = Return on Equity

Company	Ticker	Stock Price (Po)	Expected Dividend (D1)	Dividend Yield (D1/Po)	b (1-payout ratio)	ROE	Growth (b*ROE) (G)	Ke Dividends	Expected Earnings (E1)	Ke Earnings
Union Pacific Corp.	UNP	133.39	2.92	2.19%	62.0%	5.74%	3.56%	5.74%	7.65	9.29%
Norfolk Southern Corp.	NSC	144.21	2.88	2.00%	67.0%	6.03%	4.04%	6.04%	8.70	10.07%
CSX Corp.	CSX	54.79	0.88	1.61%	72.0%	5.66%	4.07%	5.68%	3.10	9.73%
Kansas City Southern	KSU	105.22	1.44	1.37%	77.0%	5.99%	4.61%	5.98%	6.30	10.60%
Genesee & Wyoming	GWR	78.73	0.00		100.0%	4.83%	4.83%		3.80	9.65%
Canadian National	CNI	82.50	1.43	1.73%	67.0%	5.21%	3.49%	5.23%	4.30	8.70%
Canadian Pacific	CP	182.76	1.70	0.93%	82.0%	5.75%	4.71%	5.64%	10.50	10.46%
							Mean	5.72%		9.79%
							Median	5.71%		9.73%
							Harmonic Mean	5.71%		9.75%
							Std Dev	0.29%		0.66%
							Coeff Var	5.08%		6.76%
							Max	6.04%		10.60%
							Min	5.23%		8.70%
								5.75%		9.75%

Say 9.75%
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SUPPORT FOR DEBT RATING AND DEBT YIELD RATE

WASHINGTON STATE DEPARTMENT OF REVENUE

2018 ASSESSMENT YEAR

RAILROADS

Company	Ticker	Mergent's Ratings	S&P Ratings	WAYTM	S&P YTM (avg)	Mergent's Ratings	S&P Ratings	Mergent's	S&P	
Union Pacific Corp.	UNP	Aa2	A	3.14%	3.25%	5	8	Aaa1	AAA+	1
Norfolk Southern Corp.	NSC	A3	BBB+	3.58%	3.45%	9	10	Aaa2	AAA	2
CSX Corp.	CSX	Baa1	BBB+	3.53%	3.36%	10	10	Aaa3	AAA-	3
Canadian Pacific	CP	Baa1	BBB+	1.36%	4.27%	10	10	Aa1	AA+	4
Kansas City Southern	KSU	Baa3	BBB-	2.75%		12	12	Aa2	AA	5
Canadian National	CNI	A2	A	2.51%	3.16%	8	8	Aa3	AA-	6
Genesee & Wyoming	GWR	Ba2	BB			14	14	A1	A+	7
Overall Average Debt Rating		Baa1	BBB+	2.81%		9.7	10.3	A2	A	8

bond analysis, A-BBB bonds

3.35%

All issues 20+ year maturities

Guideline Companies, All Ratings

3.11% 4.25%

bond analysis page 11

Mergent's Bond Record January 2018, page 249

Corporate	Aaa	Aa	A	Baa
October	3.60%	3.75%	3.91%	4.32%
November	3.57%	3.67%	3.84%	4.27%
December	3.51%	3.61%	3.79%	4.22%
4th Qtr Average	3.56%	3.68%	3.85%	4.27%
Public Utilities	Aaa	Aa	A	Baa
October		3.74%	3.91%	4.26%
November		3.65%	3.83%	4.16%
December		3.62%	3.79%	4.14%
4th Qtr Average		3.67%	3.84%	4.19%
Industrials	Aaa	Aa	A	Baa
October	3.60%	3.74%	3.90%	4.37%
November	3.57%	3.68%	3.85%	4.37%
December	3.51%	3.60%	3.79%	4.31%
4th Qtr Average	3.56%	3.67%	3.85%	4.35%

