LOWE'S FURNITURE: INVESTMENT ANALYSIS

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Discrete and Continuous Time

The Real World

Most of your cash flows occur over the entire year. Revenues and operating expenses are spread over the year, though there may be "seasonal" factors

Some of your cash flows (tax payments, debt payments) occur at discrete intervals (every quarter or month)

The PV World

The Discrete Time World: Cash flows are assumed to occur at a point in time.

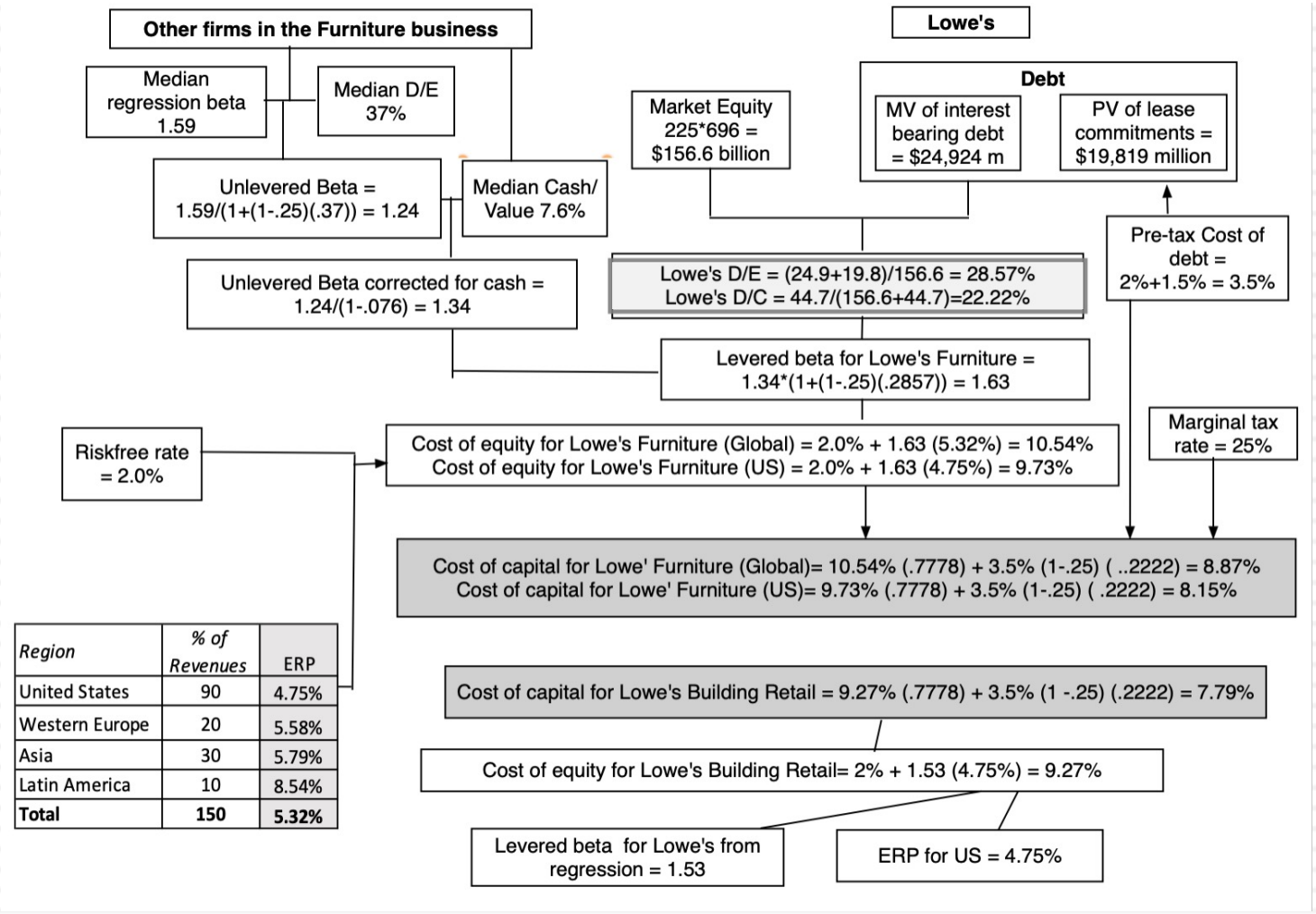
The Accounting World

The Accounting World: Revenues, earnings and expenses occur in fiscal years

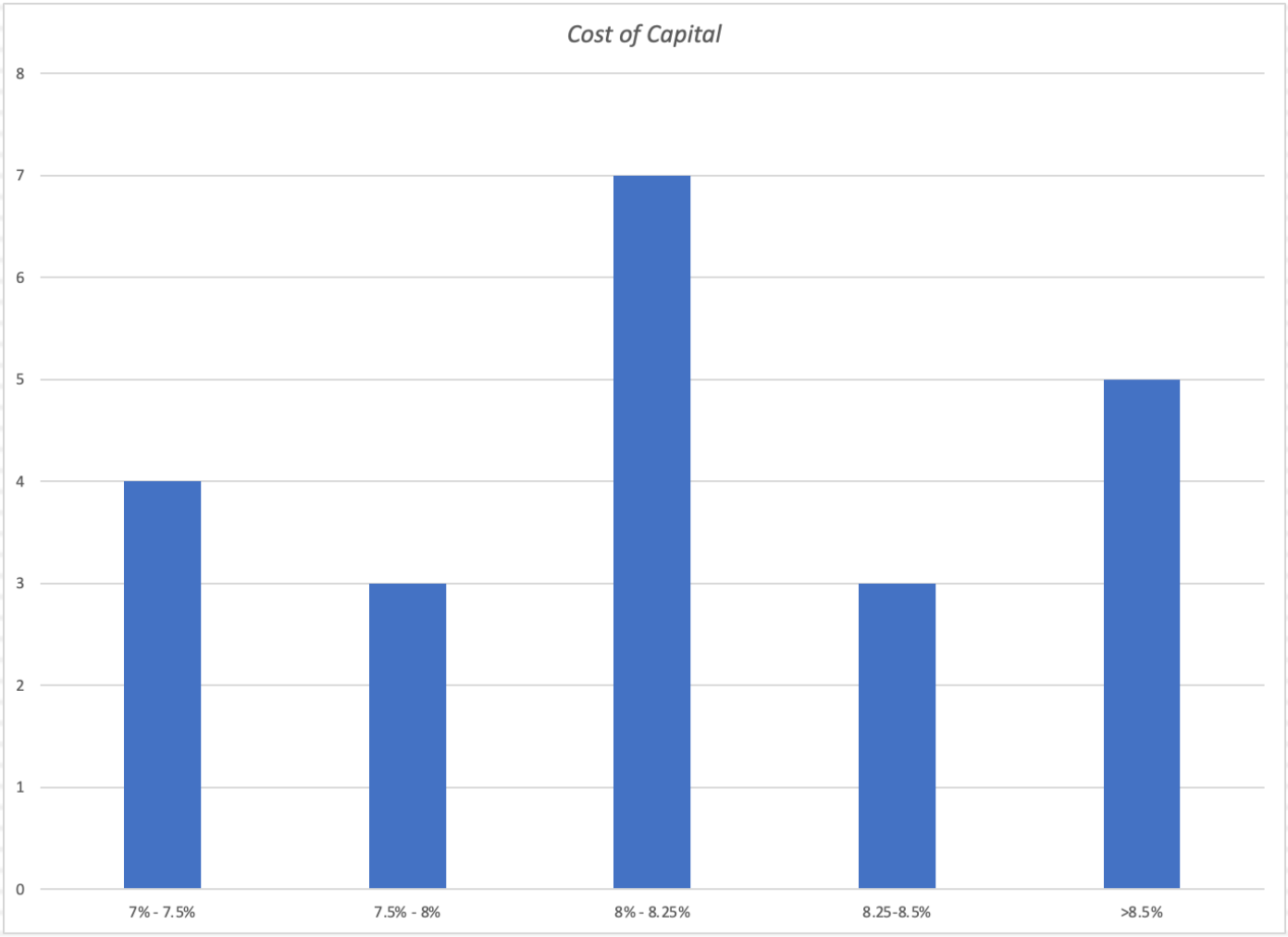
Summary of Conclusions

- Based upon the riskiness of this project and Lowe's debt to equity ratio of 28.6%, the beta for this project, when fully operational, is 1.63, the cost of equity is 10.66% and the cost of capital is 8.87%.
- From an accounting return standpoint, the return on capital computed using the average operating income and capital invested over the period is 18%-22%, depending on what you include in book value, and whether you include or exclude the synergy benefits.
- The net present value of just the cash flows on the project, discounted at 8.87% (for most of the years..)
  - *is $2,302 million, for a finite life of 15 years and without counting side effects (lost sales at stores and synergy)*
  - *is $3,964 million, under the assumption of an infinite life, with higher capital expenditures during the project life, without counting the side effects (lost sales at stores and synergies)*
- There are two side effects to Lowe's US building supply stores, one negative (loss of sales at closed stores) and one positive (increased sales at other stores).
  - The value of the cash flows, discounted at the HD's cost of capital of 7.79% is $-$537 million in the finite life case and -$421 million in the longer life case, making the NPV less positive, but still positive.
  - With these side effects incorporated, the NPV for the finite life case is $1,765 million and for the infinite case, it is $3,543 million.
- I would recommend accepting the project, because the net present value is positive. The added benefit of the project is that the stores are open gradually, thus giving the Lowe's an option to consider whether to open the remaining stores, based upon existing store performance.

