

SURFACE TRANSPORTATION BOARD

DECISION

Docket No. EP 664 (Sub-No. 4)

REVISIONS TO THE BOARD'S METHODOLOGY FOR DETERMINING THE RAILROAD
INDUSTRY'S COST OF CAPITAL

Digest:¹ In this decision, the Board makes available certain information to assist interested parties in their analysis of the Board's proposed changes to its cost-of-capital methodology.

Decided: October 11, 2019

On September 30, 2019, the Board issued a Notice of Proposed Rulemaking (NPRM) that proposed to incorporate an additional model, which the Board referred to as "Step Multi-Stage Discounted Cash Flow Model" (Step MSDCF), to complement its use of the Morningstar/Ibbotson Multi-Stage Discounted Cash Flow Model (Morningstar/Ibbotson MSDCF) and the Capital Asset Pricing Model (CAPM) in determining the cost-of-equity component of the cost of capital.²

To assist commenters in their analysis of the proposed changes to its cost-of-capital methodology, the Board is making available its workpapers that show the calculations for the values shown in Appendix B of the NPRM.³ Specifically, for the annual determinations from 2009 through 2018, the workpapers show the calculations for the cost-of-equity estimates produced by the simple average of CAPM and Morningstar/Ibbotson MSDCF and the cost-of-equity estimates produced by the proposed weighted average of CAPM (50%), Morningstar/Ibbotson MSDCF (25%), and Step MSDCF (25%). The workpapers also show how the standard deviations were calculated.

¹ The digest constitutes no part of the decision of the Board but has been prepared for the convenience of the reader. It may not be cited to or relied upon as precedent. See Policy Statement on Plain Language Digests in Decisions, EP 696 (STB served Sept. 2, 2010).

² A corrected decision was served October 11, 2019. The workpapers made available here reflect the figures in the corrected decision.

³ The workpapers are attached to this decision in PDF format as an appendix. To obtain the workpapers as an Excel spreadsheet, parties should submit a request to the Board's Office of Economics at Economic.Data@stb.gov, and reference this proceeding.

It is ordered:

1. The workpapers that support the Board's October 11, 2019 decision in this docket are available as described above.

2. This decision is effective on the date of service.

By the Board, Board Members Begeman, Fuchs, and Oberman.

APPENDIX

In Millions (\$)

Company	CSX		BNSF		NSC		UNP		
Year	2009		2009		2009		2009		
Inputs									
Initial Cash Flow	\$693.00		\$897.00		\$933.00		\$980.00		
Input for Terminal C.F.	\$1,099.00		\$1,680.00		\$1,209.00		\$1,591.00		
Stage One Growth	11.600%		12.000%		12.000%		13.100%		
Step	10.633%		10.967%		10.967%		11.883%		
Step	9.667%		9.933%		9.933%		10.667%		
Step	8.700%		8.900%		8.900%		9.450%		
Step	7.733%		7.867%		7.867%		8.233%		
Step	6.767%		6.833%		6.833%		7.017%		
Stage Three Growth	5.800%		5.800%		5.800%		5.800%		
	Year	Val. 12/31	Pres Val.	Val. 12/31	Pres Val.	Val. 12/31	Pres Val.	Val. 12/31	Pres Val.
	1	\$773	\$685	\$1,005	\$897	\$1,045	\$916	\$1,108	\$985
	2	863	677	1,125	897	1,170	899	1,254	991
	3	963	669	1,260	897	1,311	882	1,418	996
	4	1,075	661	1,411	897	1,468	866	1,604	1,001
	5	1,200	653	1,581	897	1,644	850	1,814	1,007
	6	1,327	640	1,754	889	1,825	827	2,029	1,001
	7	1,456	622	1,928	872	2,006	796	2,246	985
	8	1,582	598	2,100	848	2,184	760	2,458	958
	9	1,704	571	2,265	817	2,356	718	2,660	922
	10	1,820	540	2,420	779	2,517	673	2,847	877
	Terminal	42,875	12,719	77,309	24,885	41,537	11,099	73,067	22,517
	Sum of Pres. Values	\$19,035.00		\$33,574.00		\$19,285.00		\$32,241.00	
Market Value (input)	\$19,035.00		\$33,574.00		\$19,285.00		\$32,241.00		
Cost of Equity	12.92%		12.00%		14.11%		12.49%		
Weight Cost of Equity	2.36%		3.87%		2.61%		3.87%		
Industry Cost of Equity	12.71%								