Debt Yield Rate

4.25%

Cost of Secured Debt (Operating Lease) Rate

3.75%

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Railroad Bond Analysis

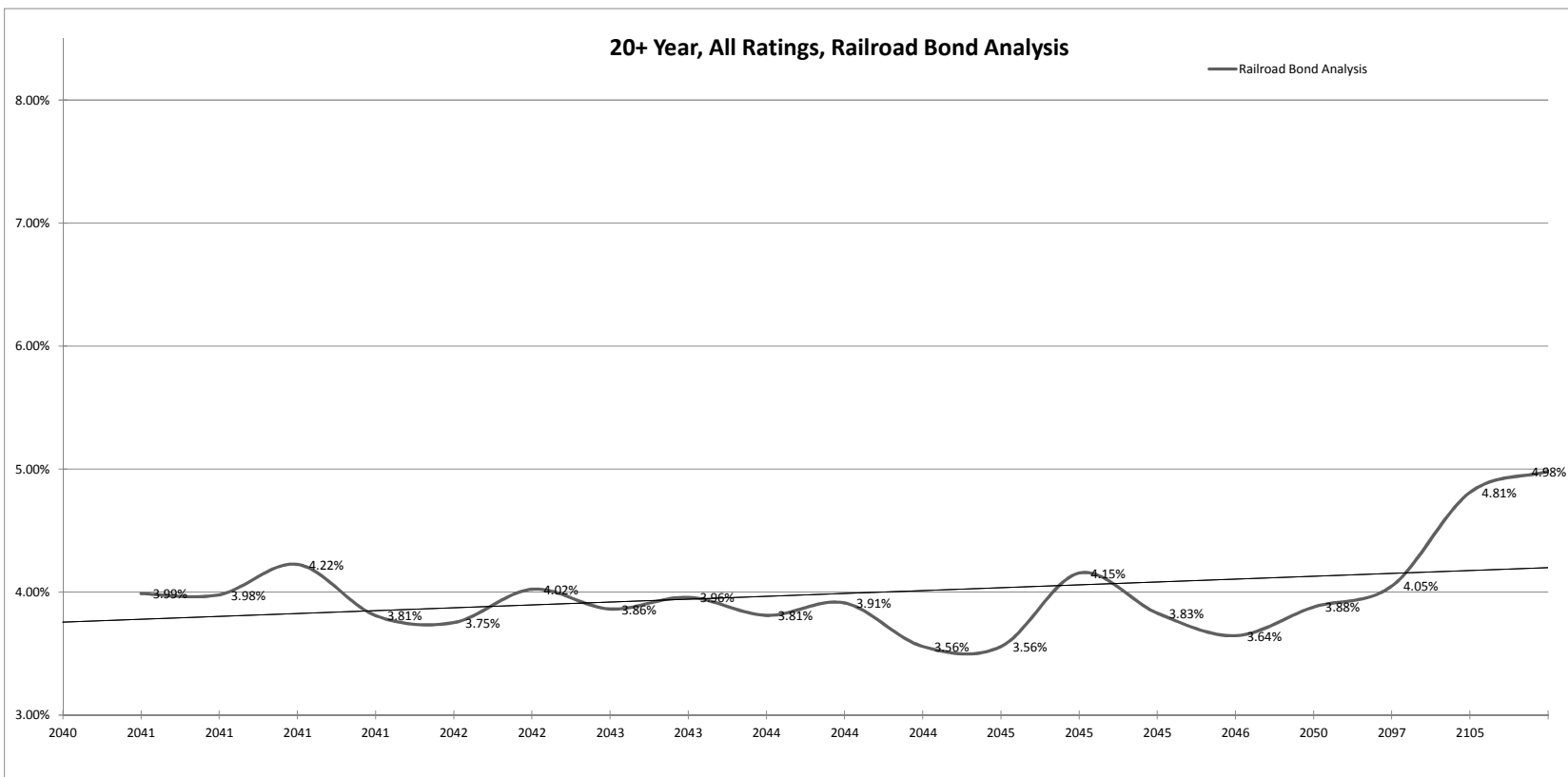
											Embedde						
Company	type	Call	coupon	maturity	Price 12/31/17	Issued / Book	current yield	YTM	Weighted A Rating		Mkt Val	Mkt : Book	d Rate	Debt Service	WAYTM	WAYTM	S&P YTM
Burlington Northern R.R.	Mtg L	NC	3.800	2020	102.04	\$ 1,000,000,000	3.724%	2.40%	0.06%	BBB+	\$ 1,020,400,000	102.04%		38,000,000	0.000559161	0.002622005	2.73
Burlington Northern R.R.	Mtg K	NC	6.550	2020	107.00	\$ 2,000,000,000	6.121%	1.78%	0.08%	BBB+	\$ 2,140,000,000	107.00%		131,000,000	0.000829433	0.003889363	2.89
Burlington Northern R.R.	Mtg O	NC	6.550	2020	107.00	\$ 1,150,000,000	6.121%	1.78%	0.05%	BBB+	\$ 1,230,500,000	107.00%		75,325,000	0.000476924	0.002236384	2.89
Burlington Northern RR	Mtg N	NC	8.150	2020	108.44	\$ 2,500,000,000	7.516%	2.36%	0.14%	BBB+	\$ 2,711,000,000	108.44%		203,750,000	0.001373479	0.006440493	3.68
Burlington Northern R.R.	Mtg P	NC	8.150	2020	108.44	\$ 1,000,000,000	7.516%	2.36%	0.05%	BBB+	\$ 1,084,400,000	108.44%		81,500,000	0.000549392	0.002576197	3.68
Burlington Northern R.R.	Mtg M	NC	3.200	2045	84.84	\$ 1,500,000,000	3.772%	4.15%	0.15%	BBB+	\$ 1,272,600,000	84.84%		48,000,000	0.001452355	0.006810356	4.15
	6 Book Val		600	sum	617.76	\$ 9,150,000,000	Percent of book	102.96%	0.52%		\$ 9,458,900,000	103.38%	6.31%	\$ 577,575,000		2.457%	
Canadian National Ry	Notes (frgn)	Z100	6.800	2018	102.58	\$ 200,000,000	6.63%	12.11%	0.06%	A	\$ 205,160,000	102.58%		13,600,000	0.000564573	0.013647073	4.11
Canadian National Ry	Notes		5.550	2019	103.76	\$ 550,000,000	5.35%	-1.86%	-0.02%	A	\$ 570,680,000	103.76%		30,525,000	-0.000239027	-0.005777844	1.72
Canadian National Ry	Deb (frgn)	NC	6.225	2023	121.42	\$ 300,000,000	6.28%	2.53%	0.02%	A	\$ 364,260,000	121.42%		22,875,000	0.000176837	0.004274563	2.95
Canadian National Ry	Notes (frgn)	Z100	6.900	2028	132.20	\$ 475,000,000	5.22%	2.96%	0.03%	A	\$ 627,950,000	132.20%		32,775,000	0.000327885	0.007925757	3.34
Canadian National Ry	Secured (frg	Put-able	6.712	2036	140.68	\$ 250,000,000	4.77%	3.55%	0.02%	A	\$ 351,700,000	140.68%		16,780,000	0.000206909	0.005001483	3.68
	5		500	sum	600.64	\$ 1,775,000,000	Percent of book	120.13%	0.10%		\$ 2,119,750,000	119.42%	6.57%	\$ 116,555,000		2.507%	
CSX Corp	Notes		6.250	2018	106.80	\$ 600,000,000	5.85%	20.51%	0.29%	NR	\$ 640,800,000	106.80%		37,500,000	0.00286882867	0.011492994	0.02
CSX Corp	Notes		7.375	2019	112.42	\$ 500,000,000	6.56%	-14.69%	-0.17%	NR	\$ 562,100,000	112.42%		36,875,000	-0.00171208111	-0.006858875	
CSX Corp	Fixed Rt		3.700	2020	103.22	\$ 500,000,000	3.58%	1.51%	0.02%	BBB+	\$ 516,100,000	103.22%		18,500,000	0.00017627977	0.000706205	2.57
CSX Corp	Deb	NC	8.100	2022	121.31	\$ 250,000,000	6.68%	1.77%	0.01%	BBB+	\$ 303,275,000	121.31%		20,250,000	0.00010298810	0.000412587	3.39
CSX Corp	Deb	NC	8.625	2022	122.58	\$ 200,000,000	7.04%	1.90%	0.01%	BBB+	\$ 245,160,000	122.58%		17,250,000	0.00008838736	0.000354094	2.61
CSX Corp	Fixed Rt		3.700	2023	103.55	\$ 500,000,000	3.57%	2.85%	0.03%	BBB+	\$ 517,750,000	103.55%		18,500,000	0.000331924	0.001329742	3.05
CSX Corp	Fixed Rt		3.400	2024	102.55	\$ 550,000,000	3.32%	2.89%	0.04%	BBB+	\$ 564,025,000	102.55%		18,700,000	0.000370699	0.001485081	3
CSX Corp	Fixed Rt		3.350	2025	101.31	\$ 600,000,000	3.31%	3.12%	0.04%	NR	\$ 607,860,000	101.31%		20,100,000	0.000436888	0.001750243	3.17
CSX Corp	Deb		7.250	2027	127.36	\$ 2,500,000,000	5.69%	3.48%	0.20%	BBB+	\$ 3,184,000,000	127.36%		181,250,000	0.002025882	0.008116013	3.63
CSX Corp	MTN Ser C		6.800	2028	126.16	\$ 200,000,000	5.39%	3.51%	0.02%	BBB+	\$ 252,320,000	126.16%		13,600,000	0.000163779	0.000656127	3.83
CSX Corp	NOTES	Z100	6.000	2036	127.13	\$ 400,000,000	4.72%	3.84%	0.04%	BBB+	\$ 508,520,000	127.13%		24,000,000	0.000358183	0.001434939	3.95
CSX Corp	NOTES	Z100	6.150	2037	130.08	\$ 700,000,000	4.73%	3.85%	0.06%	BBB+	\$ 910,560,000	130.08%		43,050,000	0.000627708	0.0025147	3.88
CSX Corp	Fixed Rt nts		6.220	2040	131.83	\$ 660,000,000	4.72%	3.99%	0.06%	BBB+	\$ 870,078,000	131.83%		41,052,000	0.000613403	0.002457392	4.72
CSX Corp	NOTES		5.500	2041	122.36	\$ 550,000,000	4.49%	3.98%	0.05%	BBB+	\$ 672,980,000	122.36%		30,250,000	0.000509885	0.002042681	4
CSX Corp	NOTES		4.750	2042	110.92	\$ 600,000,000	4.28%	4.02%	0.06%	BBB+	\$ 665,520,000	110.92%		28,500,000	0.000562568	0.00225374	4.03
CSX Corp	NOTES		4.100	2044	103.01	\$ 800,000,000	3.98%	3.91%	0.07%	BBB+	\$ 824,080,000	103.01%		32,800,000	0.000729288	0.002921645	3.9
CSX Corp	FR SR Note		3.950	2050	98.26	\$ 600,000,000	4.02%	4.05%	0.06%	BBB+	\$ 589,560,000	98.26%		23,700,000	0.000566176	0.002268195	4.05
	17		1700	sum	1950.85	\$ 10,710,000,000	Percent of book	114.76%	0.88%		\$ 12,434,688,000	116.10%	5.66%	\$ 605,877,000		3.534%	
Norfolk Southern	SR NTS		5.750	2018	100.89	\$ 600,000,000	5.70%	7.56%	0.11%	BBB+	\$ 605,340,000	100.89%		34,500,000	0.0010576202	0.00385182	
Norfolk Southern	SR NTS		5.750	2018	100.89	\$ 600,000,000	5.70%	7.56%	0.11%	BBB+	\$ 605,340,000	100.89%		34,500,000	0.00105762	0.00385182	
Norfolk Southern	SR NTS		5.900	2019	105.07	\$ 500,000,000	5.62%	-3.94%	-0.05%	BBB+	\$ 525,350,000	105.07%		29,500,000	-0.000459074	-0.00167193	0.79
Norfolk Southern	Global Sr N	100	3.250	2021	102.55	\$ 500,000,000	3.17%	2.19%	0.03%	BBB+	\$ 512,750,000	102.55%		16,250,000	0.000255289	0.00092975	2.57
Norfolk Southern	SR Notes	NC	9.000	2021	116.57	\$ 250,000,000	7.72%	2.12%	0.01%	NR	\$ 291,425,000	116.57%		22,500,000	0.000123777	0.00045079	3.12
Norfolk Southern	SR NTS		3.000	2022	101.12	\$ 600,000,000	2.97%	2.66%	0.04%	BBB+	\$ 606,720,000	101.12%		18,000,000	0.000372065	0.00135505	2.71
Norfolk Southern	Notes		2.903	2023	100.31	\$ 586,000,000	2.89%	2.83%	0.04%	BBB+	\$ 587,816,600	100.31%		17,011,580	0.000386332	0.00140701	2.83
Norfolk Southern	Notes		2.903	2023	100.31	\$ 586,000,000	2.89%	2.83%	0.04%	BBB+	\$ 587,816,600	100.31%		17,011,580	0.000386332	0.00140701	2.83
Norfolk Southern	Notes	Z100	5.590	2025	114.30	\$ 367,000,000	4.89%	3.12%	0.03%	BBB+	\$ 419,481,000	114.30%		20,515,300	0.000267293	0.00097347	3.27
Norfolk Southern	Notes	Z100	7.800	2027	135.36	\$ 800,000,000	5.76%	3.02%	0.06%	BBB+	\$ 1,082,880,000	135.36%		62,400,000	0.000563257	0.00205136	3.22
Norfolk Southern	Notes	Z100	5.640	2029	117.78	\$ 350,000,000	4.79%	3.58%	0.03%	BBB+	\$ 412,230,000	117.78%		19,740,000	0.00029194	0.00106324	3.66
Norfolk Southern	SR Notes	Z100	7.250	2031	140.39	\$ 1,000,000,000	5.16%	3.26%	0.08%	BBB+	\$ 1,403,900,000	140.39%		72,500,000	0.000760582	0.00277001	3.37
Norfolk Southern	Notes	Z100	7.050	2037	145.00	\$ 750,000,000	4.86%	3.66%	0.06%	BBB+	\$ 1,087,500,000	145.00%		52,875,000	0.000639664	0.00232963	3.71
Norfolk Southern	Notes		4.837	2041	108.78	\$ 596,000,000	4.45%	4.22%	0.06%	BBB+	\$ 648,328,800	108.78%		28,828,520	0.000586853	0.00213730	4.29
Norfolk Southern	Notes		4.837	2041	115.35	\$ 596,000,000	4.19%	3.81%	0.05%	BBB+	\$ 687,486,000	115.35%		28,828,520	0.000529104	0.001926979	3.85
Norfolk Southern	SR NTS		3.950	2042	101.34	\$ 600,000,000	3.90%	3.86%	0.05%	BBB+	\$ 608,040,000	101.34%		23,700,000	0.000540095	0.001967006	3.85
Norfolk Southern	SR NTS		4.800	2043	113.06	\$ 500,000,000	4.25%	3.96%	0.05%	BBB+	\$ 565,300,000	113.06%		24,000,000	0.000461202	0.001679683	3.98
Norfolk Southern	FR SR Note		4.450	2045	110.23	\$ 500,000,000	4.04%	3.83%	0.04%	BBB+	\$ 551,150,000	110.23%		22,250,000	0.000446185	0.001624989	3.83
Norfolk Southern	FR SR Note		4.650	2046	112.91	\$ 600,000,000	4.12%	3.88%	0.05%	NR	\$ 677,460,000	112.91%		27,900,000	0.00054234	0.001975185	3.88
Norfolk Southern	Notes	Z100	7.900	2097	162.63	\$ 350,000,000	4.86%	4.81%	0.04%	BBB+	\$ 569,205,000	162.63%		27,650,000	0.000392378	0.001429028	4.81
Norfolk Southern	FR SR Note	Z100	6.000	2105	120.13	\$ 550,000,000	4.99%	4.98%	0.06%	BBB+	\$ 660,715,000	120.13%		33,000,000	0.000638622	0.002325841	4.98
	21		2100	sum	2424.97	\$ 11,781,000,000	Percent of book	115.47%	0.98%		\$ 13,696,234,000	116.26%	5.38%	\$ 633,460,500		3.584%	
Union Pacific Corp	NOTES		5.700	2018	102.21	\$ 750,000,000	5.58%	10.23%	0.18%	A	\$ 766,575,000	102.21%		42,750,000	0.00178826	0.008973941	3.42
Union Pacific Corp	NOTES		7.875	2019	105.57	\$ 750,000,000	7.46%	-3.01%	-0.05%	A	\$ 791,775,000	105.57%		59,062,500	(0.00052661)	-0.002642677	2.18
Union Pacific Corp	NOTES		4.000	2021	104.55	\$ 500,000,000	3.83%	2.11%	0.02%	A	\$ 522,750,000	104.55%		20,000,000	0.00024616	0.001235304	2.41
Union Pacific Corp	NOTES		4.163	2022	109.15	\$ 750,000,000	3.81%	1.46%	0.03%	A	\$						