Cost of Capital Calculations



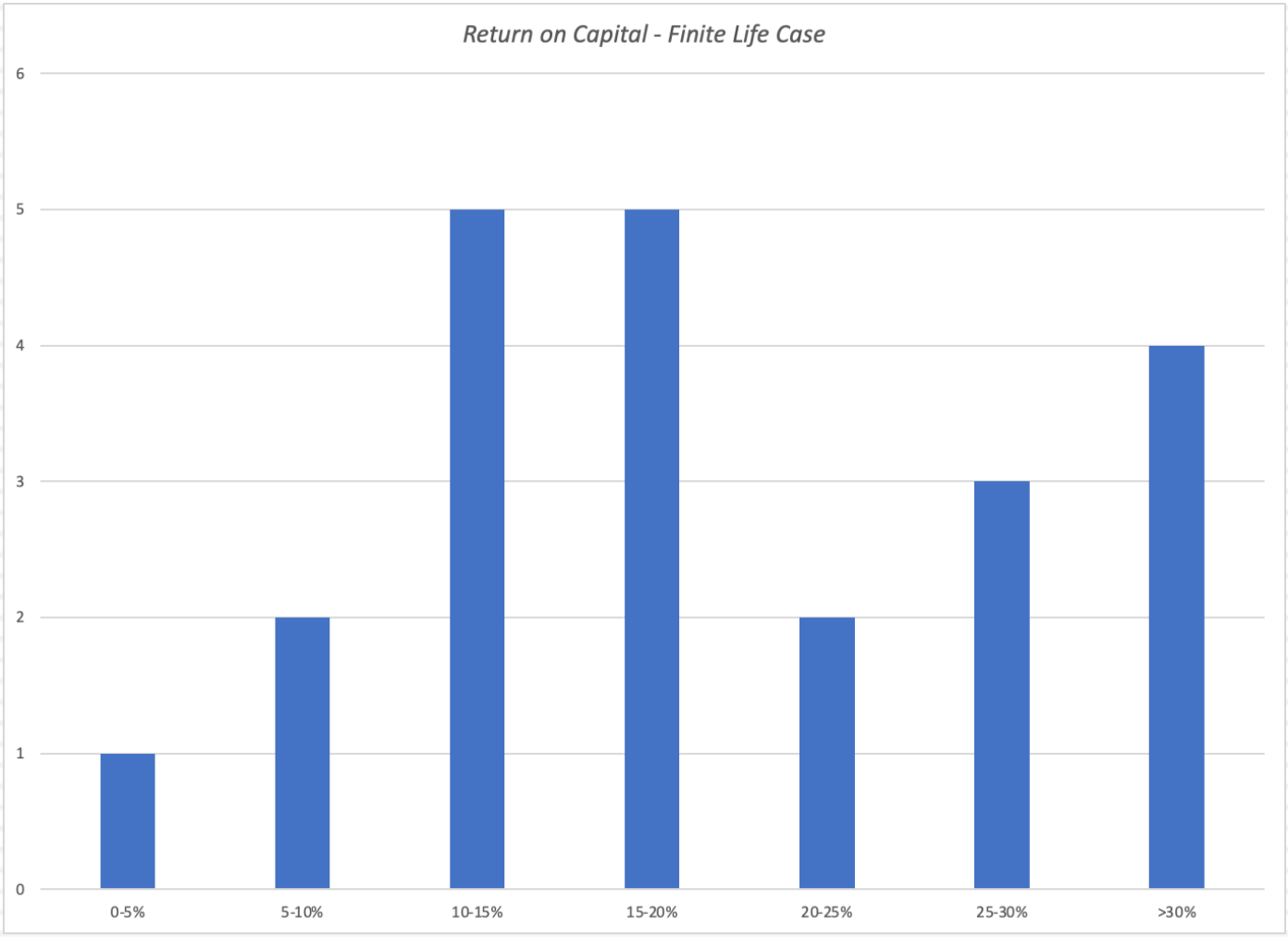
Cost of Capital: Your numbers



Return on Capital Computation

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Aggregate
Beginning Book Value	$0	$1,000	$1,250	$1,500	$1,770	$1,816	$1,851	$1,819	$1,776	$1,721	$1,654	$1,575	$1,484	$1,381	$1,304	$1,181	
+ Capital Investments	$1,000	$ 250	$ 250	$ 150	$ 152	$ 155	$ 157	$ 159	$ 162	$ 164	$ 166	$ 169	$ 172	$ -	$ -	$ -	
- Depreciation	$0	$ -	$ -	$ 150	$ 165	$ 180	$ 251	$ 267	$ 282	$ 299	$ 315	$ 332	$ 349	$ 152	$ 137	$ 122	
+ Investment in Working Capital	$0	$ -	$ -	$ 270.00	$ 58.86	$ 60.57	$ 62.31	$ 64.09	$ 65.91	$ 67.77	$ 69.67	$ 71.62	$ 73.61	$ 75.64	$ 14.10	$ 14.31	
Ending Book Value	$1,000	$1,250	$1,500	$1,770	$1,816	$1,851	$1,819	$1,776	$1,721	$1,654	$1,575	$1,484	$1,381	$1,304	$1,181	$1,073	$ 20,405
Average Book Value	$500	$1,125	$1,375	$1,635	$1,793	$1,834	$1,835	$1,798	$1,748	$1,688	$1,615	$1,530	$1,432	$1,342	$1,242	$1,127	$20,619
EBIT(1-t)		$ -	$ -	$ (99)	$ (39)	$ 21	$ 42	$ 106	$ 172	$ 240	$ 309	$ 380	$ 452	$ 687	$ 695	$ 702	$ 3,668
Return on Capital				-6.03%	-2.20%	1.17%	2.31%	5.92%	9.85%	14.20%	19.13%	24.83%	31.58%	51.17%	55.90%	62.26%	17.79%
EBIT(1-t) with synergy	$ -	$ -	$ -	$ (80)	$ (20)	$ 41	$ 62	$ 126	$ 193	$ 260	$ 330	$ 401	$ 474	$ 709	$ 717	$ 724	$ 3,936
Return on Capital with synergy				-4.88%	-1.13%	2.22%	3.38%	7.04%	11.01%	15.43%	20.42%	26.21%	33.09%	52.80%	57.69%	64.26%	22.12%

Your findings: Return on Capital



Finite Life case assumptions

- Incremental Effects
  - The depreciation on the existing stores of $ 50 million a year for the next 5 years is ignored for purposes of cash flow computation, since it is non-incremental.
  - When analyzing the cost of the distribution system, we consider the cost of the system in year 5 ($ 552 million) but we show the savings in year 12 ($ 634 million). Similarly, for depreciation, we show the depreciation on the existing system of $ 55 million from year 6-12, but show the differential depreciation between the two systems (-$8 million) in years 13-15.
  - Since we are planning on wrapping up the business in 15 years, there is no need for significant capital maintenance expenditures.
- Both working capital investments and store investments are assumed to occur at the start of the year and are therefore shown at the end of the previous year.

