



COST OF CAPITAL STUDY

**YIELD CAPITALIZATION
2020 ASSESSMENT YEAR**

APPENDIX C

Railroads

EQUITY RATE		11.50%		
CAPITAL ASSET PRICING MODEL			PAGE	
CAPM Ex Ante	7.86%		6	
DIVIDEND GROWTH MODELS (Single Stage)				
Value Line, based on Dividends Growth	11.75%		7	
Value Line, based on Earnings Growth	9.50%		8	
Value Line, based on Return on Equity	9.25%		9	
FCFE GROWTH MODEL (Multi Stage)	10.75%		10	
	RANGE	7.8625% - 11.75%		
DEBT RATE		4.00%	11	
SECURED DEBT (LEASE) RATE		3.25%	11	
MARKET CAPITAL STRUCTURE				
Equity	78%	x 11.50%	= 8.97%	3
Debt	22%	x 4.00%	= 0.88%	3
Marginal Tax Rate	24%	= (1-.24)	x 0.88%	<u>0.67%</u>
WEIGHTED AVERAGE COST OF CAPITAL		9.6%		

rounded

SUPPORT FOR GUIDELINE COMPANIES

WASHINGTON STATE DEPARTMENT OF REVENUE

2020 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	1.15	A++	49.0%	19.1	2.25%	17,875,624,250	42.7%	-	0.0%	23,943,000,000	57.3%	41,818,624,250
Norfolk Southern Corp.	NSC	1.20	A+	45.5%	17.4	2.01%	15,527,424,300	56.7%	-	0.0%	11,880,000,000	43.3%	27,407,424,300
CSX Corp.	CSX	1.25	B++	53.0%	16.2	1.44%	11,500,339,200	41.8%	-	0.0%	15,993,000,000	58.2%	27,493,339,200
Kansas City Southern	KSU	1.10	A	50.5%	20.1	0.98%	5,089,760,650	61.2%	-	0.0%	3,228,000,000	38.8%	8,317,760,650
Canadian National	CNI	1.05	A	49.0%	18.4	1.82%	13,949,415,000	60.4%	-	0.0%	9,128,513,800	39.6%	23,077,928,800
Canadian Pacific	CP	1.15	B++	49.5%	18.5	1.10%	5,508,580,000	46.7%	-	0.0%	6,275,949,400	53.3%	11,784,529,400
	Mean	1.15		49.4%	18.3	1.60%	11,575,190,567	51.6%		0.0%	11,741,410,533	48.4%	
	Weighted Mean						69,451,143,400	49.6%	-	0.00%	70,448,463,200	50.4%	139,899,606,600
	Median	1.15			18.4	1.63%		51.7%		0.0%		48.3%	
	Std Dev	0.07			1.35	0.5%		8.9%		-		8.9%	
	Coeff Var	0.06			0.07	0.32		17.2%		-		18.3%	
	Harmonic Mean	1.15			18.19	0.01		50.3%		-		47.0%	
	Max	1.25			20.10	2.25%		61.2%		0.0%		58.2%	
	Min	1.05			16.20	0.98%		41.8%		0.0%		38.8%	

Say **1.15**

**SUPPORT FOR CAPITAL STRUCTURE
MARKET VALUE**

WASHINGTON STATE DEPARTMENT OF REVENUE
2020 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	179.73	694,199,000	124,768,386,270	78.5%	-	0.0%	7,060,314,463	4.4%	27,200,000,000	17.1%	159,028,700,733
Norfolk Southern Corp.	NSC	193.28	260,746,000	50,396,986,880	73.9%	-	0.0%	3,007,457,087	4.4%	14,806,000,000	21.7%	68,210,443,967
CSX Corp.	CSX	72.11	782,336,000	56,414,248,960	74.0%	-	0.0%	1,354,658,050	1.8%	18,503,000,000	24.3%	76,271,907,010
Kansas City Southern	KSU	152.76	99,119,000	15,141,418,440	77.3%	242,170	0.0%	915,083,910	4.7%	3,535,700,000	18.0%	19,592,444,520
Canadian National	CNI	90.00	720,900,000	64,881,000,000	80.4%	-	0.0%	3,770,295,572	4.7%	12,052,623,100	14.9%	80,703,918,672
Canadian Pacific	CP	254.95	137,200,000	34,979,140,000	79.7%	-	0.0%	1,101,064,816	2.5%	7,807,625,700	17.8%	43,887,830,516
			Mean		77.3%		0.0%		3.7%		19.0%	
			Weighted Mean	346,581,180,550	77.4%	242,170	0.00%	17,208,873,898	3.84%	83,904,948,800	18.7%	447,695,245,418
			Median		77.9%		0.00%		4.42%		17.9%	
			Harmonic Mean		77.2%		#NUM!		3.3%		18.5%	
			Std Dev		2.8%		0.0%		1.3%		3.4%	
			Coeff Var		27.51		0.41		2.95		5.60	
			Max		80.4%		0.0%		4.7%		24.3%	
			Min		73.9%		0.0%		1.8%		14.9%	
			Target		78%		0%		4%		18%	100%

Source:
Stock Price: Yahoo
Market Value Debt: Bond Analysis

SUPPORT FOR MARKET MULTIPLES

WASHINGTON STATE DEPARTMENT OF REVENUE

2020 ASSESSMENT YEAR

RAILROADS

Company	Ticker	Stock Price	Revenues	Multiple	Cash Flow	Multiple	Earnings	Multiple	Book Value	Multiple
Union Pacific Corp.	UNP	179.73	31.90	5.6	11.90	15.1	8.47	21.2	25.75	7.0
Norfolk Southern Corp.	NSC	193.28	42.85	4.5	14.35	13.5	10.10	19.1	59.55	3.2
CSX Corp.	CSX	72.11	15.45	4.7	6.05	11.9	4.20	17.2	14.70	4.91
Kansas City Southern	KSU	152.76	29.05	5.26	10.80	14.1	6.97	21.9	51.35	3.0
Canadian National	CNI	90.00	16.10	5.6	6.10	14.8	4.50	20.0	19.35	4.65
Canadian Pacific	CP	254.95	43.40	5.9	16.60	15.4	12.45	20.5	40.15	6.35
		Mean		5.3		14.1		20.0		4.9
		Median		5.4		14.4		20.2		4.8
		Harmonic Mean		5.2		14.0		19.9		4.4
		Max		5.9		15.4		21.9		7.0
		Min		4.5		11.9		17.2		2.97
		Std Dev		0.6		1.3		1.7		1.6
		Coefficient of Variation		0.1		0.1		0.1		0.3
		Percentile .25		4.8		13.6		19.4		3.6
		Percentile .75		5.6		15.0		21.0		6.0
		Say		5.50		14.50		20.00		5.00

ENTERPRISE VALUE MULTIPLES

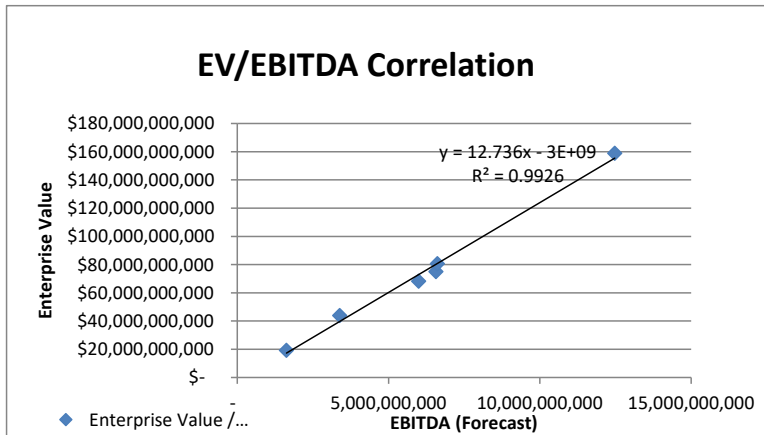
WASHINGTON STATE DEPARTMENT OF REVENUE

2020 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
					forecast							
Union Pacific Corp.	UNP	\$ 159,028,700,733	11,204,000,000	14.19	11.34%	12,475,042,017	12.75	22,308,000,000	7.13	8,745,000,000	1,088,000,000	16.17
Norfolk Southern Corp.	NSC	\$ 68,210,443,967	5,497,000,000	12.41	9.06%	5,994,986,063	11.38	11,430,400,000	5.97	4,006,400,000	592,240,000	14.83
CSX Corp.	CSX	\$ 75,144,907,010	6,307,000,000	11.91	4.13%	6,567,619,835	11.44	12,084,000,000	6.22	4,788,000,000	740,120,000	13.59
Kansas City Southern	KSU	\$ 19,354,444,520	1,463,500,000	13.22	11.11%	1,626,111,111	11.90	3,084,600,000	6.27	1,164,000,000	141,428,000	14.83
Canadian National	CNI	\$ 80,703,918,672	6,113,627,100	13.20	8.20%	6,614,744,075	12.20	12,055,500,000	6.69	4,653,000,000	482,104,924	15.72
Canadian Pacific	CP	\$ 43,887,830,516	3,108,741,300	14.12	8.73%	3,380,287,980	12.98	6,251,100,000	7.02	2,418,700,000	312,305,028	16.07
Mean							12.11		6.55	4,295,850,000		15.20
Median							12.05		6.48	4,329,700,000		15.27
Max							12.98		7.13	8,745,000,000		16.17
Min							11.38		5.97	1,164,000,000		13.59
Std Dev							0.66		0.47	2,591,550,166		0.98
Coefficient of Variation							0.05		0.07	0.60		0.06
Harmonic Mean							12.08		6.52	2,912,233,939		15.15
Say							12.00		6.50			15.25

11.50 put in income direct excluding IPP
 12.75 put in income direct including IPP



Forecast EV/EBITDA By Rank

Guideline Companies	EV/EBITDA forecast		
Norfolk Southern Corp.	11.38	11.57	Low Average
CSX Corp.	11.44	11.44	Low Median
Kansas City Southern	11.90	11.50	Say
Canadian National	12.20	12.64	Average
Union Pacific Corp.	12.75	12.75	Median
Canadian Pacific	12.98	12.75	Say