Union Pacific Corp	Fixed Rate		4.750	2043	114.80	\$	500,000,000	4.14%	3.81%	0.04%	A	\$	574,000,000	114.80%		23,750,000	0.00044400	0.002228115	3.83		
Union Pacific Corp	Fixed Rate		4.821	2044	120.95	\$	700,000,000	3.99%	3.56%	0.06%	A	\$	846,650,000	120.95%		33,747,000	0.00058041	0.002912653			
Union Pacific Corp	FR 144a		4.820	2044	120.95	\$	700,000,000	3.99%	3.56%	0.06%	A	\$	846,650,000	120.95%		33,740,000	0.00058027	0.002911934			
Union Pacific Corp	Fixed Rate		4.050	2045	106.81	\$	500,000,000	3.79%	3.64%	0.04%	NR	\$	534,050,000	106.81%		20,250,000	0.00042476	0.002131531	3.66		
15	Book Value 1500			sum	1730.60	\$	8,550,000,000	Percent of book	115.37%	0.63%		\$	9,732,820,000	113.83%	5.21%	\$	445,682,000		3.139%		
Kansas City Southern	Deb Z100		7.000	2025	125.00	\$	100,000,000	5.60%	2.75%	0.01%	NR	\$	125,000,000	125.00%		7,000,000	0.00006404	0.027477012	3.39		
1	Book Value 100			sum	125.00	\$	100,000,000	Percent of book	125.00%	0.01%		\$	125,000,000	125.00%	7.00%	\$	7,000,000		2.748%		
Canadian Natl Ry Co	Note		5.550	2019	103.76	\$	550,000,000	5.35%	-1.86%	-0.02%	A	\$	570,680,000	103.76%		\$	30,525,000	-0.000239027	-10.256%	1.72	
1	Book Value 100			sum	103.76	\$	550,000,000	Percent of book	103.76%	-0.02%		\$	570,680,000	103.76%	5.55%	\$	30,525,000		-10.256%		
Canadian Pacific, Ltd	Deb (foreigr NC		9.450	2021	121.42	\$	250,000,000	7.78%	0.77%	0.00%	BBB+	\$	303,550,000	121.42%		23,625,000	4.46794E-05	0.006610393	3.61		
Canadian Pacific Railway	Deb (foreigr NC		4.000	2022	96.75	\$	40,000,000	4.13%	5.04%	0.00%	A+	\$	38,700,000	96.75%		1,600,000	4.69486E-05	0.006946123	4.92		
2	Book Value 200			sum	218.17	\$	290,000,000	Percent of book	109.09%	0.01%		\$	342,250,000	118.02%	8.70%	\$	25,225,000		1.356%		
Total					\$	42,906,000,000						Total	\$	48,480,322,000	112.99%	5.69%	\$	2,441,899,500	3.11%	2.761%	3.350