Incremental Cash Flows - Finite Life

Year	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*
Number of Stores	-	-	-	50.00	60.00	70.00	80.00	90.00	100.00	110.00	120.00	130.00	140.00	150.00	150.00	150.00
Revenues per Store	$ -	$ -	$ -	$40.00	$40.60	$41.21	$41.83	$42.45	$43.09	$43.74	$44.39	$45.06	$45.74	$46.42	$47.12	$47.82
Revenues		$ -	$ -	$2,000	$2,436	$2,885	$3,346	$3,821	$4,309	$4,811	$5,327	$5,858	$6,403	$6,963	$7,068	$7,174
- Direct Oper. Exp.		$ -	$ -	$1,400	$1,705	$2,019	$2,342	$2,675	$3,016	$3,368	$3,729	$4,100	$4,482	$4,874	$4,947	$5,022
- Deprec'n		$ -	$ -	$ 150	$ 165	$ 180	$ 251	$ 267	$ 282	$ 299	$ 315	$ 332	$ 349	$ 152	$ 137	$ 122
- Allocated & Incrm. G&A		$ -	$ -	$ 422	$ 456	$ 491	$ 528	$ 565	$ 605	$ 646	$ 688	$ 733	$ 779	$ 827	$ 859	$ 893
- Advertising Exp.		$ -	$ -	$ 159	$ 162	$ 166	$ 169	$ 172	$ 176	$ 179	$ 183	$ 187	$ 190	$ 194	$ 198	$ 202
EBIT		$ -	$ -	$ (131)	$ (53)	$ 28	$ 57	$ 142	$ 230	$ 320	$ 412	$ 506	$ 603	$ 916	$ 926	$ 935
Taxes		$ -	$ -	$ (33)	$ (13)	$ 7	$ 14	$ 35	$ 57	$ 80	$ 103	$ 127	$ 151	$ 229	$ 232	$ 234
EBIT(1-t)		$ -	$ -	$ (99)	$ (39)	$ 21	$ 42	$ 106	$ 172	$ 240	$ 309	$ 380	$ 452	$ 687	$ 695	$ 702
+ Deprec'n		$ -	$ -	$ 150	$ 165	$ 180	$ 251	$ 267	$ 282	$ 299	$ 315	$ 332	$ 349	$ 152	$ 137	$ 122
+ Fixed Allocated Exp (1-t)		$ -	$ -	$ 260	$ 273	$ 287	$ 302	$ 317	$ 332	$ 349	$ 367	$ 385	$ 404	$ 424	$ 445	$ 468
- Cap Ex	$ 1,000	$ 250	$ 250	$ 150	$ 152	$ 155	$ 157	$ 159	$ 162	$ 164	$ 166	$ 169	$ 172	$ -	$ -	$ -
- Opp. Cost of Dist'n System		$ -	$ -	$ -	$ -	$ 552	$ -	$ -	$ -	$ -	$ -	$ -	$ (634)	$ -	$ -	$ -
- Chg in WC		$ -	$ 270	$ 59	$ 61	$ 62	$ 64	$ 66	$ 68	$ 70	$ 72	$ 74	$ 76	$ 14	$ 14	$ -
+ Salvage Value																$1,435
Cashflows to the firm	$(1,000)	$(250)	$(520)	$ 103	$ 186	$ (280)	$ 374	$ 465	$ 558	$ 654	$ 752	$ 854	$1,592	$1,249	$1,263	$2,726

Incremental Cash Flows – Finite Life (A More Direct Approach)

Year	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*
Number of Stores	-	-	-	50.00	60.00	70.00	80.00	90.00	100.00	110.00	120.00	130.00	140.00	150.00	150.00	150.00
Revenues per Store	$ -	$ -	$ -	$40.00	$40.60	$41.21	$41.83	$42.45	$43.09	$43.74	$44.39	$45.06	$45.74	$46.42	$47.12	$47.82
Revenues		$ -	$ -	$2,000	$2,436	$2,885	$3,346	$3,821	$4,309	$4,811	$5,327	$5,858	$6,403	$6,963	$7,068	$7,174
- Direct Oper. Exp.		$ -	$ -	$1,400	$1,705	$2,019	$2,342	$2,675	$3,016	$3,368	$3,729	$4,100	$4,482	$4,874	$4,947	$5,022
- Deprec'n		$ -	$ -	$ 150	$ 165	$ 180	$ 251	$ 267	$ 282	$ 299	$ 315	$ 332	$ 349	$ 152	$ 137	$ 122
- Incremental G&A		$ -	$ -	$ 75	$ 91	$ 108	$ 125	$ 143	$ 162	$ 180	$ 200	$ 220	$ 240	$ 261	$ 265	$ 269
- Advertising Exp.		$ -	$ -	$ 159	$ 162	$ 166	$ 169	$ 172	$ 176	$ 179	$ 183	$ 187	$ 190	$ 194	$ 198	$ 202
EBIT		$ -	$ -	$ 216	$ 312	$ 411	$ 459	$ 564	$ 673	$ 785	$ 901	$1,019	$1,142	$1,481	$1,520	$1,559
Taxes		$ -	$ -	$ 54	$ 78	$ 103	$ 115	$ 141	$ 168	$ 196	$ 225	$ 255	$ 285	$ 370	$ 380	$ 390
EBIT(1-t)		$ -	$ -	$ 162	$ 234	$ 309	$ 344	$ 423	$ 505	$ 589	$ 675	$ 765	$ 856	$1,111	$1,140	$1,169
+ Deprec'n		$ -	$ -	$ 150	$ 165	$ 180	$ 251	$ 267	$ 282	$ 299	$ 315	$ 332	$ 349	$ 152	$ 137	$ 122
- Cap Ex	$ 1,000	$ 250	$ 250	$ 150	$ 152	$ 155	$ 157	$ 159	$ 162	$ 164	$ 166	$ 169	$ 172	$ -	$ -	$ -
- Dist'n System		$ -	$ -	$ -	$ -	$ 552	$ -	$ -	$ -	$ -	$ -	$ -	$ (634)	$ -	$ -	$ -
- Chg in WC		$ -	$ 270	$ 59	$ 61	$ 62	$ 64	$ 66	$ 68	$ 70	$ 72	$ 74	$ 76	$ 14	$ 14	$ -
+ Salvage Value																$1,435
Cashflows to the firm	$(1,000)	$(250)	$(520)	$ 103	$ 186	$ (280)	$ 374	$ 465	$ 558	$ 654	$ 752	$ 854	$1,592	$1,249	$1,263	$2,726