SUPPORT FOR YIELD CAPITALIZATION EQUITY COMPONENT CAPITAL ASSET PRICING MODEL

WASHINGTON STATE DEPARTMENT OF REVENUE
2020 ASSESSMENT YEAR
RAILROADS

$$\text{Ex Ante}$$

$$K_e = R_f + B (R_p)$$

Ke = Cost of Equity **7.86%**

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Rm =	rate of return	7.15%
Rf =	risk free rate	2.40%
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, Fifth Edition, 2014		
Dr. Aswath Damodaran	5.20%	chart page 15
http://pages.stern.nyu.edu/~adamodar/		
2019 Implied Premium	4.72%	adjusted for Rf
John Graham and Campbell Harvey	6.81%	10 year expected real return
Duke CFO magazine Global Business Outlook survey - 4th Quarter - Dec 2019 pg 38		
	6.30-7.32%	95% Interval 10 year expect
	6.23%	adjusted for Rf
	1.82%	Rf rate used in survey

Rf = Risk Free Rate **2.40%**

to above

Value Line Investment Survey, Selected Yields January 10, 2020, page 1313		
as of 12-31-19		
US Treasury Securities year end data		
	5 year	1.69%
	10 year	1.92%
	30 year	2.39%
	30 year Zero	2.42%
Federal Reserve Statistical Release (http://www.federalreserve.gov/Releases/H15/Current/)		
January 2, 2020 as of 12-31-19		
Treasury Constant Maturities		
	5 year	1.69%
	10 year	1.92%
	20 year	2.25%
	30 year	2.39%
	20 year TIPS	<u>0.39%</u> 1.86%
	30 year TIPS	<u>0.58%</u> 1.81%

TIPS inflation indication

Inflation **2.00%**

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Value Line Investment Survey, Economic Series January 3, 2020, page 1500		
Consumer Price Index Annual Rate of Change 2022-2024		
		2.50%
The Livingston Survey December 13, 2019, page 4, 10		
Inflation median (measured by the Consumer Price Index) over next 10 ye:		
		2.22%

Gross Domestic Product (GDP) **3.90%**

real GDP + inflation est

Federal Reserve Projected Long Run Real GDP Growth		
Median Projection Value From Dec 11, 2019 Report		
		1.90%
https://www.federalreserve.gov/monetarypolicy/files/fomcprojt20191211.pdf		
Congressional Budget Office Real GDP Economic Projections		
The Budget and Economic Outlook 2020-2030		
Average Percentage Change Year To Year		
	2020-2024	1.80%
	2025-2035	1.65%
http://www.cbo.gov/publication/56020		
Federal Reserve Bank of Philadelphia		
The Livingston Survey, December 13, 2019, page 4, 10		
Average Annual Real GDP Growth Rate for Next 10 Years		
		2.00%
https://www.philadelphiafed.org/research-and-data/real-time-center/livingston-survey		

SUPPORT FOR YIELD CAPITALIZATION EQUITY COMPONENT DIVIDEND GROWTH MODEL

WASHINGTON STATE DEPARTMENT OF REVENUE

2020 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	179.73	4.04	2.25%	10.00%	12.25%	12.86%	15.11%	3.90%	6.15%
Norfolk Southern Corp.	NSC	193.28	3.88	2.01%	10.50%	12.51%	13.67%	15.68%	3.90%	5.91%
CSX Corp.	CSX	72.11	1.04	1.44%	10.00%	11.44%	12.86%	14.30%	3.90%	5.34%
Kansas City Southern	KSU	152.76	1.50	0.98%	8.00%	8.98%	9.78%	10.76%	3.90%	4.88%
Canadian National	CNI	90.00	1.64	1.82%	8.00%	9.82%	9.78%	11.60%	3.90%	5.72%
Canadian Pacific	CP	254.95	2.80	1.10%	15.00%	16.10%	21.88%	22.98%	3.90%	5.00%
			Mean			11.85%				5.50%
			Median			11.85%				5.53%
			Harmonic Mean			11.44%				5.46%
			Std Dev			2.50%				0.51%
			Coeff Var			21.06%				9.25%
			Max			16.10%				6.15%
			Min			8.98%				4.88%

Source: Value Line Projections 15-17 to 21-23

11.75%

5.50%

Say

11.75%
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SUPPORT FOR YIELD CAPITALIZATION EQUITY COMPONENT DIVIDEND GROWTH MODEL

WASHINGTON STATE DEPARTMENT OF REVENUE

2020 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

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	179.730	9.40	5.23%	14.50%	19.73%	20.89%	26.12%	3.90%	9.13%
Norfolk Southern Corp.	NSC	193.280	11.10	5.74%	15.00%	20.74%	21.88%		3.90%	9.64%
CSX Corp.	CSX	72.110	4.45	6.17%	14.50%	20.67%	20.89%	27.06%	3.90%	10.07%
Kansas City Southern	KSU	152.760	7.60	4.98%	12.00%	16.98%	16.23%	21.21%	3.90%	8.88%
Canadian National	CNI	90.000	4.90	5.44%	10.00%	15.44%	12.86%	18.30%	3.90%	9.34%
Canadian Pacific	CP	254.950	13.80	5.41%	12.00%	17.41%	16.23%		3.90%	9.31%
			Mean	5.50%		18.50%				9.40%
			Median	5.43%		18.57%				9.33%
			Harmonic Mean	5.47%		18.27%				9.38%
			Std Dev	0.42%		2.20%				0.42%
			Coeff Var	7.58%		11.87%				4.44%
			Max	6.17%		20.74%				10.07%
			Min	4.98%		15.44%				8.88%

Source: Value Line Projections 15-17 to 21-23

18.50%

9.50%

Say

9.50%
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**SUPPORT FOR YIELD CAPITALIZATION EQUITY COMPONENT
DIVIDEND GROWTH MODEL**

WASHINGTON STATE DEPARTMENT OF REVENUE
2020 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	179.73	4.04	2.25%	60.0%	5.23%	3.14%	5.39%	9.40	8.37%
Norfolk Southern Corp.	NSC	193.28	3.88	2.01%	65.0%	5.74%	3.73%	5.74%	11.10	9.48%
CSX Corp.	CSX	72.11	1.04	1.44%	77.0%	6.17%	4.75%	6.19%	4.45	10.92%
Kansas City Southern	KSU	152.76	1.50	0.98%	80.0%	4.98%	3.98%	4.96%	7.60	8.96%
Canadian National	CNI	90.00	1.64	1.82%	64.0%	5.44%	3.48%	5.31%	4.90	8.93%
Canadian Pacific	CP	254.95	2.80	1.10%	80.0%	5.41%	4.33%	5.43%	13.80	9.74%
Mean								5.50%		9.40%
Median								5.41%		9.22%
Harmonic Mean								5.48%		9.33%
Std Dev								0.42%		0.89%
Coeff Var								7.64%		9.43%
Max								6.19%		10.92%
Min								4.96%		8.37%
								5.50%		9.25%

Say **9.25%**
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SUPPORT FOR YIELD CAPITALIZATION EQUITY COMPONENT FREE CASH FLOW TO EQUITY MODEL

Washington State Department of Revenue
2020 ASSESSMENT YEAR

Based on Earnings Growth

Company	Ticker	Stock Price	Expected Earnings	P/E	Payout Ratio	ROE	Ke
Union Pacific Corp.	UNP	179.73	9.40	19.12	40.00%	38.00%	10.40%
Norfolk Southern Corp.	NSC	193.28	11.10	17.41	35.00%	19.00%	11.88%
CSX Corp.	CSX	72.11	4.45	16.20	23.00%	27.00%	11.89%
Kansas City Southern	KSU	152.76	7.60	20.10	20.00%	14.50%	9.35%
Canadian National	CNI	90.00	4.90	18.37	36.00%	23.50%	10.91%
Canadian Pacific	CP	254.95	13.80	18.47	20.00%	29.00%	10.01%
Mean				18.28	29.00%	25.17%	10.74%
Harmonic Mean				18.19	26.69%	22.90%	10.66%
Median				18.42	29.00%	25.25%	10.65%
Say				18.25	29.00%	25.00%	10.75%

SUPPORT FOR DEBT RATING AND DEBT YIELD RATE

WASHINGTON STATE DEPARTMENT OF REVENUE

2020 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	Baa1	A-	2.74%	2.97%	10	9	Aaa1	AAA+	1
Norfolk Southern Corp.	NSC	Baa1	BBB+	2.65%	3.00%	10	10	Aaa2	AAA	2
CSX Corp.	CSX	Baa1	BBB+	2.95%	3.06%	10	10	Aaa3	AAA-	3
Canadian Pacific	CP	Baa1	BBB+	2.86%	2.92%	10	10	Aa1	AA+	4
Kansas City Southern	KSU	Baa2	BBB	3.35%	3.37%	11	11	Aa2	AA	5
Canadian National	CNI	A2	A	2.39%	2.72%	8	8	Aa3	AA-	6
Overall Average Debt Rating		Baa1	BBB+	2.82%		9.8	9.7	A1	A+	7
					bond analysis, A-CCC bonds	2.99%		A2	A	8
					All issues	20+ year maturities		A3	A-	9
Guideline Companies, All Ratings			2.78%	3.75%						
					bond analysis page 12					
Mergent's Bond Record January 2020										
Corporate	Aaa	Aa	A	Baa						
October	3.01%	3.13%	3.37%	3.93%						
November	3.06%	3.16%	3.40%	3.94%						
December	3.01%	3.11%	3.36%	3.88%						
4th Qtr Average	3.03%	3.13%	3.38%	3.92%						
2019 Average	3.39%	3.53%	3.77%	4.38%						
Public Utilities	Aaa	Aa	A	Baa						
October		3.24%	3.39%	3.72%						
November		3.25%	3.43%	3.76%						
December		3.22%	3.40%	3.73%						
4th Qtr Average		3.24%	3.41%	3.74%						
2019 Average		3.61%	3.77%	4.19%						
Industrials	Aaa	Aa	A	Baa						
October	3.01%	3.01%	3.35%	4.12%						
November	3.06%	3.06%	3.37%	4.12%						
December	3.01%	3.00%	3.32%	4.03%						
4th Qtr Average	3.03%	3.02%	3.35%	4.09%						
2019 Average	3.39%	3.45%	3.76%	4.55%						
Debt Yield Rate					4.00%					
Cost of Secured Debt (Operating Lease) Rate					3.25%					