This includes short term. For 20+ year maturities see below

Embedded debt rate 5.6913%
Weighted average yield to maturity 3.1111%
Debt service / Market value 5.0369%

Source: Standard & Poor's Bond Guide, January 2018, 2017 Yr End Prices



Railroad Bond Analysis

Company	type	Call	coupon	maturity	Price 12/12	Issued / Book	current yield	yield to maturity	Weighted Aver Rating	Mkt Val	Mkt : Book	Embedded F Debt Service	WAYTM	WAYTM	S&P YTM		
CSX Corp	Fixed Rt nts		6.220	2040	131.83	\$ 660,000,000	4.72%	3.99%	0.06%	BBB+	\$ 870,078,000	131.83%	41,052,000	0.000613403	0.002457392	4.72	
CSX Corp	NOTES		5.500	2041	122.36	\$ 550,000,000	4.49%	3.98%	0.05%	BBB+	\$ 672,980,000	122.36%	30,250,000	0.000509885	0.002042681	4	
Norfolk Southern	Notes		4.837	2041	108.78	\$ 596,000,000	4.45%	4.22%	0.06%	BBB+	\$ 648,328,800	108.78%	28,828,520	0.000586853	0.00213730	4.29	
Norfolk Southern	Notes		4.837	2041	115.35	\$ 596,000,000	4.19%	3.81%	0.05%	BBB+	\$ 687,486,000	115.35%	28,828,520	0.000529104	0.001926979	3.85	
Union Pacific Corp	SR NOTES		4.750	2041	114.99	\$ 500,000,000	4.13%	3.75%	0.04%	A	\$ 574,950,000	114.99%	23,750,000	0.00043721	0.002194013	3.78	
CSX Corp	NOTES		4.750	2042	110.92	\$ 600,000,000	4.28%	4.02%	0.06%	BBB+	\$ 665,520,000	110.92%	28,500,000	0.000562568	0.00225374	4.03	
Norfolk Southern	SR NTS		3.950	2042	101.34	\$ 600,000,000	3.90%	3.86%	0.05%	BBB+	\$ 608,040,000	101.34%	23,700,000	0.000540095	0.001967006	3.85	
Norfolk Southern	SR NTS		4.800	2043	113.06	\$ 500,000,000	4.25%	3.96%	0.05%	BBB+	\$ 565,300,000	113.06%	24,000,000	0.000461202	0.001679683	3.98	
Union Pacific Corp	Fixed Rate		4.750	2043	114.80	\$ 500,000,000	4.14%	3.81%	0.04%	A	\$ 574,000,000	114.80%	23,750,000	0.00044400	0.002228115	3.83	
CSX Corp	NOTES		4.100	2044	103.01	\$ 800,000,000	3.98%	3.91%	0.07%	BBB+	\$ 824,080,000	103.01%	32,800,000	0.000729288	0.002921645	3.9	
Union Pacific Corp	Fixed Rate		4.821	2044	120.95	\$ 700,000,000	3.99%	3.56%	0.06%	A	\$ 846,650,000	120.95%	33,747,000	0.00058041	0.002912653		
Union Pacific Corp	FR 144a		4.820	2044	120.95	\$ 700,000,000	3.99%	3.56%	0.06%	A	\$ 846,650,000	120.95%	33,740,000	0.00058027	0.002911934		
Burlington Northern R.R.	Mtg M NC		3.200	2045	84.84	\$ 1,500,000,000	3.772%	4.15%	0.15%	BBB+	\$ 1,272,600,000	84.84%	48,000,000	0.001452355	0.006810356	4.15	
Norfolk Southern	FR SR Note		4.450	2045	110.23	\$ 500,000,000	4.04%	3.83%	0.04%	BBB+	\$ 551,150,000	110.23%	22,250,000	0.000446185	0.001624989	3.83	
Union Pacific Corp	Fixed Rate		4.050	2045	106.81	\$ 500,000,000	3.79%	3.64%	0.04%	NR	\$ 534,050,000	106.81%	20,250,000	0.00042476	0.002131531	3.66	
Norfolk Southern	FR SR Note		4.650	2046	112.91	\$ 600,000,000	4.12%	3.88%	0.05%	NR	\$ 677,460,000	112.91%	27,900,000	0.00054234	0.001975185	3.88	
CSX Corp	FR SR Note		3.950	2050	98.26	\$ 600,000,000	4.02%	4.05%	0.06%	BBB+	\$ 589,560,000	98.26%	23,700,000	0.000566176	0.002268195	4.05	
Norfolk Southern	Notes Z100		7.900	2097	162.63	\$ 350,000,000	4.86%	4.81%	0.04%	BBB+	\$ 569,205,000	162.63%	27,650,000	0.000392378	0.001429028	4.81	
Norfolk Southern	FR SR Note Z100		6.000	2105	120.13	\$ 550,000,000	4.99%	4.98%	0.06%	BBB+	\$ 660,715,000	120.13%	33,000,000	0.000638622	0.002325841	4.98	
Total						\$ 11,902,000,000				Total	\$ 13,238,802,800	111.23%	4.67%	\$ 555,696,040	1.10%	0.243%	4.094

Source: Standard & Poor's Bond Guide, January 2018, 2017 Yr End Prices

Embedded debt rate 4.6689%
Weighted average yield to maturity 1.1037%
Debt service / Market value 4.1975%
S&P YTM 4.09%
 SAY 4.25%

DATA INPUT

WASHINGTON STATE DEPARTMENT OF REVENUE

2018 ASSESSMENT YEAR

RAILROADS

Instructions: Data entered on this page will flow to the applicable worksheets.