The Side Effects on Lowe's US Stores

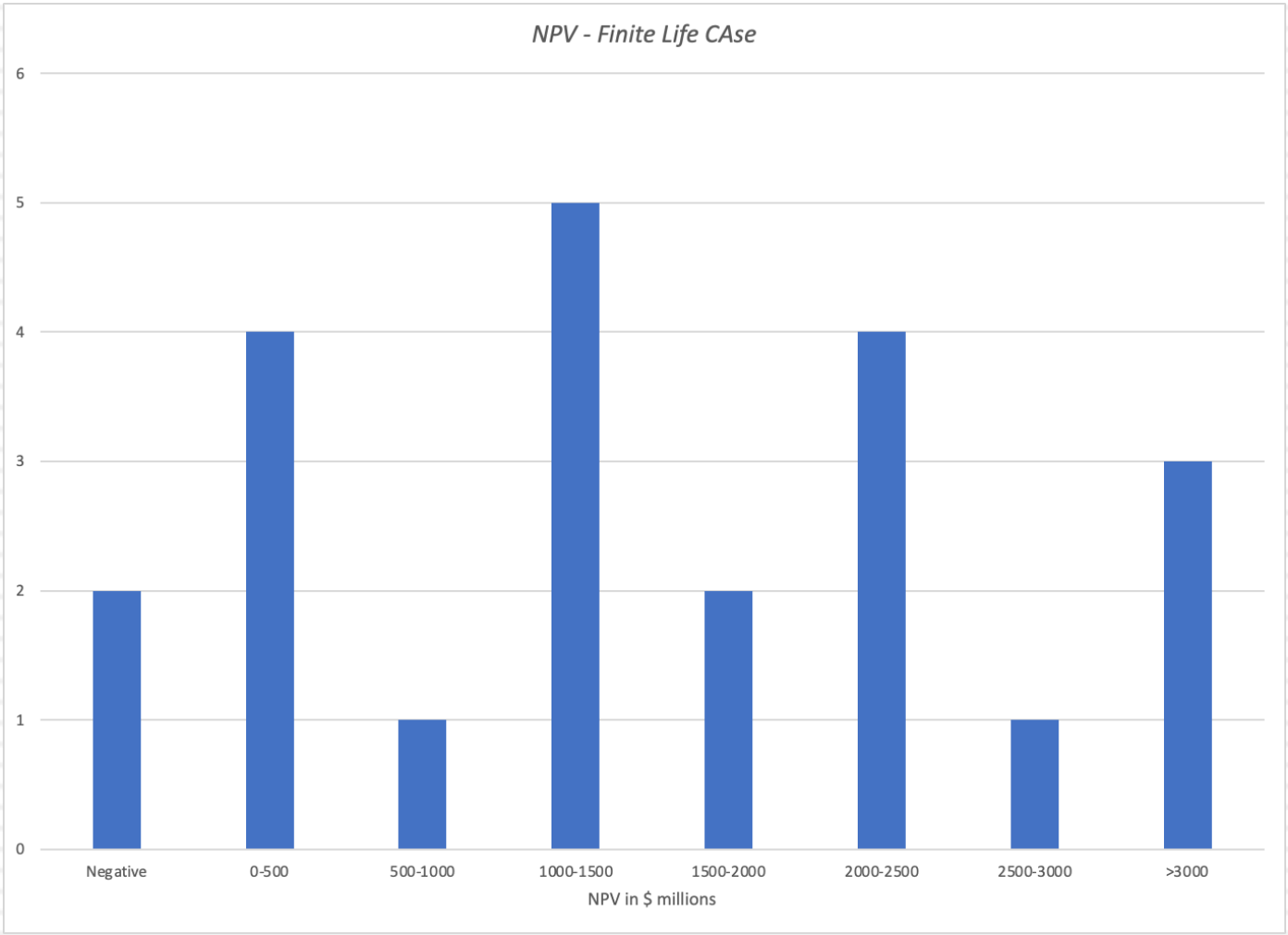
Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Lost EBIT (1-t) on closed stores	$ -	$ (100)	$ (100)	$ (100)	$ (100)	$ (100)	$ (100)	$ (100)	$ (100)	$ (100)	$ (100)	$ -	$ -	$ -	$ -	$ -
Synergy Revenues	$ -	$ -	$ -	$ 200.00	$ 203.00	$ 206.05	$ 209.14	$ 212.27	$ 215.46	$ 218.69	$ 221.97	$ 225.30	$ 228.68	$ 232.11	$ 235.59	$ 239.12
Synergy Operating Income (@12.56%)	$ -	$ -	$ -	$ 25.13	$ 25.51	$ 25.89	$ 26.28	$ 26.67	$ 27.07	$ 27.48	$ 27.89	$ 28.31	$ 28.73	$ 29.16	$ 29.60	$ 30.04
Synergy Operating income after taxes	$ -	$ -	$ -	$ 18.85	$ 19.13	$ 19.42	$ 19.71	$ 20.00	$ 20.30	$ 20.61	$ 20.92	$ 21.23	$ 21.55	$ 21.87	$ 22.20	$ 22.53
Operating Income net effect	$ -	$ (100.00)	$ (100.00)	$ (81.15)	$ (80.87)	$ (80.58)	$ (80.29)	$ (80.00)	$ (79.70)	$ (79.39)	$ (79.08)	$ 21.23	$ 21.55	$ 21.87	$ 22.20	$ 22.53

Operating Margin from 2021 = 12093/96250 = 12.56%

The Value Effect: NPV

Year	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*
Incremental Cash Flows	$ (1,000)	$ (250)	$ (520)	$ 103	$ 186	$ (280)	$ 374	$ 465	$ 558	$ 654	$ 752	$ 854	$ 1,592	$ 1,249	$ 1,263	$ 2,726
Cost of capital	8.15%	8.15%	8.15%	8.33%	8.51%	8.69%	8.87%	8.87%	8.87%	8.87%	8.87%	8.87%	8.87%	8.87%	8.87%	8.87%
Cumulated Cost of capital	1.0000	1.0815	1.1696	1.2671	1.3749	1.4945	1.6271	1.7714	1.9286	2.0997	2.2861	2.4889	2.7097	2.9502	3.2120	3.4970
PV of Cash Flows	$ (1,000)	$ (231)	$ (445)	$ 81	$ 135	$ (187)	$ 230	$ 262	$ 289	$ 311	$ 329	$ 343	$ 588	$ 423	$ 393	$ 780
Net Present Value	$ 2,302															
Internal Rate of Return =	18.22%															
Side Costs and Benefits																
Operating Income net effect	$ -	$ (100.00)	$ (100.00)	$ (81.15)	$ (80.87)	$ (80.58)	$ (80.29)	$ (80.00)	$ (79.70)	$ (79.39)	$ (79.08)	$ 21.23	$ 21.55	$ 21.87	$ 22.20	$ 22.53
PV @ Lowes Building Retail WACC	$ -	$ (92.77)	$ (86.07)	$ (64.80)	$ (59.90)	$ (55.38)	$ (51.19)	$ (47.31)	$ (43.73)	$ (40.41)	$ (37.35)	$ 9.30	$ 8.76	$ 8.25	$ 7.77	$ 7.31
Value of Side Effects =	$ (537.52)															
Overall Project NPV =	$ 1,764.55															