In Millions (\$)

Company	CSX	NSC	UNP	
Year	2010	2010	2010	
Inputs				
Initial Cash Flow	\$949.00	\$1,099.00	\$1,567.00	
Input for Terminal C.F.	\$1,415.00	\$1,456.00	\$2,194.00	
Stage One Growth	11.500%	12.000%	15.000%	
Step	10.550%	10.967%	13.467%	
Step	9.600%	9.933%	11.933%	
Step	8.650%	8.900%	10.400%	
Step	7.700%	7.867%	8.867%	
Step	6.750%	6.833%	7.333%	
Stage Three Growth	5.800%	5.800%	5.800%	
	Year	Val. 12/31 Pres Val.	Val. 12/31 Pres Val.	Val. 12/31 Pres Val.
	1	\$1,058 \$936	\$1,231 \$1,078	\$1,802 \$1,591
	2	1,180 922	1,379 1,058	2,072 1,615
	3	1,315 909	1,544 1,038	2,383 1,640
	4	1,467 897	1,729 1,018	2,741 1,665
	5	1,635 884	1,937 999	3,152 1,690
	6	1,808 864	2,149 971	3,576 1,693
	7	1,982 837	2,363 935	4,003 1,673
	8	2,153 804	2,573 892	4,419 1,631
	9	2,319 766	2,775 842	4,811 1,567
	10	2,475 723	2,965 788	5,164 1,485
	Terminal	53,521 15,633	49,683 13,209	102,381 29,444
Sum of Pres. Values		\$24,176.00	\$22,827.00	\$45,695.00
Market Value (input)		\$24,176.00	\$22,827.00	\$45,695.00
Cost of Equity	13.10%	14.17%	13.27%	
Weight Cost of Equity	3.42%	3.49%	6.54%	
Industry Cost of Equity	13.45%			

In Millions (\$)

in Millions (\$)

Company	CSX		NSC		UNP		
Year	2011		2011		2011		
Inputs							
Initial Cash Flow	\$1,119.00		\$1,268.00		\$2,156.00		
Input for Terminal C.F.	\$1,612.00		\$1,748.00		\$2,799.00		
Stage One Growth	14.250%		14.500%		15.100%		
Step	12.740%		12.948%		13.448%		
Step	11.230%		11.397%		11.797%		
Step	9.720%		9.845%		10.145%		
Step	8.210%		8.293%		8.493%		
Step	6.700%		6.742%		6.842%		
Stage Three Growth	5.190%		5.190%		5.190%		
	Year	Val. 12/31	Pres Val.	Val. 12/31	Pres Val.	Val. 12/31	Pres Val.
	1	\$1,278	\$1,107	\$1,452	\$1,256	\$2,482	\$2,177
	2	1,461	1,095	1,662	1,244	2,856	2,198
	3	1,669	1,083	1,903	1,232	3,288	2,220
	4	1,907	1,071	2,179	1,220	3,784	2,241
	5	2,178	1,059	2,495	1,208	4,355	2,263
	6	2,456	1,034	2,819	1,180	4,941	2,252
	7	2,732	996	3,140	1,137	5,524	2,209
	8	2,997	946	3,449	1,080	6,084	2,134
	9	3,243	886	3,735	1,012	6,601	2,031
	10	3,460	818	3,987	934	7,053	1,904
	Terminal	50,815	12,018	55,437	12,988	109,444	29,547
Sum of Pres. Values			\$22,112.00		\$24,489.00		\$51,177.00
Market Value (input)			\$22,112.00		\$24,489.00		\$51,177.00
Cost of Equity		15.51%		15.62%		13.99%	
Weight Cost of Equity		3.51%		3.91%		7.32%	
Industry Cost of Equity		14.74%					