Guideline Companies		Stock Price	Beta	Current Year						Current Year			
				Revenues	Cash Flow	Earnings	Dividends	Bk Value	Common	Long-Term Debt	Capital Spending per share	Trailing P/E Ratio	Average Annual Dividend Yield
Name	Ticker	(Adj YE Close)	Per Share	Per Share	Per Share	Per Share	Stock	Shares		per share	VL	VL	
Union Pacific Corp.	UNP	\$133.39	1.05	\$ 27.05	\$ 8.60	\$ 5.80	\$ 2.48	31.65	787,168	\$ 15,930,000,000	\$ 4.15	22.1	2.30%
Norfolk Southern Corp.	NSC	\$144.21	1.15	\$ 36.35	\$ 10.15	\$ 6.54	\$ 2.44	56.35	283,997	\$ 9,136,000,000	\$ 5.95	21.5	2.10%
CSX Corp.	CSX	\$54.79	1.25	\$ 12.75	\$ 3.80	\$ 2.30	\$ 0.78	16.45	893,723	\$ 11,790,000,000	\$ 2.30	23.3	1.60%
Kansas City Southern	KSU	\$105.22	1.15	\$ 25.07	\$ 8.60	\$ 5.17	\$ 1.38	43.99	103,053	\$ 2,235,500,000	\$ 5.68	20.1	1.40%
Genesee & Wyoming	GWR	\$78.73	1.50	\$ 34.95	\$ 6.85	\$ 2.91	\$ -	61.65	62,336	\$ 2,398,100,000	\$ 3.60	24.2	0.00%
Canadian National	CNI	\$82.50	1.05	\$ 13.55	\$ 5.20	\$ 3.82	\$ 1.25	17.70	750,000	\$ 7,061,000,000	\$ 2.85	19.8	1.90%
Canadian Pacific	CP	\$182.76	1.20	\$ 34.85	\$ 12.15	\$ 8.70	\$ 1.59	35.10	145,000	\$ 5,745,000,000	\$ 6.50	20.6	0.90%

Value Line February 23, 2018

Yahoo

Value Line

Value Line

Value Line

Value Line

Value Line

Value Line

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Value Line

21.500

The harmonic mean is the preferable method for averaging multiples, such as the price/earning ratio, in which price is in the numerator. If these ratios are averaged using an arithmetic mean (a common error),

High data points are given greater weights than low data points.

The harmonic mean, on the other hand, gives equal weight to each data point

Note:

Canadian Exchange Rate per Value Line is .79 for February 23, 2018 tissue.

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Value Line figures are all values in US dollars.

Forecast % Change

			Projected (Next Year)										Forecast % Change			
Operating Margin	Income Tax Rate	% Return on Shareholders' Equity	Revenues	Cash Flow	Earnings	Dividends	Bk Value	Common Shares	Capital Spending per share	% Return on Shareholders' Equity	% Retained to Common Equity	All Dividends to Net Profits	Market to Book	2018-2022	2018-2022	2018-2022
VL	VL	V L	VL	VL	VL	VL	VL	VL	VL	VL	VL	VL	Calc Debt	VL	VL	VL
47.5%	38.0%	21.2%	\$ 29.30	\$ 10.65	\$ 7.65	\$ 2.92	34.45	760,000	4.10	22.5%	14.0%	38.0%	107.7%	8.50	11.00	9.50
42.0%	37.0%	11.5%	\$ 39.85	\$ 12.70	\$ 8.70	\$ 2.88	61.40	276,000	6.50	14.0%	9.5%	33.0%	120.9%	6.00	11.50	9.50
43.5%	37.0%	19.7%	\$ 13.20	\$ 4.65	\$ 3.10	\$ 0.88	16.60	880,000	2.30	19.0%	10.5%	28.0%	111.9%	11.00	13.50	10.50
48.1%	35.1%	12.4%	\$ 26.75	\$ 9.85	\$ 6.30	\$ 1.44	45.80	101,000	5.50	13.5%	10.5%	23.0%	104.6%	8.50	12.50	11.00
29.5%	27.0%	4.5%	\$ 37.60	\$ 8.15	\$ 3.80	\$ -	65.65	63,200	4.00	5.5%	5.5%	nil	101.0%	0.00	6.00	6.50
53.0%	26.0%	22.1%	\$ 15.05	\$ 5.85	\$ 4.30	\$ 1.43	19.65	732,000	3.45	22.0%	15.0%	33.0%	112.3%	11.00	10.00	9.50
52.0%	26.0%	25.0%	\$ 38.90	\$ 14.75	\$ 10.50	\$ 1.70	43.75	144,000	8.00	24.5%	20.5%	18.0%	118.6%	11.50	11.50	10.50

16.6%
0.122163195

\$ 6.30

17.3%
0.137075435
19.0%

28.8%

Revenue	Income	Balance Sheet				Cash Flow	Fair Value	Carrying Value
2018-2022	Operating Income	Current Assets	PP & E Gross	Current Liabilities	Long Term Debt	Depreciation & Amortization	Debt	Debt
VL	M*	M*	M*	M*	M*	M*	10-k	10-k
6.00	\$ 8,061,000,000	\$ 4,006,000,000	\$ 70,813,000,000	\$ 3,939,000,000	\$ 16,144,000,000	\$ 2,105,000,000	\$ 18,200,000,000	\$ 16,900,000,000
5.50	\$ 3,586,000,000	\$ 2,149,000,000	\$ 42,239,000,000	\$ 2,545,000,000	\$ 9,136,000,000	\$ 1,059,000,000	\$ 11,771,000,000	\$ 9,736,000,000
4.50	\$ 3,667,000,000	\$ 1,915,000,000	\$ 44,324,000,000	\$ 1,894,000,000	\$ 11,790,000,000	\$ 1,315,000,000	\$ 13,220,000,000	\$ 11,809,000,000
8.50	\$ 922,000,000	\$ 680,000,000	\$ 10,905,000,000	\$ 972,000,000	\$ 2,236,000,000	\$ 321,000,000	\$ 2,377,800,000	\$ 2,274,300,000
4.00	\$ 398,462,000	\$ 590,000,000	\$ 5,863,000,000	\$ 468,000,000	\$ 2,303,000,000	\$ 250,000,000	\$ 2,279,907,000	\$ 2,256,312,000
8.50	\$ 4,390,820,000	\$ 1,730,100,000	\$ 37,026,510,000	\$ 3,146,570,000	\$ 6,910,920,000	\$ 1,011,990,000	\$ 9,609,560,000	\$ 8,554,120,000
8.00	\$ 2,206,470,000	\$ 1,006,460,000	\$ 19,298,910,000	\$ 1,567,360,000	\$ 5,856,270,000	\$ 522,190,000	\$ 7,647,200,000	\$ 6,445,610,000