Your findings… Finite Life NPV



Explanations for Infinite Life Case

- When extending the project life to infinity, I did make some changes to the assumptions about capital maintenance.
  - Made the capital expenditure exceed depreciation = all through the 15 years, with cap ex growing at 1.5% a year (the inflation rate) Essentially, I am assuming that whatever depletion occurs in book value because of depreciation is made up by new capital maintenance expenditures in that year, with the inflation adjustment.
  - Set capital expenditures 1.5% higher than total depreciation in year 16, to allow for the fact that in perpetuity, I would have to keep stores looking pristine to have growth of 1.5% a year forever.
  - Advertising expenses continue beyond year 15.
  - Working capital will continue to grow to keep up with revenues
- The synergy benefits now continue in perpetuity as well.

Incremental Cash Flows- Infinite Life

Year	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*
Number of Stores	-	-	-	50.00	60.00	70.00	80.00	90.00	100.00	110.00	120.00	130.00	140.00	150.00	150.00	150.00	150.00
Revenues per Store	$ -	$ -	$ -	$40.00	$40.60	$41.21	$41.83	$42.45	$43.09	$43.74	$44.39	$45.06	$45.74	$46.42	$47.12	$ 47.82	$48.54
Revenues		$ -	$ -	$2,000	$2,436	$2,885	$3,346	$3,821	$4,309	$4,811	$5,327	$5,858	$6,403	$6,963	$7,068	$ 7,174	$7,281
- Oper. Exp.		$ -	$ -	$1,400	$1,705	$2,019	$2,342	$2,675	$3,016	$3,368	$3,729	$4,100	$4,482	$4,874	$4,947	$ 5,022	$5,097
- Deprec'n on new investment		$ -	$ -	$ 150	$ 165	$ 180	$ 251	$ 267	$ 282	$ 299	$ 315	$ 332	$ 349	$ 152	$ 137	$ 122	$ 124
- Deprecn: Cap Mtnce				$ -	$ 16	$ 32	$ 48	$ 71	$ 93	$ 116	$ 138	$ 161	$ 184	$ 207	$ 205	$ 201	$ 205
- Allocated & Incrm. G&A		$ -	$ -	$ 422	$ 456	$ 491	$ 528	$ 565	$ 605	$ 646	$ 688	$ 733	$ 779	$ 827	$ 859	$ 893	$ 906
- Advertising Exp.		$ -	$ -	$ 159	$ 162	$ 166	$ 169	$ 172	$ 176	$ 179	$ 183	$ 187	$ 190	$ 194	$ 198	$ 202	$ 206
EBIT		$ -	$ -	$ (131)	$ (68)	$ (3)	$ 9	$ 71	$ 137	$ 204	$ 274	$ 345	$ 419	$ 709	$ 721	$ 734	$ 743
Taxes		$ -	$ -	$ (33)	$ (17)	$ (1)	$ 2	$ 18	$ 34	$ 51	$ 68	$ 86	$ 105	$ 177	$ 180	$ 184	$ 186
EBIT(1-t)		$ -	$ -	$ (99)	$ (51)	$ (2)	$ 6	$ 54	$ 102	$ 153	$ 205	$ 259	$ 314	$ 531	$ 541	$ 551	$ 557
+ Deprec'n		$ -	$ -	$ 150	$ 181	$ 212	$ 299	$ 337	$ 376	$ 414	$ 453	$ 493	$ 532	$ 360	$ 342	$ 323	$ 418
+ Fixed Allocated Exp (1-t)		$ -	$ -	$ 260	$ 273	$ 287	$ 302	$ 317	$ 332	$ 349	$ 367	$ 385	$ 404	$ 424	$ 445	$ 468	$ 475
- Cap Ex	$ 1,000	$ 250	$ 250	$ 150	$ 152	$ 155	$ 157	$ 159	$ 162	$ 164	$ 166	$ 169	$ 172	$ -	$ -	$ -	$ -
- Capital Maintenance		$ -	$ -	$ 157	$ 175	$ 194	$ 274	$ 296	$ 318	$ 341	$ 366	$ 391	$ 417	$ 185	$ 169	$ 153	$ 334
- Opp. Cost of Dist'n System		$ -	$ -	$ -	$ -	$ 552	$ -	$ -	$ -	$ -	$ -	$ -	$ (634)	$ -	$ -	$ -	
- Chg in WC		$ -	$ 270	$ 59	$ 61	$ 62	$ 64	$ 66	$ 68	$ 70	$ 72	$ 74	$ 76	$ 14	$ 14	$ 14	$ 15
+ Terminal Value																$12,599	
Cashflows to the firm	$(1,000)	$(250)	$(520)	$ (54)	$ 15	$ (466)	$ 112	$ 186	$ 263	$ 341	$ 421	$ 503	$1,221	$1,116	$1,145	$13,744	$ 929

The terminal value calculation

- I assumed a perpetual life.
  - Did I have to?
  - What are the alternatives?
- Cash flow to the firm in year 16

  = EBIT (1-t) + Depreciation – Cap Ex – Change in WC

  = $ 557 + $ 329 – $ 418 - $ 15 = $929 million
- Terminal Value in year 15

  = CF in year 16/ (Cost of capital –g)