In Millions (\$)

in Millions (\$)

Company	CSX	NSC	UNP				
Year	2012	2012	2012				
Inputs							
Initial Cash Flow	\$1,202.00	\$1,160.00	\$2,617.00				
Input for Terminal C.F.	\$1,697.00	\$1,734.00	\$3,327.00				
Stage One Growth	14.700%	12.100%	15.400%				
Step	13.163%	10.997%	13.747%				
Step	11.627%	9.893%	12.093%				
Step	10.090%	8.790%	10.440%				
Step	8.553%	7.687%	8.787%				
Step	7.017%	6.583%	7.133%				
Stage Three Growth	5.480%	5.480%	5.480%				
	Year	Val. 12/31	Pres Val.	Val. 12/31	Pres Val.	Val. 12/31	Pres Val.
	1	\$1,379	\$1,175	\$1,300	\$1,118	\$3,020	\$2,633
	2	1,581	1,149	1,458	1,078	3,485	2,649
	3	1,814	1,124	1,634	1,039	4,022	2,665
	4	2,080	1,099	1,832	1,001	4,641	2,681
	5	2,386	1,074	2,053	965	5,356	2,697
	6	2,700	1,036	2,279	921	6,092	2,674
	7	3,014	986	2,505	870	6,829	2,613
	8	3,319	925	2,725	814	7,542	2,516
	9	3,602	856	2,934	753	8,205	2,386
	10	3,855	781	3,128	690	8,790	2,228
	Terminal	48,534	9,834	45,541	10,053	127,702	32,373
Sum of Pres. Values		\$20,040.00		\$19,301.00		\$58,113.00	
Market Value (input)		\$20,040.00		\$19,301.00		\$58,113.00	
Cost of Equity		17.31%		16.31%		14.71%	
Weight Cost of Equity		3.56%		3.23%		8.77%	
Industry Cost of Equity		15.56%					

In Millions (\$)

Information (\$)									
Company	CSX			KSU		NSC		UNP	
Year	2013			2013		2013		2013	
Inputs									
Initial Cash Flow	\$1,186.00			\$46.00		\$1,137.00		\$3,076.00	
Input for Terminal C.F.	\$1,800.00			\$304.00		\$1,789.00		\$3,825.00	
Stage One Growth	8.150%			16.700%		10.750%		14.270%	
Step	7.722%			14.847%		9.888%		12.822%	
Step	7.293%			12.993%		9.027%		11.373%	
Step	6.865%			11.140%		8.165%		9.925%	
Step	6.437%			9.287%		7.303%		8.477%	
Step	6.008%			7.433%		6.442%		7.028%	
Stage Three Growth	5.580%			5.580%		5.580%		5.580%	
	Year	Val. 12/31	Pres Val.	Val. 12/31	Pres Val.	Val. 12/31	Pres Val.	Val. 12/31	Pres Val.
	1	\$1,283	\$1,144	\$54	\$49	\$1,259	\$1,114	\$3,515	\$3,100
	2	1,387	1,104	63	52	1,395	1,091	4,017	3,125
	3	1,500	1,065	73	56	1,545	1,069	4,590	3,149
	4	1,623	1,027	85	60	1,711	1,047	5,245	3,174
	5	1,755	991	100	64	1,894	1,026	5,993	3,199
	6	1,890	952	114	67	2,082	997	6,761	3,183
	7	2,028	911	129	69	2,270	962	7,530	3,127
	8	2,167	869	144	70	2,455	920	8,278	3,032
	9	2,307	825	157	70	2,634	874	8,980	2,901
	10	2,445	780	169	69	2,804	823	9,611	2,739
	Terminal	60,045	19,151	30,859	12,575	62,383	18,301	161,839	46,116
	Sum of Pres. Values		\$28,819.00		\$13,200.00		\$28,225.00		\$76,846.00
	Market Value (input)		\$28,819.00		\$13,200.00		\$28,225.00		\$76,846.00
Cost of Equity		12.11%		9.39%		13.05%		13.38%	
Weight Cost of Equity		2.37%		0.84%		2.50%		6.99%	
Industry Cost of Equity		12.71%							