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Railroad Bond Analysis

Company	type	Call	coupon	maturity	Price	Issued / Book	current yield	YTM	Weighted		Embedde					
									Average	Rating	Mkt Val	Mkt : Book	d Rate	ebt Service	WAYTM	WAYTM
Canadian National	Deb (frgn)	NC	2.850	2021	101.56	\$ 400,000,000	2.81%	-0.26%	0.00%	A	#####	101.56%	#####	-0.000015	-0.00017	1.905
Canadian National			2.250	2022	100.89	\$ 250,000,000	2.23%	1.64%	0.01%	A	#####	100.89%	5,625,000	0.000058	0.00064	1.9
Canadian National	Deb (frgn)	NC	7.625	2023	118.18	\$ 300,000,000	6.45%	0.31%	0.00%	A	#####	118.18%	#####	0.00013	0.00015	2.146
Canadian National			2.950	2024	103.34	\$ 350,000,000	2.85%	1.95%	0.01%	A	#####	103.34%	#####	0.000097	0.00107	2.196
Canadian National			2.750	2026	102.98	\$ 500,000,000	2.67%	2.17%	0.02%	A	#####	102.98%	#####	0.000154	0.00170	2.209
Canadian National	Notes (frgn)	Z100	6.900	2028	133.98	\$ 475,000,000	5.15%	1.98%	0.01%	A	#####	133.98%	#####	0.000134	0.00148	2.456
Canadian National			7.375	2031	144.36	\$ 200,000,000	5.11%	2.52%	0.01%	A	#####	144.36%	#####	0.000071	0.00079	2.929
Canadian National			6.250	2034	137.29	\$ 500,000,000	4.55%	2.88%	0.02%	A	#####	137.29%	#####	0.000204	0.00226	3.065
Canadian National	Secured (fr	Put-able	6.712	2036	144.63	\$ 250,000,000	4.64%	3.05%	0.01%	A	#####	144.63%	#####	0.000109	0.00120	3.22
Canadian National			6.200	2036	140.76	\$ 450,000,000	4.40%	2.90%	0.02%	A	#####	140.76%	#####	0.000185	0.00205	3.028
Canadian National	SR Notes		6.375	2037	145.97	\$ 300,000,000	4.37%	2.85%	0.01%	A	#####	145.97%	#####	0.000121	0.00134	3.024
Canadian National	SR Notes		3.500	2042	105.47	\$ 250,000,000	3.32%	3.15%	0.01%	A	#####	105.47%	8,750,000	0.000112	0.00123	3.157
Canadian National	SR Notes		4.500	2043	118.18	\$ 250,000,000	3.81%	3.34%	0.01%	A	#####	118.18%	#####	0.000119	0.00131	3.37
Canadian National	SR Notes		3.200	2046	104.77	\$ 650,000,000	3.05%	2.93%	0.03%	A	#####	104.77%	#####	0.000271	0.00299	2.937
Canadian National	SR Notes		3.650	2048	112.52	\$ 600,000,000	3.24%	2.98%	0.03%	A	#####	112.52%	#####	0.000254	0.00280	2.981
Canadian National	SR Notes		4.450	2049	126.97	\$ 650,000,000	3.50%	3.02%	0.03%	A	#####	126.97%	#####	0.000279	0.00308	3.034
16			1600	sum	1941.85	\$ 6,375,000,000	% of book	121.37%		0.22%	#####	120.39%	4.68%	#####	2.392%	
CSX Corp			4.250	2021	102.99	\$ 350,000,000	4.13%	-1.66%	-0.01%	BBB+	#####	102.99%	#####	-0.000082	-0.00040	1.619
CSX Corp	Fixed Rt		3.700	2023	106.10	\$ 500,000,000	3.49%	1.21%	0.01%	BBB+	#####	106.10%	#####	0.000086	0.00042	1.923
CSX Corp	Fixed Rt		3.400	2024	106.25	\$ 550,000,000	3.20%	1.55%	0.01%	BBB+	#####	106.25%	#####	0.000121	0.00059	1.886
CSX Corp	Fixed Rt		3.350	2025	106.76	\$ 600,000,000	3.14%	1.77%	0.02%	BBB+	#####	106.76%	#####	0.000151	0.00074	2.058
CSX Corp			2.600	2026	103.72	\$ 700,000,000	2.51%	1.88%	0.02%	BBB+	#####	103.72%	#####	0.000187	0.00091	1.992
CSX Corp			3.250	2027	105.96	\$ 850,000,000	3.07%	2.25%	0.03%	BBB+	#####	105.96%	#####	0.000272	0.00132	2.34
CSX Corp			3.800	2028	109.87	\$ 800,000,000	3.46%	2.35%	0.03%	BBB+	#####	109.87%	#####	0.000267	0.00130	2.42
CSX Corp	MTN Ser C		6.800	2028	131.66	\$ 200,000,000	5.16%	2.18%	0.01%	BBB+	#####	131.66%	#####	0.000062	0.00030	2.782
CSX Corp			4.250	2029	113.70	\$ 350,000,000	3.74%	2.45%	0.01%	BBB+	#####	113.70%	#####	0.000122	0.00059	2.528
CSX Corp	NOTES	Z100	6.000	2036	132.88	\$ 400,000,000	4.52%	3.26%	0.02%	BBB+	#####	132.88%	#####	0.000186	0.00090	3.405
CSX Corp	NOTES	Z100	6.150	2037	133.83	\$ 700,000,000	4.60%	3.43%	0.03%	BBB+	#####	133.83%	#####	0.000341	0.00166	3.523
CSX Corp			7.450	2037	147.56	\$ 400,000,000	5.05%	3.58%	0.02%	BBB+	#####	147.56%	#####	0.000204	0.00099	3.844
CSX Corp	Fixed Rt nts		6.220	2040	137.42	\$ 660,000,000	4.53%	3.53%	0.03%	BBB+	#####	137.42%	#####	0.000331	0.00161	3.605
CSX Corp	NOTES		5.500	2041	127.33	\$ 550,000,000	4.32%	3.59%	0.03%	BBB+	#####	127.33%	#####	0.000281	0.00137	3.619
CSX Corp	NOTES		4.750	2042	118.65	\$ 600,000,000	4.00%	3.50%	0.03%	BBB+	#####	118.65%	#####	0.000299	0.00145	3.521
CSX Corp			4.400	2043	112.93	\$ 300,000,000	3.90%	3.56%	0.03%	BBB+	#####	112.93%	#####	0.000152	0.00074	3.564
CSX Corp	NOTES		4.100	2044	111.11	\$ 800,000,000	3.69%	3.41%	0.04%	BBB+	#####	111.11%	#####	0.000387	0.00188	3.412
CSX Corp			3.800	2046	107.05	\$ 800,000,000	3.55%	3.38%	0.04%	BBB+	#####	107.05%	#####	0.000385	0.00187	3.393
CSX Corp			4.750	2048	122.58	\$ 650,000,000	3.88%	3.46%	0.03%	BBB+	#####	122.58%	#####	0.000320	0.00156	3.489
CSX Corp			4.300	2048	115.24	\$ 850,000,000	3.73%	3.43%	0.04%	BBB+	#####	115.24%	#####	0.000415	0.00202	3.441
CSX Corp			4.500	2049	100.33	\$ 600,000,000	4.49%	4.48%	0.04%	BBB+	#####	100.33%	#####	0.000382	0.00186	3.332
CSX Corp	FR SR Note		3.950	2050	109.88	\$ 600,000,000	3.59%	3.41%	0.03%	BBB+	#####	109.88%	#####	0.000291	0.00142	3.419
CSX Corp	SR Notes		4.500	2054	114.90	\$ 450,000,000	3.92%	3.72%	0.03%	BBB+	#####	114.90%	#####	0.000238	0.00116	3.725
CSX Corp	SR Notes		4.250	2066	109.03	\$ 600,000,000	3.90%	3.83%	0.03%	BBB+	#####	109.03%	#####	0.000326	0.00159	3.832
CSX Corp	SR Notes		4.650	2068	116.05	\$ 600,000,000	4.01%	3.90%	0.03%	BBB+	#####	116.05%	#####	0.000333	0.00162	3.905
25			2500	sum	2903.78	\$ 14,460,000,000	% of book	116.15%		0.61%	#####	115.14%	4.44%	#####	2.947%	
Norfolk Southern	Global Sr N	100	3.250	2021	102.70	\$ 500,000,000	3.16%	-2.07%	-0.01%	BBB+	#####	102.70%	#####	-0.000147	-0.00065	1.581
Norfolk Southern	SR Notes	NC	9.000	2021	108.15	\$ 250,000,000	8.32%	-6.50%	-0.02%	BBB+	#####	108.15%	#####	-0.000231	-0.00102	1.787
Norfolk Southern	SR NTS		3.000	2022	102.17	\$ 600,000,000	2.94%	1.53%	0.01%	BBB+	#####	102.17%	#####	0.000130	0.00058	1.880
Norfolk Southern	Notes		2.903	2023	102.33	\$ 586,000,000	2.84%	1.94%	0.02%	BBB+	#####	102.33%	#####	0.000161	0.00072	2.058
Norfolk Southern	Notes		2.903	2023	102.16	\$ 586,000,000	2.84%	2.01%	0.02%	BBB+	#####	102.16%	#####	0.000167	0.00074	2.191
Norfolk Southern			3.850	2024	106.61	\$ 400,000,000	3.61%	1.88%	0.01%	BBB+	#####	106.61%	#####	0.000107	0.00047	2.022
Norfolk Southern			3.650	2025	107.14	\$ 300,000,000	3.41%	1.98%	0.01%	BBB+	#####	107.14%	#####	0.000084	0.00037	2.238
Norfolk Southern	Notes	Z100	5.590	2025	115.70	\$ 367,000,000	4.83%	1.92%	0.01%	BBB+	#####	115.70%	#####	0.000100	0.00044	2.445
Norfolk Southern			2.900	2026	103.52	\$ 600,000,000	2.80%	2.21%	0.02%	BBB+	#####	103.52%	#####	0.000189	0.00084	2.287
Norfolk Southern			3.150	2027	106.86	\$ 799,999,999	2.95%	2.01%	0.02%	BBB+	#####	106.86%	#####	0.000229	0.00101	2.407
Norfolk Southern	Notes	Z100	7.800	2027	135.11	\$ 800,000,000	5.77%	1.99%	0.02%	BBB+	#####	135.11%	#####	0.000226	0.00100	2.544
Norfolk Southern			3.800	2028	110.88	\$ 400,000,000	3.43%	2.21%	0.01%	BBB+	#####	110.88%	#####	0.000126	0.00056	2.352
Norfolk Southern			2.550	2029	99.88	\$ 400,000,000	2.55%	2.57%	0.01%	BBB+	#####	99.88%	#####	0.000146	0.00065	2.564
Norfolk Southern	Notes	Z100	5.640	2029	121.51	\$ 350,000,000	4.64%	2.77%	0.01%	BBB+	#####	121.51%	#####	0.000138	0.00061	2.988
Norfolk Southern	SR Notes	Z100	7.250	2031	139.46	\$ 700,000,000	5.20%	2.85%	0.03%	BBB+	#####	139.46%	#####	0.000283	0.00126	3.069
Norfolk Southern	Notes	Z100	7.050	2037	145.60	\$ 750,000,000	4.84%	3.39%	0.04%	BBB+	#####	145.60%	#####	0.000362	0.00160	3.512
Norfolk Southern	Notes		4.837	2041	120.04	\$ 596,000,000	4.03%	3.46%	0.03%	BBB+	#####	120.04%	#####	0.000293	0.00130	3.511
Norfolk Southern	SR NTS		3.950	2042	109.43	\$ 600,000,000	3.61%	3.33%	0.03%	BBB+	#####	109.43%	#####	0.000284	0.00126	3.345
Norfolk Southern	SR NTS		4.800	2043	115.25	\$ 500,000,000	4.16%	3.78%	0.03%	BBB+	#####	115.25%	#####	0.000269	0.00119	3.803
Norfolk Southern	FR SR Note		4.450	2045	115.62	\$ 500,000,000	3.85%	3.49%	0.02%	BBB+	#####	115.62%	#####	0.000248	0.00110	3.506
Norfolk Southern	FR SR Note		4.650	2046	119.02	\$ 600,000,000	3.91%	3.51%	0.03%	BBB+	#####	119.02%	#####	0.000299	0.00133	3.515
Norfolk Southern			3.942	2047	110.33	\$ 749,169,000	3.57%	3.35%	0.04%	BBB+	#####	110.33%	#####	0.000356	0.00158	3.361
Norfolk Southern			4.150	2048	113.99	\$ 500,000,000	3.64%	3.36%	0.02%	BBB+	#####	113.99%	#####	0.000239	0.00106	3.368</