Operating Lease	Balance Sheet	ROE	All Div'ds to Net Prof
Rent	Intangibles (excluding Goodwill)	5 yr	5 yr
10-k	M*	VL	VL
\$ 480,000,000	\$ -	22.5%	34%
\$ 169,000,000	\$ -	15.5%	27%
\$ 78,000,000	\$ -	20.5%	30%
\$ 59,500,000	\$ -	16.5%	21%
\$ 17,268,000	\$ 1,567,000,000	7.5%	
\$ 150,890,000	\$ 48,980,000	25.0%	31%
\$ 82,160,000	\$ 7,110,000	24.5%	18%
	median	21%	29%
	ave	19%	27%
	harmean	16%	26%

SUPPORT FOR DIRECT CAPITALIZATION EQUITY COMPONENT

WASHINGTON STATE DEPARTMENT OF REVENUE

2018 ASSESSMENT YEAR

RAILROADS

Company	Ticker	Stock Price	2017		2018		2017		2018	
			Actual Earnings Ratio (EPS/P)	Projected Earnings Ratio (PEPS/P)	Cash Flow Ratio (CF/P)	Projected Cash Flow Ratio (PCF/P)				
Union Pacific Corp.	UNP	133.39	5.80	4.35%	7.65	5.74%	8.60	6.45%	10.65	7.98%
Norfolk Southern Corp.	NSC	144.21	6.54	4.54%	8.70	6.03%	10.15	7.04%	12.70	8.81%
CSX Corp.	CSX	54.79	2.30	4.20%	3.10	5.66%	3.80	6.94%	4.65	8.49%
Kansas City Southern	KSU	105.22	5.17	4.91%	6.30	5.99%	8.60	8.17%	9.85	9.36%
Genesee & Wyoming	GWR	78.73	2.91	3.70%	3.80	4.83%	6.85	8.70%	8.15	10.35%
Canadian National	CNI	82.50	3.82	4.63%	4.30	5.21%	5.20	6.30%	5.85	7.09%
Canadian Pacific	CP	182.76	8.70	4.76%	10.50	5.75%	12.15	6.65%	14.75	8.07%
		Mean		4.44%		5.60%		7.18%		8.59%
		Median		4.54%		5.74%		6.94%		8.49%
		Max		4.91%		6.03%		8.70%		10.35%
		Min		3.70%		4.83%		6.30%		7.09%
		stdev		0.00		0.00		0.01		0.01
		cov		0.09		0.08		0.13		0.12
		harmean		4.41%		5.57%		7.09%		8.49%
		Say		4.50%		5.75%		7.00%		8.50%

Source:

Actual earnings: Value Line / Q4 average stock price

Estimated Earnings: Value Line / Q4 average stock price

Actual Cash Flow: Value Line / Q4 average stock price

Estimated Cash Flow: Value Line / Q4 average stock price

IMPLIED PREMIUMS FOR US MARKET

Updated January 5, 2018.

Source: <http://pages.stern.nyu.edu/~adamodar/>

These implied premiums are calculated using the S&P 500.