In Millions (\$)

in Millions (\$)

Company	CSX		KSU		NSC		UNP		
Year	2014		2014		2014		2014		
Inputs									
Initial Cash Flow	\$1,149.00		\$46.00		\$1,143.00		\$3,492.00		
Input for Terminal C.F.	\$1,951.00		\$401.00		\$1,931.00		\$4,543.00		
Stage One Growth	10.100%		15.450%		11.900%		13.250%		
Step	9.247%		13.705%		10.747%		11.872%		
Step	8.393%		11.960%		9.593%		10.493%		
Step	7.540%		10.215%		8.440%		9.115%		
Step	6.687%		8.470%		7.287%		7.737%		
Step	5.833%		6.725%		6.133%		6.358%		
Stage Three Growth	4.980%		4.980%		4.980%		4.980%		
	Year	Val. 12/31	Pres Val.	Val. 12/31	Pres Val.	Val. 12/31	Pres Val.	Val. 12/31	Pres Val.
	1	\$1,265	\$1,136	\$53	\$49	\$1,279	\$1,139	\$3,955	\$3,544
	2	1,393	1,122	61	51	1,431	1,135	4,479	3,596
	3	1,533	1,109	71	54	1,602	1,131	5,072	3,649
	4	1,688	1,096	82	57	1,792	1,128	5,744	3,703
	5	1,859	1,083	94	60	2,005	1,124	6,505	3,758
	6	2,031	1,062	107	62	2,221	1,109	7,278	3,767
	7	2,201	1,034	120	64	2,434	1,082	8,041	3,729
	8	2,367	998	132	64	2,639	1,045	8,774	3,646
	9	2,526	955	144	64	2,832	999	9,453	3,520
	10	2,673	908	153	62	3,005	944	10,054	3,355
	Terminal	74,155	25,182	31,348	12,703	73,037	22,940	207,372	69,190
Sum of Pres. Values			\$35,685.00		\$13,290.00		\$33,776.00		\$105,456.00
Market Value (input)			\$35,685.00		\$13,290.00		\$33,776.00		\$105,456.00
Cost of Equity		11.41%		9.45%		12.28%		11.60%	
Weight Cost of Equity		2.16%		0.67%		2.20%		6.50%	
Industry Cost of Equity		11.53%							

In Millions (\$)

Company Year	CSX 2015		KSU 2015		NSC 2015		UNP 2015	
Inputs								
Initial Cash Flow	\$1,035.70		\$26.52		\$898.67		\$3,122.42	
Input for Terminal C.F.	\$1,863.36		\$422.22		\$1,726.43		\$4,347.61	
Stage One Growth	6.200%		8.450%		0.800%		6.500%	
Step	5.973%		7.848%		1.473%		6.223%	
Step	5.747%		7.247%		2.147%		5.947%	
Step	5.520%		6.645%		2.820%		5.670%	
Step	5.293%		6.043%		3.493%		5.393%	
Step	5.067%		5.442%		4.167%		5.117%	
Stage Three Growth	4.840%		4.840%		4.840%		4.840%	
Year	Val. 12/31	Pres Val.	Val. 12/31	Pres Val.	Val. 12/31	Pres Val.	Val. 12/31	Pres Val.
1	\$1,100	\$986	\$29	\$26	\$906	\$828	\$3,325	\$2,985
2	1,168	939	31	26	913	763	3,542	2,853
3	1,241	894	34	26	920	703	3,772	2,727
4	1,317	852	37	26	928	647	4,017	2,606
5	1,399	811	40	25	935	597	4,278	2,491
6	1,483	771	43	25	949	553	4,544	2,375
7	1,568	731	46	24	969	517	4,814	2,259
8	1,654	691	49	24	997	485	5,087	2,142
9	1,742	653	52	23	1,031	459	5,362	2,026
10	1,830	615	55	22	1,074	437	5,636	1,912
Terminal	51,657	17,357	19,605	7,902	47,356	19,267	125,060	42,416
Sum of Pres. Values	\$25,300.00		\$8,149.00		\$25,256.00		\$66,792.00	
Market Value (input)	\$25,300.00		\$8,149.00		\$25,256.00		\$66,792.00	
Cost of Equity	11.52%		9.51%		9.41%		11.42%	
Weight Cost of Equity	2.32%		0.62%		1.89%		6.08%	
Industry Cost of Equity	10.91%							