Union Pacific Corp	NOTES		3,200	2021	102.07	\$	600,000,000	3.14%	-0.91%	-0.01%	A-	#####	102.07%	#####	-0.000078	-0.00023	1.717
Union Pacific Corp	NOTES		4,000	2021	101.76	\$	500,000,000	3.93%	0.47%	0.00%	A-	#####	101.76%	#####	0.000033	0.00010	1.814
Union Pacific Corp			2,950	2022	102.27	\$	500,000,000	2.88%	1.41%	0.01%	A-	#####	102.27%	#####	0.000100	0.00029	1.868
Union Pacific Corp	NOTES		4,163	2022	105.28	\$	750,000,000	3.95%	0.62%	0.01%	A-	#####	105.28%	#####	0.000066	0.00019	1.777
Union Pacific Corp			2,750	2023	102.24	\$	325,000,000	2.69%	1.83%	0.01%	A-	#####	102.24%	8,937,500	0.000084	0.00024	1.984
Union Pacific Corp			3,500	2023	104.96	\$	650,000,000	3.33%	1.46%	0.01%	A-	#####	104.96%	#####	0.000135	0.00039	1.955
Union Pacific Corp			2,950	2023	102.55	\$	300,000,000	2.88%	1.90%	0.01%	A-	#####	102.55%	8,850,000	0.000081	0.00023	1.998
Union Pacific Corp			3,750	2024	106.13	\$	400,000,000	3.53%	1.92%	0.01%	A-	#####	106.13%	#####	0.000109	0.00032	2.118
Union Pacific Corp			3,150	2024	104.22	\$	500,000,000	3.02%	1.89%	0.01%	A-	#####	104.22%	#####	0.000134	0.00039	2.062
Union Pacific Corp			3,646	2024	105.90	\$	439,192,000	3.44%	1.89%	0.01%	A-	#####	105.90%	#####	0.000118	0.00034	2.045
Union Pacific Corp			3,750	2025	107.76	\$	500,000,000	3.48%	1.93%	0.01%	A-	#####	107.76%	#####	0.000137	0.00040	2.206
Union Pacific Corp	FR Note		3,250	2025	105.72	\$	500,000,000	3.07%	1.91%	0.01%	A-	#####	105.72%	#####	0.000136	0.00039	2.115
Union Pacific Corp			2,750	2026	102.88	\$	500,000,000	2.67%	2.19%	0.02%	A-	#####	102.88%	#####	0.000156	0.00045	2.226
Union Pacific Corp			3,000	2027	105.03	\$	500,000,000	2.86%	2.16%	0.02%	A-	#####	105.03%	#####	0.000154	0.00044	2.222
Union Pacific Corp	Deb	NC	3,950	2028	111.10	\$	1,500,000,000	3.56%	2.32%	0.05%	A-	#####	111.10%	#####	0.000495	0.00143	2.482
Union Pacific Corp			3,700	2029	109.85	\$	1,000,000,000	3.37%	2.40%	0.03%	A-	#####	109.85%	#####	0.000342	0.00099	2.460
Union Pacific Corp	Deb	Z100	6,625	2029	130.92	\$	600,000,000	5.06%	2.54%	0.02%	A-	#####	130.92%	#####	0.000216	0.00063	2.749
Union Pacific Corp			5,375	2033	123.60	\$	200,000,000	4.35%	3.07%	0.01%	A-	#####	123.60%	#####	0.000087	0.00025	3.196
Union Pacific Corp	SR NOTES	Z100	6,250	2034	134.87	\$	250,000,000	4.63%	3.06%	0.01%	A-	#####	134.87%	#####	0.000109	0.00031	3.213
Union Pacific Corp			3,375	2035	105.38	\$	450,000,000	3.20%	2.91%	0.02%	A-	#####	105.38%	#####	0.000186	0.00054	2.919
Union Pacific Corp			3,600	2037	106.38	\$	500,000,000	3.38%	3.10%	0.02%	A-	#####	106.38%	#####	0.000220	0.00064	3.117
Union Pacific Corp	Deb		6,150	2037	134.40	\$	250,000,000	4.58%	3.39%	0.01%	A-	#####	134.40%	#####	0.000121	0.00035	3.487
Union Pacific Corp			4,375	2038	115.58	\$	750,000,000	3.79%	3.20%	0.03%	A-	#####	115.58%	#####	0.000341	0.00099	3.234
Union Pacific Corp			3,550	2039	105.04	\$	500,000,000	3.38%	3.19%	0.02%	A-	#####	105.04%	#####	0.000226	0.00066	3.195
Union Pacific Corp			5,780	2040	105.73	\$	375,890,000	5.47%	5.30%	0.03%	A-	#####	105.73%	#####	0.000283	0.00082	5.329
Union Pacific Corp	SR NOTES		4,750	2041	118.10	\$	500,000,000	4.02%	3.50%	0.02%	A-	#####	118.10%	#####	0.000249	0.00072	3.530
Union Pacific Corp			4,300	2042	112.98	\$	300,000,000	3.81%	3.44%	0.01%	A-	#####	112.98%	#####	0.000147	0.00042	3.452
Union Pacific Corp			4,250	2043	112.72	\$	325,000,000	3.77%	3.43%	0.02%	A-	#####	112.72%	#####	0.000158	0.00046	3.439
Union Pacific Corp	Fixed Rate		4,750	2043	116.80	\$	500,000,000	4.07%	3.64%	0.03%	A-	#####	116.80%	#####	0.000259	0.00075	3.676
Union Pacific Corp			4,850	2044	121.69	\$	300,000,000	3.99%	3.48%	0.01%	A-	#####	121.69%	#####	0.000149	0.00043	3.509
Union Pacific Corp	Fixed Rate		4,821	2044	120.66	\$	700,000,000	4.00%	3.51%	0.03%	A-	#####	120.66%	#####	0.000350	0.00101	3.526
Union Pacific Corp	Fixed Rate		4,050	2045	110.19	\$	500,000,000	3.68%	3.43%	0.02%	A-	#####	110.19%	#####	0.000244	0.00071	3.444
Union Pacific Corp	SR NOTES		4,150	2045	110.87	\$	350,000,000	3.74%	3.48%	0.02%	A-	#####	110.87%	#####	0.000173	0.00050	3.487
Union Pacific Corp	SR NOTES		4,050	2046	111.58	\$	600,000,000	3.63%	3.37%	0.03%	A-	#####	111.58%	#####	0.000287	0.00083	3.372
Union Pacific Corp	SR NOTES		3,350	2046	99.77	\$	300,000,000	3.36%	3.36%	0.01%	A-	#####	99.77%	#####	0.000143	0.00042	3.363
Union Pacific Corp	SR NOTES		4,000	2047	111.20	\$	500,000,000	3.60%	3.36%	0.02%	A-	#####	111.20%	#####	0.000238	0.00069	3.362
Union Pacific Corp	SR NOTES		4,500	2048	118.60	\$	1,500,000,000	3.79%	3.44%	0.07%	A-	#####	118.60%	#####	0.000734	0.00212	3.461
Union Pacific Corp			4,300	2049	117.59	\$	1,000,000,000	3.66%	3.33%	0.05%	A-	#####	117.59%	#####	0.000474	0.00137	3.341
Union Pacific Corp	SR NOTES		3,799	2051	107.71	\$	1,044,261,000	3.53%	3.39%	0.05%	A-	#####	107.71%	#####	0.000503	0.00146	3.397
Union Pacific Corp	SR NOTES		3,875	2055	105.70	\$	450,000,000	3.67%	3.58%	0.02%	A-	#####	105.70%	#####	0.000229	0.00066	3.586
Union Pacific Corp	SR NOTES		4,800	2058	120.31	\$	500,000,000	3.99%	3.78%	0.03%	A-	#####	120.31%	#####	0.000268	0.00078	3.789
Union Pacific Corp			3,950	2059	106.32	\$	500,000,000	3.72%	3.64%	0.03%	A-	#####	106.32%	#####	0.000259	0.00075	3.645
Union Pacific Corp	SR NOTES		4,375	2065	110.78	\$	600,000,000	3.95%	3.86%	0.03%	A-	#####	110.78%	#####	0.000329	0.00095	3.869
Union Pacific Corp	SR NOTES		4,100	2067	104.00	\$	500,000,000	3.94%	3.91%	0.03%	A-	#####	104.00%	#####	0.000278	0.00080	3.913
44 Book Value 4400				sum	4879.19	\$	24,309,343,000	% of book	110.89%	0.95%		#####	110.88%	4.07%	#####	2.739%	
Kansas City Southern			3,850	2023	104.20	\$	199,224,000	3.69%	2.11%	0.01%	BBB-	#####	104.20%	7,670,124	0.000060	0.00099	2.627
Kansas City Southern			3,000	2023	102.44	\$	439,123,000	2.93%	1.99%	0.01%	BBB-	#####	102.44%	#####	0.000124	0.00206	2.182
Kansas City Southern	Deb	Z100	7,000	2025	119.00	\$	100,000,000	5.88%	2.49%	0.00%	BBB	#####	119.00%	7,000,000	0.000035	0.00059	3.665
Kansas City Southern	SR NOTES		3,125	2026	102.26	\$	250,000,000	3.06%	2.68%	0.01%	BBB	#####	102.26%	7,812,500	0.000095	0.00158	2.726
Kansas City Southern			2,875	2029	100.74	\$	425,000,000	2.85%	2.78%	0.02%	BBB	#####	100.74%	#####	0.000168	0.00279	2.787
Kansas City Southern	SR NOTES		4,300	2043	111.49	\$	448,651,000	3.86%	3.55%	0.02%	BBB	#####	111.49%	#####	0.000226	0.00376	3.561
Kansas City Southern	SR NOTES		4,300	2043	104.78	\$	450,000,000	4.10%	3.97%	0.03%	BBB-	#####	104.78%	#####	0.000254	0.00422	3.983
Kansas City Southern	SR NOTES		4,950	2045	110.50	\$	500,000,000	4.48%	4.25%	0.03%	BBB-	#####	110.50%	#####	0.000302	0.00502	4.265
Kansas City Southern	SR NOTES		4,950	2045	120.13	\$	499,165,000	4.12%	3.69%	0.03%	BBB	#####	120.13%	#####	0.000262	0.00435	3.711
Kansas City Southern			4,700	2048	119.60	\$	500,000,000	3.93%	3.57%	0.03%	BBB	#####	119.60%	#####	0.000254	0.00421	3.581
Kansas City Southern			4,200	2069	105.32	\$	425,000,000	3.99%	3.95%	0.02%	BBB	#####	105.32%	#####	0.000239	0.00396	3.954
11 Book Value 1100				sum	1200.46	\$	4,236,163,000	% of book	109.13%	0.20%		#####	109.29%	4.19%	#####	3.353%	
Canadian Pacific	Deb (foreign)	NC	4,500	2022	104.79	\$	250,000,000	4.29%	1.26%	0.00%	AA-	#####	104.79%	#####	0.000045	0.00062	2.067
Canadian Pacific	SR NOTES		4,450	2023	106.63	\$	350,000,000	4.17%	1.72%	0.01%	AA-	#####	106.63%	#####	0.000085	0.00118	2.148
Canadian Pacific	SR NOTES		2,900	2025	103.48	\$	700,000,000	2.80%	2.08%	0.02%	AA-	#####	103.48%	#####	0.000207	0.00286	2.136
Canadian Pacific	SR NOTES		3,700	2026	106.69	\$	250,000,000	3.47%	2.39%	0.01%	AA-	#####	106.69%	9,250,000	0.000085	0.00117	2.462
Canadian Pacific	SR NOTES		4,000	2028	110.59	\$	500,000,000	3.62%	2.44%	0.02%	AA-	#####	110.59%	#####	0.000173	0.00239	2.557
Canadian Pacific	SR NOTES		7,125	2031	139.25	\$	350,000,000	5.12%	2.77%	0.01%	AA-	#####	139.25%	#####	0.000138	0.00190	3.127
Canadian Pacific	SR NOTES		5,750	2033	125.83	\$	250,000,000	4.57%	3.21%	0.01%	AA-	#####	125.83%	#####	0.000114	0.00157	3.318
Canadian Pacific	SR NOTES		4,800	2035	119.35	\$	300,000,000	4.02%	3.12%	0.01%	AA-	#####	119.35%	#####	0.000133	0.00184	3.184
Canadian Pacific	SR NOTES		5,950	2037	136.52	\$	450,000,000	4.36%	3.09%	0.02%	AA-	#####	136.52%	#####	0.000198	0.00273	3.192
Canadian Pacific	SR NOTES		5,750	2042	134.10	\$	250,000,000	4.29%	3.47%	0.01%	AA-	#####	134.10%	#####	0.000123	0.00170	3.515
Canadian Pacific	SR NOTES		4,800	2045	126.61	\$	550,000,000	3.79%	3.21%	0.03%	AA-	#####	126.61%	#####	0.000251	0.00347	3.241
Canadian Pacific	SR NOTES		6,125	2115	149.16	\$	900,000,000	4.11%	4.07%	0.05%	AA-	#####	149.16%	#####	0.000521	0.00719	4.077
12 Book Value 1200				sum	1463.00	\$	5,100,000,000	% of book	121.92%	0.21%		#####	124.07%	4.96%	#####	2.861%	