Year	Earnings Yield	Dividend Yield	S&P 500	Earnings*	Dividends*	Change in Earnings	Change in Dividend	T.Bill Rate	T.Bond Rate	Bond-Bill	Smoothed Growth	Implied Premium (FCFE)	ERP/Riskfree Rate	ERP+Riskfree Rate
1960	5.34%	3.41%	58.11	3.10	1.98			0.0266	2.76%	0.10%	2.45%			2.76%
1961	4.71%	2.85%	71.55	3.37	2.04	8.60%	2.91%	2.13%	2.35%	0.22%	2.41%	2.92%	1.24	5.27%
1962	5.81%	3.40%	63.1	3.67	2.15	8.79%	5.21%	2.73%	3.85%	1.12%	4.05%	3.56%	0.92	7.41%
1963	5.51%	3.13%	75.02	4.13	2.35	12.75%	9.45%	3.12%	4.14%	1.02%	4.96%	3.38%	0.82	7.52%
1964	5.62%	3.05%	84.75	4.76	2.58	15.23%	10.08%	3.54%	4.21%	0.67%	5.13%	3.31%	0.79	7.52%
1965	5.73%	3.06%	92.43	5.30	2.83	11.20%	9.42%	3.93%	4.65%	0.72%	5.46%	3.32%	0.71	7.97%
1966	6.74%	3.59%	80.33	5.41	2.88	2.23%	1.96%	4.76%	4.64%	-0.12%	4.19%	3.68%	0.79	8.32%
1967	5.66%	3.09%	96.47	5.46	2.98	0.85%	3.37%	4.21%	5.70%	1.49%	5.25%	3.20%	0.56	8.90%
1968	5.51%	2.93%	103.86	5.72	3.04	4.81%	2.09%	5.21%	6.16%	0.95%	5.32%	3.00%	0.49	9.16%
1969	6.63%	3.52%	92.06	6.10	3.24	6.66%	6.49%	6.58%	7.88%	1.30%	7.55%	3.74%	0.47	11.62%
1970	5.98%	3.46%	92.15	5.51	3.19	-9.72%	-1.61%	6.53%	6.50%	-0.03%	4.78%	3.41%	0.52	9.91%
1971	5.46%	3.10%	102.09	5.57	3.16	1.15%	-0.74%	4.39%	5.89%	1.50%	4.57%	3.09%	0.52	8.98%
1972	5.23%	2.70%	118.05	6.17	3.19	10.76%	0.71%	3.84%	6.41%	2.57%	5.21%	2.72%	0.42	9.13%
1973	8.16%	3.70%	97.55	7.96	3.61	28.93%	13.24%	6.93%	6.90%	-0.03%	8.30%	4.30%	0.62	11.20%
1974	13.64%	5.43%	68.56	9.35	3.72	17.48%	3.14%	8.00%	7.40%	-0.60%	6.42%	5.59%	0.76	12.99%
1975	8.55%	4.14%	90.19	7.71	3.73	-17.54%	0.30%	5.80%	7.76%	1.96%	5.99%	4.13%	0.53	11.89%
1976	9.07%	3.93%	107.46	9.75	4.22	26.39%	13.10%	5.08%	6.81%	1.73%	8.19%	4.55%	0.67	11.36%
1977	11.43%	5.11%	95.1	10.87	4.86	11.53%	15.07%	5.12%	7.78%	2.66%	9.52%	5.92%	0.76	13.70%
1978	12.11%	5.39%	96.11	11.64	5.18	7.07%	6.60%	7.18%	9.15%	1.97%	8.48%	5.72%	0.63	14.87%
1979	13.48%	5.53%	107.94	14.55	5.97	25.01%	15.23%	10.38%	10.33%	-0.05%	11.70%	6.45%	0.62	16.78%
1980	11.04%	4.74%	135.76	14.99	6.44	3.01%	7.81%	11.24%	12.43%	1.19%	11.01%	5.03%	0.40	17.46%
1981	12.39%	5.57%	122.55	15.18	6.83	1.31%	6.08%	14.71%	13.98%	-0.73%	11.42%	5.73%	0.41	19.71%
1982	9.83%	4.93%	140.64	13.82	6.93	-8.95%	1.58%	10.54%	10.47%	-0.07%	7.96%	4.90%	0.47	15.37%
1983	8.06%	4.32%	164.93	13.29	7.12	-3.84%	2.76%	8.80%	11.80%	3.00%	9.09%	4.31%	0.37	16.11%
1984	10.07%	4.68%	167.24	16.84	7.83	26.69%	9.85%	9.85%	11.51%	1.66%	11.02%	5.11%	0.44	16.62%
1985	7.42%	3.88%	211.28	15.68	8.20	-6.91%	4.74%	7.72%	8.99%	1.27%	7.89%	4.03%	0.43	12.83%
1986	5.96%	3.38%	242.17	14.43	8.19	-7.93%	-0.15%	6.16%	7.22%	1.06%	5.54%	3.36%	0.50	10.80%
1987	6.49%	3.71%	247.08	16.04	9.17	11.10%	11.99%	5.47%	8.86%	3.39%	9.66%	4.18%	0.45	12.85%
1988	8.20%	3.68%	277.72	24.12	10.22	50.42%	11.49%	6.35%	9.14%	2.79%	9.76%	4.12%	0.41	12.91%
1989	6.80%	3.32%	353.4	24.32	11.73	0.83%	14.80%	8.37%	7.93%	-0.44%	9.58%	3.85%	0.44	11.44%
1990	6.58%	3.74%	330.22	22.65	12.35	-6.87%	5.26%	7.81%	8.07%	0.26%	7.39%	3.92%	0.48	11.96%
1991	4.58%	3.11%	417.09	19.30	12.97	-14.79%	5.03%	7.00%	6.70%	-0.30%	6.34%	3.27%	0.52	10.18%
1992	4.16%	2.90%	435.71	20.87	12.64	8.13%	-2.59%	5.30%	6.68%	1.38%	4.67%	2.83%	0.53	10.23%
1993	4.25%	2.72%	466.45	26.90	12.69	28.89%	0.41%	3.50%	5.79%	2.29%	4.73%	2.74%	0.55	8.96%
1994	5.89%	2.91%	459.27	31.75	13.36	18.03%	5.34%	5.00%	7.82%	2.82%	7.23%	3.06%	0.45	11.37%
1995	5.74%	2.30%	615.93	37.70	14.17	18.74%	6.00%	3.50%	5.57%	2.07%	5.65%	2.44%	0.59	8.86%
1996	4.83%	2.01%	740.74	40.63	14.89	7.77%	5.10%	5.00%	6.41%	1.41%	6.13%	2.11%	0.50	9.61%
1997	4.08%	1.60%	970.43	44.09	15.52	8.52%	4.25%	5.35%	5.74%	0.39%	5.45%	1.67%	0.48	8.47%
1998	3.11%	1.32%	1229.23	44.27	16.20	0.41%	4.37%	4.33%	4.65%	0.32%	4.60%	1.38%	0.49	6.91%
1999	3.07%	1.14%	1469.25	51.68	16.71	16.74%	3.16%	5.37%	6.44%	1.07%	5.75%	1.20%	0.32	8.49%
2000	3.94%	1.23%	1320.28	56.13	16.27	8.61%	-2.65%	5.73%	5.11%	-0.62%	3.71%	1.65%	0.56	7.98%
2001	3.85%	1.37%	1148.09	38.85	15.74	-30.79%	-3.24%	1.80%	5.05%	3.25%	3.56%	1.73%	0.72	8.67%
2002	5.23%	1.83%	879.82	46.04	16.08	18.51%	2.15%	1.20%	3.81%	2.61%	3.57%	2.29%	1.08	7.91%
2003	4.87%	1.61%	1111.91	54.69	17.88	18.79%	11.19%	1.00%	4.25%	3.25%	5.35%	2.12%	0.87	7.94%
2004	5.58%	1.60%	1211.92	67.68	19.407	23.75%	8.54%	2.18%	4.22%	2.04%	4.90%	2.02%	0.86	7.87%
2005	5.47%	1.79%	1248.29	76.45	22.38	12.96%	15.32%	4.31%	4.39%	0.08%	6.16%	2.20%	0.93	8.47%
2006	6.18%	1.77%	1418.3	87.72	25.05	14.74%	11.93%	4.88%	4.70%	-0.18%	5.93%	1.97%	0.89	8.86%
2007	5.62%	1.89%	1468.36	82.54	27.73	-5.91%	10.70%	3.31%	4.02%	0.71%	5.03%	2.06%	1.09	8.39%
2008	7.24%	3.11%	903.25	65.39	28.05	-20.78%	1.15%	1.59%	21.21%	0.62%	2.11%	4.05%	2.91	8.64%

2009	5.35%	2.00%	1115.10	59.65	22.31	-8.78%	-20.46%	0.14%	3.84%	3.70%	0.28%	2.60%	7.20%	4.36%	1.14	8.20%
2010	6.65%	1.84%	1257.64	83.66	23.12	40.25%	3.63%	0.13%	3.29%	3.16%	3.33%	2.24%	6.95%	5.20%	1.58	8.49%
2011	7.72%	2.07%	1257.60	97.05	26.02	16.01%	12.54%	0.03%	1.88%	1.85%	2.75%	2.71%	7.18%	6.01%	3.20	7.89%
2012	7.18%	2.13%	1426.19	102.47	30.44	5.58%	16.99%	0.05%	1.76%	1.71%	2.93%	2.47%	5.27%	5.78%	3.28	7.54%
2013	5.81%	1.96%	1848.36	107.45	36.28	4.86%	19.19%	0.07%	3.04%	2.97%	5.01%	2.03%	4.28%	4.96%	1.63	8.00%
2014	5.49%	1.92%	2058.90	113.01	39.44	5.17%	8.71%	0.05%	2.17%	2.12%	2.77%	2.24%	5.58%	5.78%	2.66	7.95%
2015	5.20%	2.11%	2043.94	106.32	43.16	-5.92%	9.43%	0.21%	2.27%	2.06%	2.96%	2.46%	5.51%	6.12%	2.70	8.39%
2016	4.86%	2.01%	2238.83	108.86	45.03	2.39%	4.33%	0.51%	2.45%	1.94%	2.64%	2.41%	5.54%	5.69%	2.32	8.14%
2017	4.67%	1.86%	2673.61	124.94	49.73	14.77%	10.44%	1.39%	2.41%	1.02%	3.22%	2.36%	7.05%	5.08%	2.11	7.49%

2018 Multi Stage Earnings Growth Model
Railroad Industry

Company 3.80% GDP
 Ticker 17.4 Industry P/E
 28.5% Target Dividend Payout Ratio (All dividends to net profit)
 20.5% Target ROE

Canadian National CNI		Growth	Reinvestment	Payout	Earnings	FCFE	Terminal	Cash
Year	Rate	Rate	Ratio				Value	Flow
0		61.29%	38.71%	\$ 3.82			stock price =	(82.50)
1	12.57%	59.56%	40.44%	\$ 4.30	1.74			1.74
2	12.21%	53.08%	46.92%	4.83	2.26			2.26
3	10.88%	47.87%	52.13%	5.35	2.79			2.79
4	9.81%	43.59%	56.41%	5.88	3.31			3.31
5	8.94%	38.58%	61.42%	6.40	3.93			3.93
6	7.91%	33.57%	66.43%	6.91	4.59			4.59
7	6.88%	28.56%	71.44%	7.38	5.27			5.27
8	5.85%	23.55%	76.45%	7.81	5.97			5.97
9	4.83%	18.54%	81.46%	8.19	6.67			6.67
10	3.80%	18.54%	81.46%	8.50	6.93	153.88		160.81
11+	3.80%	18.54%	81.46%	8.83	7.19			7.19