In Millions (\$)

Company	CSX		KSU		NSC		UNP		
Year	2016		2016		2016		2016		
Inputs									
Initial Cash Flow	\$960.13		\$53.79		\$844.63		\$3,005.53		
Input for Terminal C.F.	\$1,741.55		\$428.58		\$1,617.35		\$4,133.18		
Stage One Growth	5.100%		8.120%		10.170%		6.490%		
Step	5.115%		7.632%		9.340%		6.273%		
Step	5.130%		7.143%		8.510%		6.057%		
Step	5.145%		6.655%		7.680%		5.840%		
Step	5.160%		6.167%		6.850%		5.623%		
Step	5.175%		5.678%		6.020%		5.407%		
Stage Three Growth	5.190%		5.190%		5.190%		5.190%		
	Year	Val. 12/31	Pres Val.	Val. 12/31	Pres Val.	Val. 12/31	Pres Val.	Val. 12/31	Pres Val.
	1	\$1,009	\$919	\$58	\$53	\$931	\$838	\$3,201	\$2,906
	2	1,061	880	63	52	1,025	831	3,408	2,809
	3	1,115	843	68	52	1,129	824	3,630	2,715
	4	1,171	807	74	51	1,244	817	3,865	2,625
	5	1,231	773	79	51	1,371	810	4,116	2,538
	6	1,294	740	86	50	1,499	798	4,374	2,448
	7	1,361	709	92	49	1,626	779	4,639	2,357
	8	1,431	679	98	47	1,751	755	4,910	2,265
	9	1,504	651	104	46	1,871	726	5,186	2,172
	10	1,582	623	110	44	1,984	693	5,466	2,078
	Terminal	66,056	26,029	21,376	8,633	67,764	23,679	159,242	60,532
	Sum of Pres. Values	\$33,654.23		\$9,128.08		\$31,550.20		\$85,443.98	
	Market Value (input)	\$33,654.23		\$9,128.08		\$31,550.20		\$85,443.98	
	Cost of Equity	9.76%		9.49%		11.09%		10.16%	
Weight Cost of Equity	2.06%		0.54%		2.19%		5.43%		
Industry Cost of Equity	10.22%								

In Millions (\$)

INFORMATION (\$)									
Company	CSX			KSU		NSC		UNP	
Year	2017			2017		2017		2017	
Inputs									
Initial Cash Flow	\$1,024.69			\$83.42		\$1,093.54		\$3,488.63	
Input for Terminal C.F.	\$1,801.24			\$481.36		\$1,775.39		\$4,525.23	
Stage One Growth	15.660%			13.160%		12.000%		13.360%	
Step	13.913%			11.830%		10.863%		11.997%	
Step	12.167%			10.500%		9.727%		10.633%	
Step	10.420%			9.170%		8.590%		9.270%	
Step	8.673%			7.840%		7.453%		7.907%	
Step	6.927%			6.510%		6.317%		6.543%	
Stage Three Growth	5.180%			5.180%		5.180%		5.180%	
	Year	Val. 12/31	Pres Val.	Val. 12/31	Pres Val.	Val. 12/31	Pres Val.	Val. 12/31	Pres Val.
	1	\$1,185	\$1,066	\$94	\$85	\$1,225	\$1,104	\$3,955	\$3,539
	2	1,371	1,109	107	87	1,372	1,114	4,483	3,589
	3	1,585	1,153	121	90	1,536	1,125	5,082	3,641
	4	1,834	1,200	137	92	1,721	1,135	5,761	3,693
	5	2,121	1,248	155	94	1,927	1,146	6,531	3,746
	6	2,416	1,279	173	95	2,137	1,145	7,314	3,754
	7	2,710	1,290	191	95	2,344	1,132	8,092	3,717
	8	2,992	1,281	209	94	2,546	1,108	8,842	3,634
	9	3,252	1,252	225	91	2,735	1,073	9,541	3,509
	10	3,477	1,204	240	88	2,908	1,028	10,165	3,345
	Terminal	107,055	37,081	27,183	9,984	85,895	30,355	210,884	69,393
	Sum of Pres. Values		\$49,163.71		\$10,894.81		\$41,462.95		\$105,559.34
Market Value (input)		\$49,163.71		\$10,894.81		\$41,462.95		\$105,559.34	
Cost of Equity	11.18%			10.54%		10.96%		11.76%	
Weight Cost of Equity	2.66%			0.55%		2.19%		5.99%	
Industry Cost of Equity	11.40%								