Total \$ 70,364,669,005.00

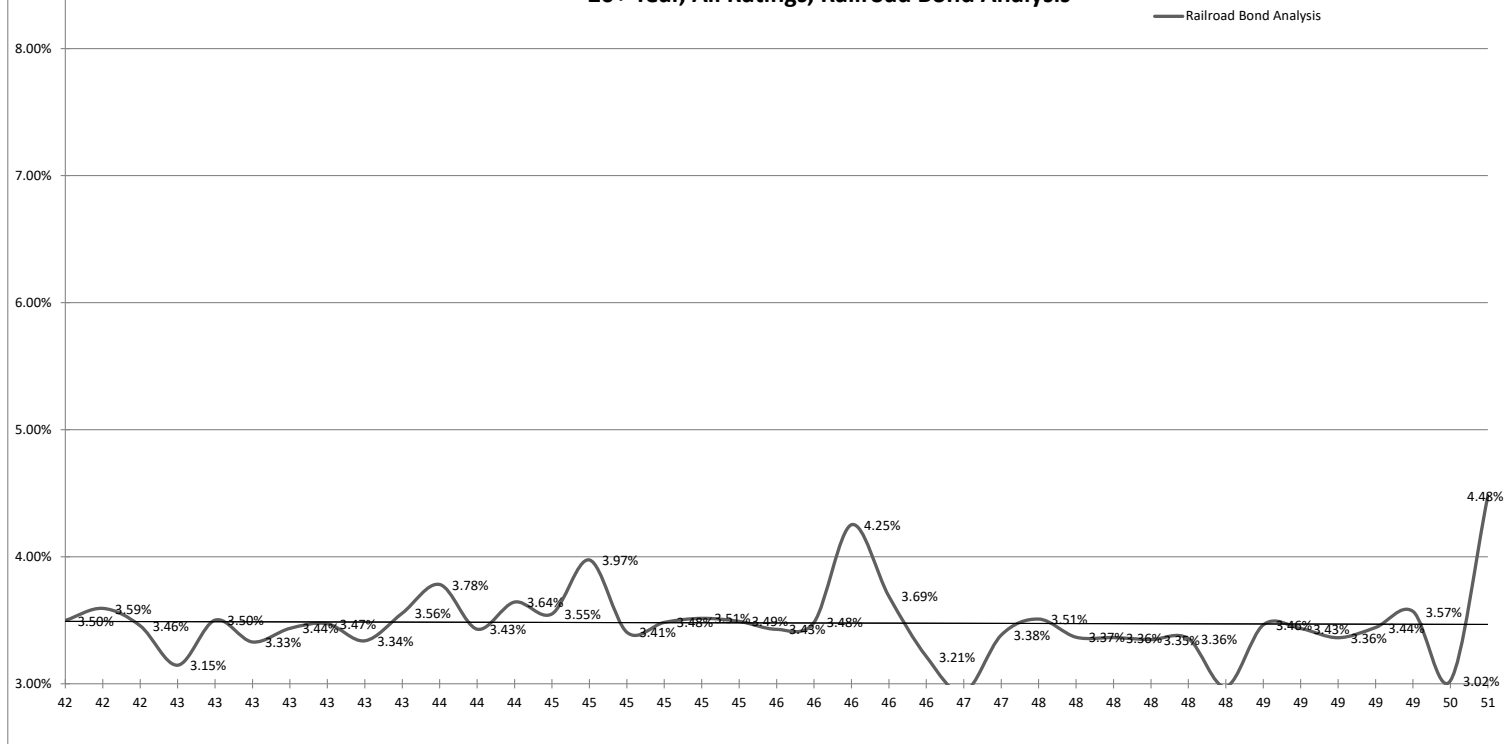
Total ##### 114.89% 4.41% ##### 2.777% 2.824% 2.992

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

Source: Standard & Poor's Bond Guide, January 2020, 2019 Yr End Prices

Embedded debt rate 4.4101%
Weighted average yield to maturity 2.7771%
Debt service / Market value 3.8386%