Value Line Dividends Growth Rate Ke = 10.10%

Union Pacific UP		Growth	Reinvestment	Payout	Earnings	FCFE	Terminal	Cash
Year	Rate	Rate	Ratio				Value	Flow
0		155.59%	-55.59%	\$ 5.80			stock price =	(133.39)
1	31.90%	56.59%	43.41%	7.65	3.32			3.32
2	11.60%	50.71%	49.29%	8.54	4.21			4.21
3	10.40%	45.93%	54.07%	9.43	5.10			5.10
4	9.42%	41.98%	58.02%	10.31	5.98			5.98
5	8.61%	37.29%	62.71%	11.20	7.02			7.02
6	7.64%	32.60%	67.40%	12.06	8.13			8.13
7	6.68%	27.91%	72.09%	12.86	9.27			9.27
8	5.72%	23.23%	76.77%	13.60	10.44			10.44
9	4.76%	18.54%	81.46%	14.25	11.60			11.60
10	3.80%	18.54%	81.46%	14.79	12.05	267.63		279.67
11+	3.80%	18.54%	81.46%	15.35	12.50			12.50

Value Line Dividends Growth Rate Ke = 11.12%

Norfolk Southern NSC		Growth	Reinvestment	Payout	Earnings	FCFE	Terminal	Cash
Year	Rate	Rate	Ratio				Value	Flow
0		161.11%	-61.11%	\$ 6.54			stock price =	(144.21)
1	33.03%	51.86%	48.14%	8.70	4.19			4.19
2	10.63%	46.88%	53.12%	9.63	5.11			5.11
3	9.61%	42.77%	57.23%	10.55	6.04			6.04
4	8.77%	39.32%	60.68%	11.48	6.96			6.96
5	8.06%	35.16%	64.84%	12.40	8.04			8.04
6	7.21%	31.01%	68.99%	13.29	9.17			9.17
7	6.36%	26.85%	73.15%	14.14	10.34			10.34
8	5.50%	22.69%	77.31%	14.92	11.53			11.53
9	4.65%	18.54%	81.46%	15.61	12.72			12.72
10	3.80%	18.54%	81.46%	16.20	13.20	293.29		306.49
11+	3.80%	18.54%	81.46%	16.82	13.70			13.70

Value Line Dividends Growth Rate Ke = 11.46%

CSX Corp CSX		Growth	Reinvestment	Payout	Earnings	FCFE	Terminal	Cash
Year	Rate	Rate	Ratio				Value	Flow
0		169.67%	-69.67%	\$ 2.30			stock price =	(54.79)
1	34.78%	60.98%	39.02%	3.10	1.21			1.21
2	12.50%	54.20%	45.80%	3.49	1.60			1.60
3	11.11%	48.78%	51.22%	3.88	1.98			1.98
4	10.00%	44.35%	55.65%	4.26	2.37			2.37

5	9.09%	39.18%	60.82%	4.65	2.83		2.83
6	8.03%	34.02%	65.98%	5.02	3.31		3.31
7	6.97%	28.86%	71.14%	5.37	3.82		3.82
8	5.92%	23.70%	76.30%	5.69	4.34		4.34
9	4.86%	18.54%	81.46%	5.97	4.86		4.86
10	3.80%	18.54%	81.46%	6.20	5.05	112.13	117.17
11+	3.80%	18.54%	81.46%	6.43	5.24		

Value Line Dividends Growth Rate $K_e = 11.22\%$

Kansas City Southern

Year	Growth Rate	Reinvestment Rate	Payout Ratio	Earnings	FCFE	Terminal Value	Cash Flow
0		106.62%	-6.62%	\$ 5.17		stock price =	(105.22)
1	21.86%	61.94%	38.06%	6.30	2.40		2.40
2	12.70%	54.96%	45.04%	7.10	3.20		3.20
3	11.27%	49.40%	50.60%	7.90	4.00		4.00
4	10.13%	44.86%	55.14%	8.70	4.80		4.80
5	9.20%	39.59%	60.41%	9.50	5.74		5.74
6	8.12%	34.33%	65.67%	10.27	6.75		6.75
7	7.04%	29.06%	70.94%	10.99	7.80		7.80
8	5.96%	23.80%	76.20%	11.65	8.88		8.88
9	4.88%	18.54%	81.46%	12.22	9.95		9.95
10	3.80%	18.54%	81.46%	12.68	10.33	229.52	239.86
11+	3.80%	18.54%	81.46%	13.16	10.72		

Value Line Dividends Growth Rate $K_e = 12.00\%$

Genesee & Wyoming

Year	Growth Rate	Reinvestment Rate	Payout Ratio	Earnings	FCFE	Terminal Value	Cash Flow
0		149.19%	-49.19%	\$ 2.91		stock price =	(78.73)
1	30.58%	62.58%	37.42%	3.80	1.42		1.42
2	12.83%	55.46%	44.54%	4.29	1.91		1.91
3	11.37%	49.80%	50.20%	4.78	2.40		2.40
4	10.21%	45.19%	54.81%	5.26	2.88		2.88
5	9.26%	39.86%	60.14%	5.75	3.46		3.46
6	8.17%	34.53%	65.47%	6.22	4.07		4.07
7	7.08%	29.20%	70.80%	6.66	4.72		4.72
8	5.99%	23.87%	76.13%	7.06	5.37		5.37
9	4.89%	18.54%	81.46%	7.40	6.03		6.03
10	3.80%	18.54%	81.46%	7.69	6.26	139.10	145.36
11+	3.80%	18.54%	81.46%	7.98	6.50		

Value Line Dividends Growth Rate $K_e = 9.34\%$

Canadian Pacific

Year	Growth Rate	Reinvestment Rate	Payout Ratio	Earnings	FCFE	Terminal Value	Cash Flow
0		100.93%	-0.93%	\$ 8.70		stock price =	(182.76)
1	20.69%	62.14%	37.86%	10.50	3.98		3.98
2	12.74%	55.12%	44.88%	11.84	5.31		5.31
3	11.30%	49.52%	50.48%	13.18	6.65		6.65
4	10.15%	44.96%	55.04%	14.51	7.99		7.99
5	9.22%	39.67%	60.33%	15.85	9.56		9.56
6	8.13%	34.39%	65.61%	17.14	11.25		11.25
7	7.05%	29.10%	70.90%	18.35	13.01		13.01
8	5.97%	23.82%	76.18%	19.44	14.81		14.81
9	4.88%	18.54%	81.46%	20.39	16.61		16.61
10	3.80%	18.54%	81.46%	21.17	17.24	383.09	400.34
11+	3.80%	18.54%	81.46%	21.97	17.90		

Value Line Dividends Growth Rate $K_e = 11.48\%$

ave 10.96%
 med 11.22%
 har mean 10.89%