In Millions (\$)

Company	CSX		KSU		NSC		UNP		
Year	2018		2018		2018		2018		
Inputs									
Initial Cash Flow	\$1,555.28		\$208.45		\$1,367.15		\$4,066.82		
Input for Terminal C.F.	\$2,225.84		\$551.31		\$2,080.73		\$5,154.01		
Stage One Growth	27.430%		14.700%		17.400%		19.990%		
Step	23.692%		13.083%		15.333%		17.492%		
Step	19.953%		11.467%		13.267%		14.993%		
Step	16.215%		9.850%		11.200%		12.495%		
Step	12.477%		8.233%		9.133%		9.997%		
Step	8.738%		6.617%		7.067%		7.498%		
Stage Three Growth	5.000%		5.000%		5.000%		5.000%		
	Year	Val. 12/31	Pres Val.	Val. 12/31	Pres Val.	Val. 12/31	Pres Val.	Val. 12/31	Pres Val.
	1	\$1,982	\$1,697	\$239	\$212	\$1,605	\$1,409	\$4,880	\$4,224
	2	2,526	1,851	274	217	1,884	1,452	5,855	4,387
	3	3,218	2,019	315	221	2,212	1,496	7,026	4,556
	4	4,101	2,203	361	225	2,597	1,542	8,430	4,732
	5	5,226	2,403	414	229	3,049	1,589	10,115	4,915
	6	6,464	2,545	468	231	3,517	1,608	11,885	4,998
	7	7,754	2,613	522	229	3,983	1,599	13,667	4,975
	8	9,011	2,600	573	223	4,429	1,561	15,374	4,845
	9	10,135	2,504	620	215	4,834	1,495	16,911	4,613
	10	11,021	2,331	661	203	5,175	1,405	18,179	4,292
	Terminal	140,245	29,657	24,438	7,516	92,652	25,155	229,748	54,241
	Sum of Pres. Values		\$52,421.62		\$9,721.26		\$40,310.07		\$100,778.15
	Market Value (input)		\$52,421.62		\$9,721.26		\$40,310.07		\$100,778.15
Cost of Equity	16.81%		12.51%		13.93%		15.53%		
Weight Cost of Equity	4.34%		0.60%		2.76%		7.70%		
Industry Cost of Equity	15.40%								

	CAPM*	MSDCF*	Step MSDCF	COE*	Proposed COE (50% CAPM 25% MSDCF 25% Step MSDCF)
2009	11.39%	13.34%	12.71%	12.37%	12.21%
2010	11.84%	14.13%	13.45%	12.99%	12.81%
2011	11.31%	15.83%	14.74%	13.57%	13.30%
2012	10.27%	16.53%	15.56%	13.40%	13.16%
2013	12.52%	13.40%	12.71%	12.96%	12.79%
2014	11.82%	12.30%	11.53%	12.06%	11.87%
2015	10.95%	10.97%	10.91%	10.96%	10.95%
2016	10.18%	10.44%	10.22%	10.31%	10.25%
2017	10.74%	12.18%	11.40%	11.46%	11.26%
2018	10.70%	17.01%	15.40%	13.86%	13.45%

**As reported by the Board in its EP 558 decisions*

	Standard Deviation	Min	Max
2 Models	1.18%	10.31%	13.86%
3 Models	1.09%	10.25%	13.45%