20+ Year, All Ratings, Railroad Bond Analysis



12/31/2019

Railroad Bond Analysis

Company	type	Call	coupon	maturity	Price	Issued / Book	current yield	yield to maturity	Weighted Avera	Rating	Mkt Val	Mkt : Book	Embedded R:	Debt Service	WAYTM	WAYTM	Finra YTM
Union Pacific Corp	SR NOTES		4.750	41	118.10	\$ 500,000,000	4.022%	3.50%	0.03%	A-	#####	118.10%		#####	0.0002522	0.000719526	3.53
CSX Corp	NOTES		5.500	41	127.33	\$ 550,000,000	4.32%	3.59%	0.03%	BBB+	#####	127.33%		#####	0.000285	0.00137	3.619
Norfolk Southern	Notes		4.837	41	120.04	\$ 596,000,000	4.029%	3.46%	0.03%	BBB+	#####	120.04%		#####	0.000297	0.001296906	3.511
Canadian National	SR Notes		3.500	42	105.47	\$ 250,000,000	3.32%	3.15%	0.01%	A	#####	105.47%	8,750,000	0.000113	0.001123	3.157	
CSX Corp	NOTES		4.750	42	118.65	\$ 600,000,000	4.00%	3.50%	0.03%	BBB+	#####	118.65%		#####	0.000303	0.00145	3.521
Norfolk Southern	SR NTS		3.950	42	109.43	\$ 600,000,000	3.610%	3.33%	0.03%	BBB+	#####	109.43%		#####	0.0002879	0.001257445	3.345
Union Pacific Corp			4.300	42	112.98	\$ 300,000,000	3.806%	3.44%	0.01%	A-	#####	112.98%		#####	0.0001486	0.000424058	3.452
Canadian Pacific	SR NOTES		5.750	42	134.10	\$ 250,000,000	4.288%	3.47%	0.01%	AA-	#####	134.10%		#####	0.0001252	0.001702299	3.515
Canadian National	SR Notes		4.500	43	118.18	\$ 250,000,000	3.81%	3.34%	0.01%	A	#####	118.18%		#####	0.000120	0.00131	3.57
CSX Corp			4.400	43	112.93	\$ 300,000,000	3.90%	3.56%	0.02%	BBB+	#####	112.93%		#####	0.000154	0.00074	3.364
Norfolk Southern	SR NTS		4.800	43	115.25	\$ 500,000,000	4.165%	3.78%	0.03%	BBB+	#####	115.25%		#####	0.0002726	0.001190328	3.803
Union Pacific Corp			4.250	43	112.72	\$ 325,000,000	3.770%	3.43%	0.02%	A-	#####	112.72%		#####	0.0001607	0.000458513	3.439
Union Pacific Corp	Fixed Rate		4.750	43	116.80	\$ 500,000,000	4.067%	3.64%	0.03%	A-	#####	116.80%		#####	0.0002626	0.000749333	3.676
Kansas City Southern	SR NOTES		4.300	43	111.49	\$ 448,651,000	3.857%	3.55%	0.02%	BBB	#####	111.49%		#####	0.0002296	0.004810081	3.561
Kansas City Southern	SR NOTES		4.300	43	104.78	\$ 450,000,000	4.104%	3.97%	0.03%	BBB-	#####	104.78%		#####	0.0002579	0.005401714	3.983
CSX Corp	NOTES		4.100	44	111.11	\$ 800,000,000	3.69%	3.41%	0.04%	BBB+	#####	111.11%		#####	0.000393	0.00188	3.412
Union Pacific Corp			4.850	44	121.69	\$ 300,000,000	3.986%	3.48%	0.02%	A-	#####	121.69%		#####	0.0001506	0.000429856	3.509
Union Pacific Corp	Fixed Rate		4.821	44	120.66	\$ 700,000,000	3.996%	3.51%	0.04%	A-	#####	120.66%		#####	0.0003547	0.001012109	3.526
Norfolk Southern	FR SR Note		4.450	45	115.62	\$ 500,000,000	3.849%	3.49%	0.03%	BBB+	#####	115.62%		#####	0.0002516	0.001098887	3.506
Union Pacific Corp	Fixed Rate		4.050	45	110.19	\$ 500,000,000	3.675%	3.43%	0.02%	A-	#####	110.19%		#####	0.0002471	0.000705188	3.444
Union Pacific Corp	SR NOTES		4.150	45	110.87	\$ 350,000,000	3.743%	3.48%	0.02%	A-	#####	110.87%		#####	0.0001758	0.000501499	3.487
Kansas City Southern	SR NOTES		4.950	45	110.50	\$ 500,000,000	4.480%	4.25%	0.03%	BBB-	#####	110.50%		#####	0.0003065	0.006420474	4.265
Kansas City Southern	SR NOTES		4.950	45	120.13	\$ 499,165,000	4.121%	3.69%	0.03%	BBB	#####	120.13%		#####	0.0002654	0.005559639	3.711
Canadian Pacific	SR NOTES		4.800	45	126.61	\$ 550,000,000	3.791%	3.21%	0.03%	AA-	#####	126.61%		#####	0.0002549	0.003466263	3.241
Canadian National	SR Notes		3.200	46	104.77	\$ 650,000,000	3.05%	2.93%	0.03%	A	#####	104.77%		#####	0.000275	0.00299	2.937
CSX Corp			3.800	46	107.05	\$ 800,000,001	3.55%	3.38%	0.04%	BBB+	#####	107.05%		#####	0.000390	0.00187	3.393

Norfolk Southern	FR SR Note	4.650	46	119.02	\$	600,000,000	3.907%	3.51%	0.03%	BBB+	#####	119.02%	#####	0.0003035	0.001325507	3.515	
Union Pacific Corp	SR NOTES	4.050	46	111.58	\$	600,000,000	3.630%	3.37%	0.03%	A-	#####	111.58%	#####	0.0002912	0.000830858	3.372	
Union Pacific Corp	SR NOTES	3.350	46	99.77	\$	300,000,000	3.358%	3.36%	0.01%	A-	#####	99.77%	#####	0.0001455	0.000415097	3.363	
Norfolk Southern		3.942	47	110.33	\$	749,169,000	3.57%	3.35%	0.04%	BBB+	#####	110.33%	#####	0.0003616	0.00157904	3.36	
Union Pacific Corp	SR NOTES	4.000	47	111.20	\$	500,000,000	3.597%	3.36%	0.02%	A-	#####	111.20%	#####	0.0002419	0.000690138	3.362	
Canadian National	SR Notes	3.650	48	112.52	\$	600,000,000	3.24%	2.98%	0.03%	A	#####	112.52%	#####	0.000257	0.00280	2.981	
CSX Corp		4.750	48	122.58	\$	650,000,000	3.88%	3.46%	0.03%	BBB+	#####	122.58%	#####	0.000325	0.00156	3.489	
CSX Corp		4.300	48	115.24	\$	850,000,000	3.73%	3.43%	0.04%	BBB+	#####	115.24%	#####	0.000421	0.00202	3.441	
Norfolk Southern		4.150	48	113.99	\$	500,000,000	3.641%	3.36%	0.02%	BBB+	#####	113.99%	#####	0.0002424	0.001058412	3.368	
Union Pacific Corp	SR NOTES	4.500	48	118.60	\$	1,500,000,000	3.794%	3.44%	0.07%	A-	#####	118.60%	#####	0.0007445	0.002124428	3.461	
Kansas City Southern		4.700	48	119.60	\$	500,000,000	3.930%	3.57%	0.03%	BBB	#####	119.60%	#####	0.0002573	0.005390015	3.581	
Canadian National	SR Notes	4.450	49	126.97	\$	650,000,000	3.50%	3.02%	0.03%	A	#####	126.97%	#####	0.000283	0.00308	3.034	
CSX Corp		4.500	49	100.33	\$	600,000,000	4.49%	4.48%	0.04%	BBB+	#####	100.33%	#####	0.000387	0.00186	3.332	
Norfolk Southern		3.400	49	101.26	\$	400,000,000	3.358%	3.33%	0.02%	BBB+	#####	101.26%	#####	0.0001921	0.000838786	3.332	
Norfolk Southern		4.100	49	113.52	\$	400,000,000	3.612%	3.36%	0.02%	BBB+	#####	113.52%	#####	0.0001935	0.000845067	3.364	
Union Pacific Corp		4.300	49	117.59	\$	1,000,000,000	3.657%	3.33%	0.05%	A-	#####	117.59%	#####	0.0004807	0.001371608	3.341	
CSX Corp	FR SR Note	3.950	50	109.88	\$	600,000,000	3.59%	3.41%	0.03%	BBB+	#####	109.88%	#####	0.000295	0.00142	3.419	
Union Pacific Corp	SR NOTES	3.799	51	107.71	\$	1,044,261,000	3.527%	3.39%	0.05%	A-	#####	107.71%	#####	0.0005103	0.001456042	3.397	
Norfolk Southern		4.050	52	111.42	\$	749,994,000	3.635%	3.45%	0.04%	BBB+	#####	111.42%	#####	0.000373	0.001628888	3.458	
CSX Corp	SR Notes	4.500	54	114.90	\$	450,000,000	3.92%	3.72%	0.02%	BBB+	#####	114.90%	#####	0.000241	0.00116	3.725	
Union Pacific Corp	SR NOTES	3.875	55	105.70	\$	450,000,000	3.666%	3.58%	0.02%	A-	#####	105.70%	#####	0.0002325	0.000663539	3.586	
Union Pacific Corp	SR NOTES	4.800	58	120.31	\$	500,000,000	3.990%	3.78%	0.03%	A-	#####	120.31%	#####	0.0002724	0.000777138	3.789	
Union Pacific Corp		3.950	59	106.32	\$	500,000,000	3.715%	3.64%	0.03%	A-	#####	106.32%	#####	0.0002625	0.000749128	3.645	
Union Pacific Corp	SR NOTES	4.375	65	110.78	\$	600,000,000	3.949%	3.86%	0.03%	A-	#####	110.78%	#####	0.0003342	0.000953678	3.869	
CSX Corp	SR Notes	4.250	66	109.03	\$	600,000,002	3.90%	3.83%	0.03%	BBB+	#####	109.03%	#####	0.000331	0.00159	3.832	
Union Pacific Corp	SR NOTES	4.100	67	104.00	\$	500,000,000	3.942%	3.91%	0.03%	A-	#####	104.00%	#####	0.000282	0.000804618	3.913	
CSX Corp	SR Notes	4.650	68	116.05	\$	600,000,003	4.01%	3.90%	0.03%	BBB+	#####	116.05%	#####	0.000338	0.00162	3.905	
Kansas City Southern		4.200	2069	105.32	\$	425,000,000	3.99%	3.95%	0.02%	BBB	#####	105.32%	#####	0.000239	0.00396	3.954	
Norfolk Southern	Notes Z100	7.900	97	188.28	\$	350,000,000	4.20%	4.10%	0.02%	BBB+	#####	188.28%	#####	0.000207	0.000904036	4.11	
Norfolk Southern	FR SR Not Z100	6.000	2105	127.25	\$	550,000,000	4.715%	4.69%	0.04%	BBB+	#####	127.25%	#####	0.0003722	0.001625276	4.695	
Norfolk Southern	SR NOTES	6.000	11	131.15	\$	400,000,000	4.57%	4.56%	0.03%	BBB+	#####	131.15%	#####	#####	0.001147146	4.56	
Canadian Pacific	SR NOTES	6.125	15	149.16	\$	900,000,000	4.106%	4.07%	0.05%	AA-	#####	149.16%	#####	0.0005287	0.007190786	4.077	
Norfolk Southern	SR NOTES	5.100	18	121.27	\$	600,000,000	4.21%	4.19%	0.04%	BBB+	#####	121.27%	#####	0.0003626	0.001583398	4.193	
Total					\$	32,787,240,006				Total	#####	116.07%	4.47%	#####	2.777%	2.824%	3.581