  = 929/(.0887-.015) = $ 12,599 million

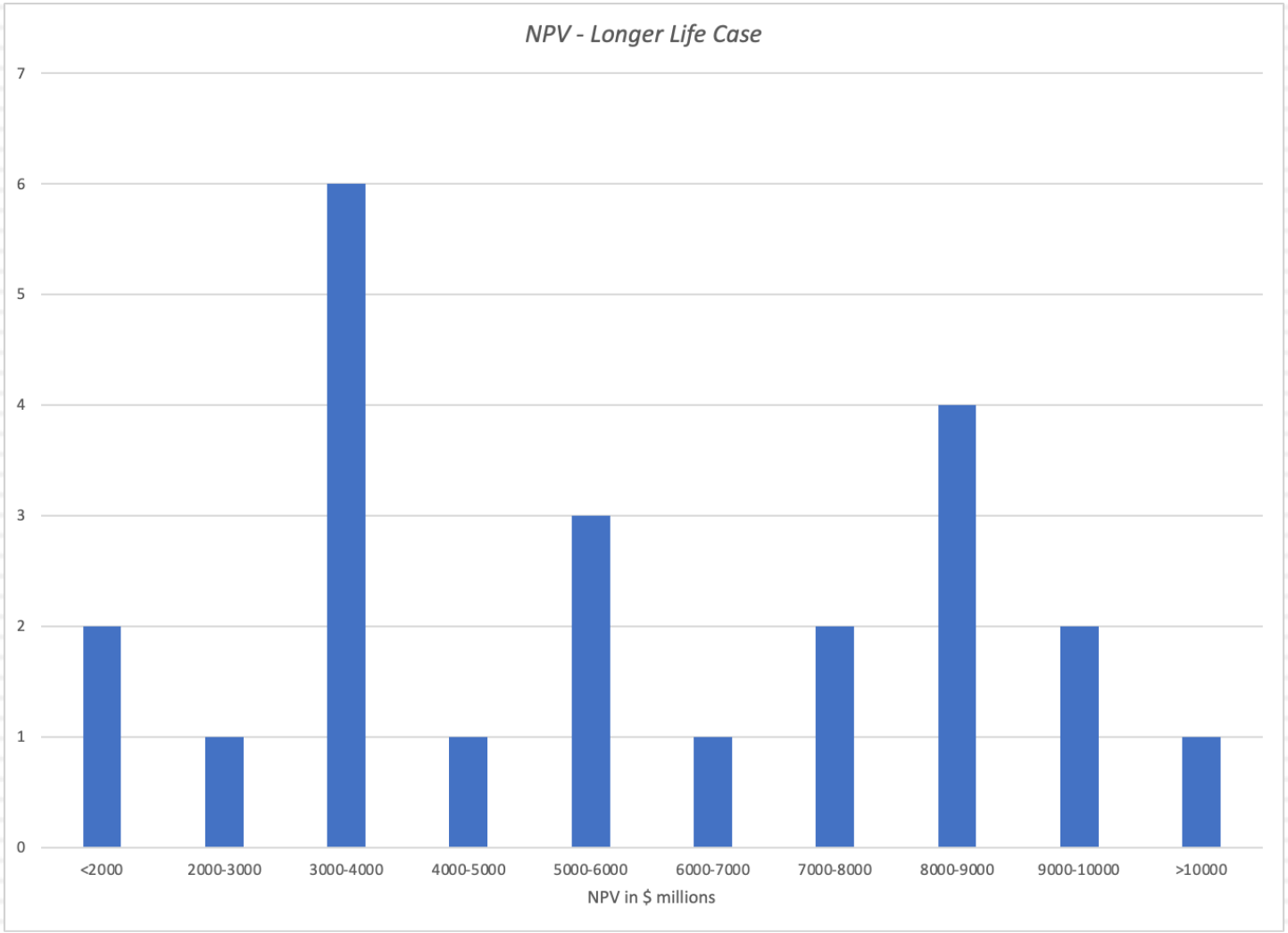
Finite versus Infinite: The Cash Flow Trade off

Year	*Finite*	*Infinite*	*Infinite minus Finite*
0	$ (1,000)	$ (1,000)	$ -
1	$ (250)	$ (250)	$ -
2	$ (520)	$ (520)	$ -
3	$ 103	$ (54)	$ (157)
4	$ 186	$ 15	$ (171)
5	$ (280)	$ (466)	$ (186)
6	$ 374	$ 112	$ (262)
7	$ 465	$ 186	$ (278)
8	$ 558	$ 263	$ (295)
9	$ 654	$ 341	$ (313)
10	$ 752	$ 421	$ (331)
11	$ 854	$ 503	$ (350)
12	$ 1,592	$ 1,221	$ (371)
13	$ 1,249	$ 1,116	$ (133)
14	$ 1,263	$ 1,145	$ (118)
15	$ 1,291	$ 13,774	$ 12,482
Ending Value	$ 1,435	12599	$ 11,164