Source: Standard & Poor's Bond Guide, January 2020, 2019 Yr End Prices

Embedded debt rate 4.4720%
 Weighted average yield to maturity 2.7771%
 Debt service / Market value 3.8530%
 Finra YTM 3.58%
 SAY 3.75%

DATA INPUT

WASHINGTON STATE DEPARTMENT OF REVENUE

2020 ASSESSMENT YEAR

RAILROADS

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

		Current Year												
Guideline Companies		Stock Price 12/31/2019	Beta levered	Revenues Per Share	Cash Flow Per Share	Earnings Per Share	Dividends Per Share	Book Value	Common Shares	Long-Term Debt	Capital Spending per share	Trailing P/E Ratio	Average Annual Dividend Yield	Operating Margin
Name	Ticker	Yahoo	VL	VL	VL	VL	VL	VL	VL	VL	VL	VL	VL	VL
Union Pacific Corp.	UNP	\$179.73	1.15	\$ 31.90	\$ 11.90	\$ 8.47	\$ 3.70	\$ 25.75	694,199	\$ 24,314,000,000	\$ 4.50	20.7	0.00%	49.0%
Norfolk Southern Corp.	NSC	\$193.28	1.20	\$ 42.85	\$ 14.35	\$ 10.10	\$ 3.64	\$ 59.55	260,746	\$ 11,085,000,000	\$ 7.15	18.8	0.00%	45.5%
CSX Corp.	CSX	\$72.11	1.25	\$ 15.45	\$ 6.05	\$ 4.20	\$ 0.96	\$ 14.70	782,336	\$ 15,992,000,000	\$ 2.05	17.4	0.00%	53.0%
Kansas City Southern	KSU	\$152.76	1.10	\$ 29.05	\$ 10.80	\$ 6.97	\$ 1.44	\$ 51.35	99,119	\$ 2,394,800,000	\$ 6.00	22.7	0.00%	50.5%
Canadian National	CNI	\$90.00	1.05	\$ 16.10	\$ 6.10	\$ 4.50	\$ 1.64	\$ 19.35	720,900	\$ 8,806,000,000	\$ 3.70	20.6	0.00%	49.0%
Canadian Pacific	CP	\$254.95	1.15	\$ 43.40	\$ 16.60	\$ 12.45	\$ 2.24	\$ 40.15	137,200	\$ 6,315,000,000	\$ 8.75	19.1	0.00%	49.5%

Value Line November 19, 2019

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 0.7693

Value Line figures are all values in US dollars.

													Forecast % Change		
Projected (Next Year) 2020													Dividends	Earnings	Cash Flow
Income Tax Rate	% Return on Shareholders' Equity	Revenues Per Share	Cash Flow Per Share	Earnings Per Share	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	2020-2024	2020-2024	2020-2024
VL	VL	VL	VL	VL	VL	VL	VL	VL	VL	VL	VL	VL	VL	VL	VL
24.0%	34.0%	\$ 33.80	\$ 13.25	\$ 9.40	\$ 4.04	25.40	660,000	4.35	38.0%	23.5%	40.0%	107.9%	10.00	14.50	12.00
24.0%	17.0%	\$ 44.65	\$ 15.65	\$ 11.10	\$ 3.88	59.00	256,000	7.15	19.0%	12.0%	35.0%	121.4%	10.50	15.00	12.00
25.0%	29.0%	\$ 15.90	\$ 6.30	\$ 4.45	\$ 1.04	16.45	760,000	2.00	27.0%	21.0%	23.0%	113.9%	10.00	14.50	11.00
29.0%	13.5%	\$ 31.80	\$ 12.00	\$ 7.60	\$ 1.50	54.15	97,000	6.25	14.5%	12.0%	20.0%	108.9%	8.00	12.00	10.50
25.0%	23.5%	\$ 17.10	\$ 6.60	\$ 4.90	\$ 1.64	21.15	705,000	3.70	23.5%	15.5%	36.0%	114.7%	8.00	10.00	9.50
26.0%	31.0%	\$ 46.65	\$ 18.05	\$ 13.80	\$ 2.80	47.55	134,000	8.50	29.0%	23.0%	20.0%	115.9%	15.00	12.00	10.50

	Revenue	Income	Balance Sheet				Cash Flow	Fair Value	
	2020-2024	Operating Income	Current Assets	PP & E Gross	Current Liabilities	Long Term Debt	Intangibles (excluding Goodwill)	Depreciation & Amortization	Debt
	VL	M*	M*	M*	M*	M*	M*	M*	10-k
	9.00	\$ 8,554,000,000	\$ 3,459,000,000	\$ 76,058,000,000	\$ 4,351,000,000	\$ 23,943,000,000	\$ -	\$ 2,216,000,000	\$ 27,200,000,000
	7.50	\$ 4,182,000,000	\$ 2,081,000,000	\$ 43,596,000,000	\$ 2,300,000,000	\$ 11,880,000,000	\$ -	\$ 1,139,000,000	\$ 14,806,000,000
	7.50	\$ 4,874,000,000	\$ 3,278,000,000	\$ 45,632,000,000	\$ 2,151,000,000	\$ 15,993,000,000	\$ -	\$ 1,349,000,000	\$ 18,503,000,000
	8.00	\$ 1,055,000,000	\$ 729,000,000	\$ 11,513,000,000	\$ 491,000,000	\$ 3,228,000,000	\$ 112,000,000	\$ 351,000,000	\$ 3,535,700,000
	9.00	\$ 4,681,190,500	\$ 2,177,119,000	\$ 41,619,899,300	\$ 3,297,989,100	\$ 9,128,513,800	\$ 116,933,600	\$ 1,201,646,600	\$ 12,052,623,100
	9.50	\$ 2,501,763,600	\$ 930,853,000	\$ 21,242,680,900	\$ 1,763,235,600	\$ 6,275,949,400	\$ 9,231,600	\$ 543,125,800	\$ 7,807,625,700

Carrying Value	Operating Lease	ROE	All Div'ds to Net Prof
Debt	Rent	5 yr	5 yr
10-k	10-k	VL	VL
\$ 25,200,000,000	\$ 434,000,000	43.5%	37%
\$ 12,196,000,000	\$ 176,000,000	29.5%	30%
\$ 16,238,000,000	\$ 84,000,000	30.0%	24%
\$ 3,246,000,000	\$ 57,500,000	15.0%	19%
\$ 10,510,176,600	\$ 230,790,000	24.0%	29%
\$ 6,736,760,100	\$ 63,851,900	25.0%	17%

27% 27%
28% 26%
25% 24%

SUPPORT FOR DIRECT CAPITALIZATION EQUITY COMPONENT

WASHINGTON STATE DEPARTMENT OF REVENUE

2020 ASSESSMENT YEAR

RAILROADS

Company	Ticker	Stock Price	2019		2020		2019		2020	
			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	179.73	8.47	4.71%	9.40	5.23%	11.90	6.62%	13.25	7.37%
Norfolk Southern Corp.	NSC	193.28	10.10	5.23%	11.10	5.74%	14.35	7.42%	15.65	8.10%
CSX Corp.	CSX	72.11	4.20	5.82%	4.45	6.17%	6.05	8.39%	6.30	8.74%
Kansas City Southern	KSU	152.76	6.97	4.56%	7.60	4.98%	10.80	7.07%	12.00	7.86%
Canadian National	CNI	90.00	4.50	5.00%	4.90	5.44%	6.10	6.78%	6.60	7.33%
Canadian Pacific	CP	254.95	12.45	4.88%	13.80	5.41%	16.60	6.51%	18.05	7.08%
	Mean			5.03%		5.50%		7.13%		7.75%
	Median			4.94%		5.43%		6.92%		7.61%
	Max			5.82%		6.17%		8.39%		8.74%
	Min			4.56%		4.98%		6.51%		7.08%
	stdev			0.00		0.00		0.01		0.01
	cov			0.09		0.08		0.10		0.08
	harmean			5.00%		5.47%		7.08%		7.71%
	Say			5.00%		5.50%		7.00%		7.75%

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, 2020

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*	Dividends + Buybacks	Change in Earnings	Change in Dividends	T.Bill Rate	T.Bond Rate	Bond-Bill	Smoothed Growth	Implied Premium	Analyst Growth	Implied Premium	Implied Premium	ERP/Riskfree Rate
1960	5.34%	3.41%	58.11	3.10	1.98				2.66%	2.76%	0.10%	2.45%					
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%		2.92%		1.24
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%		3.56%		0.92
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%		3.38%		0.82
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%		3.31%		0.79
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%		3.32%		0.71
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%		3.68%		0.79
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%		3.20%		0.56
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%		3.00%		0.49
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%		3.74%		0.47
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%		3.41%		0.52
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%		3.09%		0.52
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%		2.72%		0.42
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%		4.30%		0.62
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%		5.59%		0.76
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%		4.13%		0.53
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%		4.55%		0.67
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%		5.92%		0.76
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%		5.72%		0.63
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%		6.45%		0.62
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%		5.03%		0.40
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%		5.73%		0.41
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%		4.90%		0.47
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%		4.31%		0.37
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%		5.11%		0.44
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%	6.75%	3.84%		0.43
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%	6.96%	3.58%		0.50
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%	8.58%	3.99%		0.45
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%	7.67%	3.77%		0.41
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%	7.46%	3.51%		0.44
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%	7.19%	3.89%		0.48
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%	7.81%	3.48%		0.52
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%	9.83%	3.55%		0.53
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%	8.00%	3.17%		0.55
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%	7.17%	3.55%		0.45
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%	6.50%	3.29%		0.59
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%	7.92%	3.20%		0.50
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%	8.00%	2.73%		0.48
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%	7.20%	2.26%		0.49
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%	12.50%	2.05%		0.32
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%	12.00%	2.87%		0.56
2001	3.85%	1.37%	1148.09	38.85	15.74	30.08	-30.79%	-3.24%	1.80%	5.05%	3.25%	3.56%	1.73%	10.30%	3.62%	2.91%	0.72
2002	5.23%	1.83%	879.82	46.04	16.08	29.83	18.51%	2.15%	1.20%	3.81%	2.61%	3.57%	2.29%	8.00%	4.10%	4.73%	1.08
2003	4.87%	1.61%	1111.91	54.69	17.88	31.58	18.79%	11.19%	1.00%	4.25%	3.25%	5.35%	2.12%	11.00%	3.69%	4.74%	0.87
2004	5.58%	1.60%	1211.92	67.68	19.407	40.60	23.75%	8.54%	2.18%	4.22%	2.04%	4.90%	2.02%	8.50%	3.65%	4.86%	0.86
2005	5.47%	1.79%	1248.29	76.45	22.38	61.17	12.96%	15.32%	4.31%	4.39%	0.08%	6.16%	2.20%	8.00%	4.08%	5.22%	0.93
2006	6.18%	1.77%	1418.3	87.72	25.05	73.16	14.74%	11.93%	4.88%	4.70%	-0.18%	5.93%	1.97%	12.50%	4.16%	6.12%	0.89
2007	5.62%	1.89%	1468.36	82.54	27.73	95.36	-5.91%	10.70%	3.31%	4.02%	0.71%	5.03%	2.06%	5.00%	4.37%	4.59%	1.09
2008	7.24%	3.11%	903.25	65.39	28.05	67.52	-20.78%	1.15%	1.59%	2.21%	0.62%	2.11%	4.05%	4.00%	6.43%	6.92%	2.91
2009	5.35%	2.00%	1115.10	59.65	22.31	37.43	-8.78%	-20.46%	0.14%	3.84%	3.70%	0.28%	2.60%	7.20%	4.36%	4.64%	1.14
2010	6.65%	1.84%	1257.64	83.66	23.12	55.53	40.25%	3.63%	0.13%	3.29%	3.16%	3.33%	2.24%	6.95%	5.20%	6.09%	1.58
2011	7.72%	2.07%	1257.60	97.05	26.02	71.28	16.01%	12.54%	0.03%	1.88%	1.85%	2.75%	2.71%	7.18%	6.01%	8.34%	3.20
2012	7.18%	2.13%	1426.19	102.47	30.44	75.90	5.58%	16.99%	0.05%	1.76%	1.71%	2.93%	2.47%	5.27%	5.78%	7.30%	3.28
2013	5.81%	1.96%	1848.36	107.45	36.28	88.13	4.86%	19.19%	0.07%	3.04%	2.97%	5.01%	2.03%	4.28%	4.96%	4.99%	1.63
2014	5.49%	1.92%	2058.90	113.01	39.44	101.98	5.17%	8.71%	0.05%	2.17%	2.12%	2.77%	2.24%	5.58%	5.78%	5.48%	2.66
2015	5.20%	2.11%	2043.94	106.32	43.16	106.10	-5.92%	9.43%	0.21%	2.27%	2.06%	2.96%	2.46%	5.51%	6.12%	5.16%	2.70
2016	4.86%	2.01%	2238.83	108.86	45.03	108.67	2.39%	4.33%	0.51%	2.45%	1.94%	2.64%	2.41%	5.54%	5.69%	4.50%	2.32
2017	4.67%	1.86%	2673.61	124.94	49.73	108.28	14.77%	10.44%	1.39%	2.41%	1.02%	3.22%	2.36%	7.05%	5.08%	4.75%	2.11
2018	5.92%	2.14%	2506.85	148.34	53.61	136.65	18.73%	7.80%	2.37%	2.68%	0.31%	3.24%	2.50%	4.12%	5.96%	5.55%	2.22
2019	5.03%	1.82%	3230.78	162.35	58.80	150.50	9.44%	9.68%	1.55%	1.92%	0.37%	2.57%		3.96%	5.20%	5.06%	2.71

* Earnings and dividends numbers each year reflect the estimated numbers as of the end of the year. These numbers get updated later in the year but I do not update the numbers in this spreadsheet, since I would
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2020 Multi Stage Earnings Growth Model
Railroad Industry

Company 3.90% GDP
 Ticker 18.4 Industry P/E
 26.5% Target Dividend Payout Ratio (All dividends to net profit)
 27.3% Target ROE

Canadian National CNI							
Year	Growth Rate	Reinvestment Rate	Payout Ratio	Earnings	FCFE	Terminal Value	Cash Flow
0		32.62%	67.38%	\$ 4.50		stock price =	(90.00)
1	8.89%	36.51%	63.49%	\$ 4.90	3.11		3.11
2	9.95%	33.21%	66.79%	5.39	3.60		3.60
3	9.05%	30.45%	69.55%	5.88	4.09		4.09
4	8.30%	28.12%	71.88%	6.36	4.57		4.57
5	7.66%	25.36%	74.64%	6.85	5.11		5.11
6	6.91%	22.60%	77.40%	7.32	5.67		5.67
7	6.16%	19.83%	80.17%	7.77	6.23		6.23
8	5.40%	17.07%	82.93%	8.19	6.80		6.80
9	4.65%	14.31%	85.69%	8.58	7.35		7.35
10	3.90%	14.31%	85.69%	8.91	7.63	170.53	178.17
11+	3.90%	14.31%	85.69%	9.26	7.93		7.93

Value Line Dividends Growth Rate $K_e = 10.91\%$

Union Pacific UP							
Year	Growth Rate	Reinvestment Rate	Payout Ratio	Earnings	FCFE	Terminal Value	Cash Flow
0		40.29%	59.71%	\$ 8.47		stock price =	(179.73)
1	10.98%	36.60%	63.40%	9.40	5.96		5.96
2	9.97%	33.28%	66.72%	10.34	6.90		6.90
3	9.07%	30.51%	69.49%	11.28	7.83		7.83
4	8.31%	28.17%	71.83%	12.21	8.77		8.77
5	7.68%	25.40%	74.60%	13.15	9.81		9.81
6	6.92%	22.63%	77.37%	14.06	10.88		10.88
7	6.17%	19.86%	80.14%	14.93	11.96		11.96
8	5.41%	17.08%	82.92%	15.73	13.05		13.05
9	4.66%	14.31%	85.69%	16.47	14.11		14.11
10	3.90%	14.31%	85.69%	17.11	14.66	327.46	342.13
11+	3.90%	14.31%	85.69%	17.78	15.23		15.23

Value Line Dividends Growth Rate $K_e = 10.40\%$

Norfolk Southern NSC							
Year	Growth Rate	Reinvestment Rate	Payout Ratio	Earnings	FCFE	Terminal Value	Cash Flow
0		36.33%	63.67%	\$ 10.10		stock price =	(193.28)
1	9.90%	39.26%	60.74%	11.10	6.74		6.74
2	10.70%	35.47%	64.53%	12.29	7.93		7.93
3	9.66%	32.34%	67.66%	13.48	9.12		9.12
4	8.81%	29.72%	70.28%	14.66	10.30		10.30
5	8.10%	26.64%	73.36%	15.85	11.63		11.63
6	7.26%	23.56%	76.44%	17.00	13.00		13.00
7	6.42%	20.48%	79.52%	18.09	14.39		14.39
8	5.58%	17.39%	82.61%	19.10	15.78		15.78
9	4.74%	14.31%	85.69%	20.01	17.14		17.14
10	3.90%	14.31%	85.69%	20.79	17.81	397.85	415.66
11+	3.90%	14.31%	85.69%	21.60	18.51		18.51

Value Line Dividends Growth Rate $K_e = 11.88\%$

CSX		Growth	Reinvestment	Payout	Earnings	FCFE	Terminal	Cash
Year	Rate	Rate	Ratio				Value	Flow
0		21.84%	78.16%	\$ 4.20		stock price =		(72.11)
1	5.95%	29.89%	70.11%	4.45	3.12			3.12
2	8.15%	27.64%	72.36%	4.81	3.48			3.48
3	7.53%	25.71%	74.29%	5.18	3.84			3.84
4	7.00%	24.02%	75.98%	5.54	4.21			4.21
5	6.55%	22.08%	77.92%	5.90	4.60			4.60
6	6.02%	20.14%	79.86%	6.26	5.00			5.00
7	5.49%	18.20%	81.80%	6.60	5.40			5.40
8	4.96%	16.25%	83.75%	6.93	5.80			5.80
9	4.43%	14.31%	85.69%	7.23	6.20			6.20
10	3.90%	14.31%	85.69%	7.51	6.44	143.82		150.26
11+	3.90%	14.31%	85.69%	7.81	6.69			
<i>Value Line Dividends Growth Rate</i>						Ke =	11.89%	

Kansas City Southern		Growth	Reinvestment	Payout	Earnings	FCFE	Terminal	Cash
Year	Rate	Rate	Ratio				Value	Flow
0		33.17%	66.83%	\$ 6.97		stock price =		(152.76)
1	9.04%	32.59%	67.41%	7.60	5.12			5.12
2	8.88%	29.93%	70.07%	8.28	5.80			5.80
3	8.16%	27.68%	72.32%	8.95	6.47			6.47
4	7.54%	25.74%	74.26%	9.63	7.15			7.15
5	7.01%	23.45%	76.55%	10.30	7.88			7.88
6	6.39%	21.17%	78.83%	10.96	8.64			8.64
7	5.77%	18.88%	81.12%	11.59	9.40			9.40
8	5.15%	16.60%	83.40%	12.19	10.16			10.16
9	4.52%	14.31%	85.69%	12.74	10.91			10.91
10	3.90%	14.31%	85.69%	13.23	11.34	253.30		264.64
11+	3.90%	14.31%	85.69%	13.75	11.78			
<i>Value Line Dividends Growth Rate</i>						Ke =	9.35%	

Canadian Pacific		Growth	Reinvestment	Payout	Earnings	FCFE	Terminal	Cash
Year	Rate	Rate	Ratio				Value	Flow
0		39.79%	60.21%	\$ 12.45		stock price =		(254.95)
1	10.84%	28.59%	71.41%	13.80	9.86			9.86
2	7.79%	26.52%	73.48%	14.88	10.93			10.93
3	7.23%	24.73%	75.27%	15.95	12.01			12.01
4	6.74%	23.17%	76.83%	17.03	13.08			13.08
5	6.31%	21.40%	78.60%	18.10	14.23			14.23
6	5.83%	19.63%	80.37%	19.16	15.40			15.40
7	5.35%	17.86%	82.14%	20.18	16.58			16.58
8	4.87%	16.08%	83.92%	21.16	17.76			17.76
9	4.38%	14.31%	85.69%	22.09	18.93			18.93
10	3.90%	14.31%	85.69%	22.95	19.67	439.27		458.93
11+	3.90%	14.31%	85.69%	23.85	20.43			
<i>Value Line Dividends Growth Rate</i>						Ke =	10.01%	