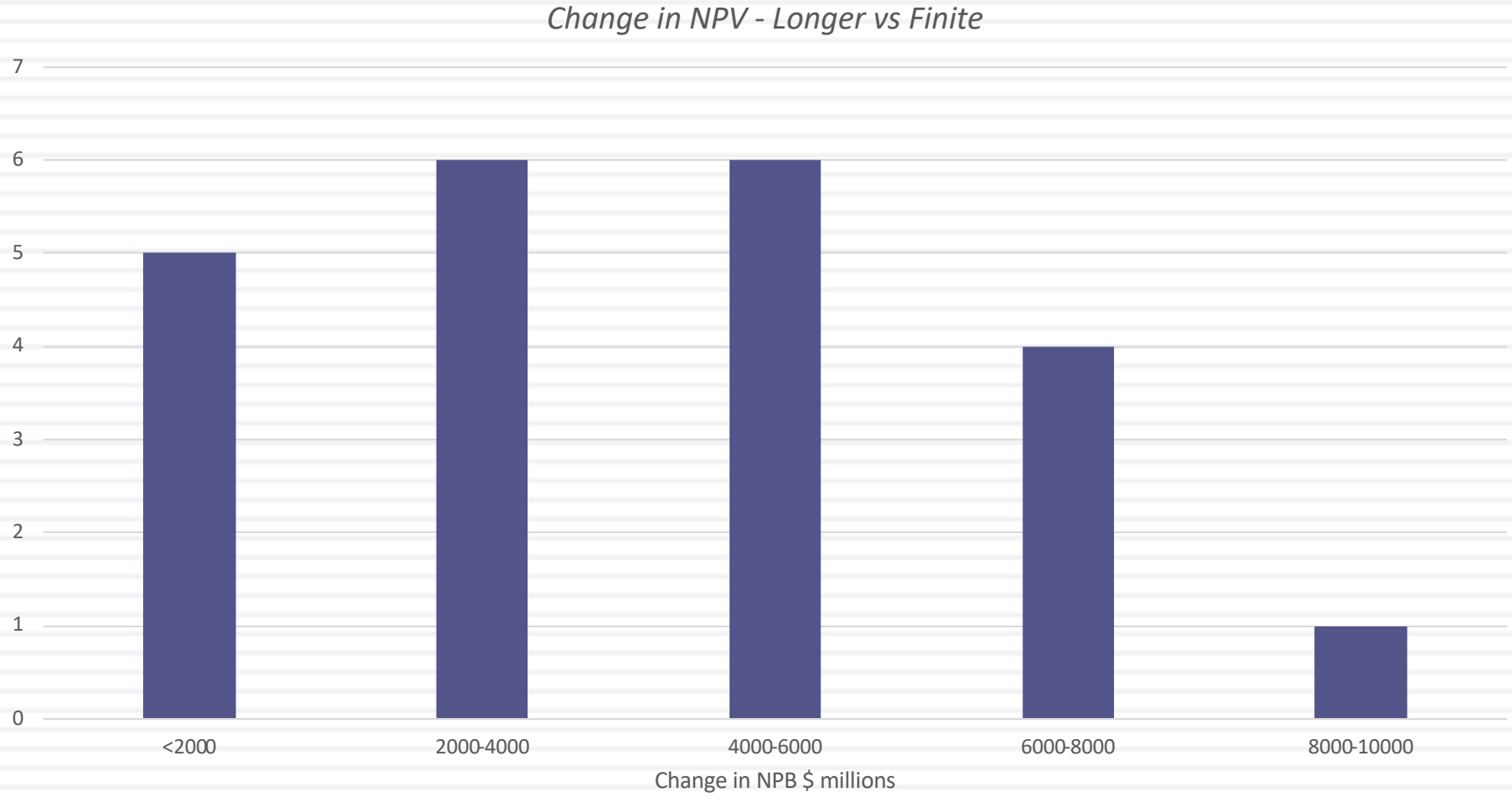
Value Added: NPV of Infinite Life Case

Year	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*
Incremental Cash Flows	$ (1,000)	$ (250)	$ (520)	$ (54)	$ 15	$ (466)	$ 112	$ 186	$ 263	$ 341	$ 421	$ 503	$ 1,221	$ 1,116	$ 1,145	$ 13,774
Cost of capital	8.15%	8.15%	8.15%	8.33%	8.51%	8.69%	8.87%	8.87%	8.87%	8.87%	8.87%	8.87%	8.87%	8.87%	8.87%	8.87%
Cumulated Cost of capital	1.0000	1.0815	1.1696	1.2671	1.3749	1.4945	1.6271	1.7714	1.9286	2.0997	2.2861	2.4889	2.7097	2.9502	3.2120	3.4970
PV of Cash Flows	$ (1,000)	$ (231)	$ (445)	$ (42)	$ 11	$ (312)	$ 69	$ 105	$ 136	$ 162	$ 184	$ 202	$ 451	$ 378	$ 357	$ 3,939
Net Present Value	$ 3,964															
Internal Rate of Return =	18.80%															
Side Costs and Benefits																
Operating Income net effect	$ -	$ (100.00)	$ (100.00)	$ (81.15)	$ (80.87)	$ (80.58)	$ (80.29)	$ (80.00)	$ (79.70)	$ (79.39)	$ (79.08)	$ 21.23	$ 21.55	$ 21.87	$ 22.20	$ 22.53
Value in perpetuity																$ 358.16
PV @ Lowes Building Retail WACC	$ -	$ (92.77)	$ (86.07)	$ (64.80)	$ (59.90)	$ (55.38)	$ (51.19)	$ (47.31)	$ (43.73)	$ (40.41)	$ (37.35)	$ 9.30	$ 8.76	$ 8.25	$ 7.77	$ 123.54
Value of Side Effects =	-$421.30															
Overall Project NPV =	$ 3,543															

Your findings: Infinite Life



Change in NPV



Consistency in growth and investment assumptions

After year 12	*Capital Expenditure Assumption*
Project ends	No (or very low) capital maintenance
	Let assets run down towards end of life
Infinite life; g=0%	Capital maintenance = Depreciation
	Maintain invested capital at base level
Infinite life; g= inflation	Capital maintenance > Depreciation
	Capital invested has to grow at inflation rate
Infinite life; g> inflation	Capital investment to increase capacity
	Capital maintenance > Depreciation
	Capital invested has to grow to reflect real growth

Final Conclusions

- Of the 24 groups that turned in numbers, every group chose to invest in the project.
- If you believe in crowd wisdom, here was the crowd judgment on the key variables:

	Cost of Capital	*ROC*	*NPV- finite*	*NPV - infinite*	*Change in NPV*
Average	**8.33%**	**27.04%**	**$ 2,640**	**$ 6,804**	**$ 4,164**
Median	**8.12%**	**19.80%**	**$ 1,822**	**$ 5,829**	**$ 4,255**
High	10.22%	123.00%	$ 22,107	$ 26,362	$ 10,703
Low	7.01%	3.52%	$ (791)	$ 284	$ 149

- If you were worried about disruption in this business, have you brought this into your analysis already.
  - If so, where did you bring it in?
  - If not, how would you incorporate it in your analysis?