

## Increasing Returns to Scale: Leshkal Industries<sup>1</sup> In-Class Problem<sup>2</sup>

*The subject firm in this problem set is Leshkal Industries, Inc., a fictional firm for which hypothetical values have been presented.*

As a private equity investment manager interested in securing a majority stake in domestic manufacturing firms with exposure to renewable energies, you've become interested in Leshkal Industries, Inc., a leader in energy storage and renewable energy integration. You've spent the last three months studying the firm and its financial statements, interviewing the firm's management, stakeholders, workers, suppliers, customers, and considered how the firm may fit within the other equity holding you oversee. You're now prepared to forecast the firm's future cash flows to determine what you may be prepared to offer for a stake in the firm.

To help focus your analysis, you're prepared to perform a critical analysis of the firm's revenues and expenses, by category. You've retained a consulting firm to consider market share, expected industry and category growth, the firm's position in the industry, and potential strategic outcomes resulting from you becoming a stakeholder in the firm. Though you'll keep the firm's debt, invested capital, and revenue ratios constant as you consider the firm's value from the standpoint of its current ownership, you're confident you can effect valuable scale economies were the firm a part of your portfolio.

For your forecast, you've chosen to consider a five year period in which the firm's revenues expand as indicated by the market analysis you commissioned (Appendix A), and then another five years in which revenue growth declines by 2% annually (nominal) until settling into a long-run growth pattern 5% (long-run domestic economic growth is forecast at 3%). The market consulting firm had two important items for your consideration: 1) Reposition some of the firm's non-operating assets to fund an expansion of the firm's sales and marketing efforts and capture an additional 5% in sales (nominal), and 2) a survey of the firm's major clients found that most would be interested in seeing the firm offer complementing products and services (new product lines) for an overall revenue increase of some 5%.

You've further identified that you can capture a "best owner premium" in the firm's Production Labor (1%), Materials (1%), Sales & Marketing (3%), Administration (4%), Facilities (2%), and Leases (1%), and are confident you can improve the firm's Debt Capital Utility and Invested Capital Efficiency by 1%, each.

You've scrutinized the firm's financial statements are prepared to rely on the last two years of financial data in forming your analysis (Appendix B). This includes an assessment of the firm's outstanding common stock, bonds, and a consideration of the firm's opportunity cost of capital (Appendix C).

In an effort to better understand the expectation of the firm's current ownership you'll perform analyses of the firm's value using various discounted cash flow models. In these you'll need to consider the firm's WACC, cost of unlevered equity ( $k_U$ ), cost of debt capital ( $R_D$  or  $k_D$ ), opportunity cost of paying the various income taxes assessed against the firm ( $k_{TAX}$ ), and your required return, equaling 15.62%, 17.69%, 8.00%, 12.253%, and 18%, respectively. Your firm has access to long-run debt capital to fund acquisitions or

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<sup>1</sup> This problem and solution set is intended to present an abbreviated discussion of the included finance concepts and is not intended to be a full or complete representation of them or the underlying foundations from which they are built.

<sup>2</sup> This problem set was developed by Richard Haskell, PhD (rhaskell@westminstercollege.edu), Gore School of Business, Westminster College, Salt Lake City, Utah (2015).

refinance existing debt at 7.00%. Though you're aware federal corporate tax rates have undergone a recent change, you've chosen to use those rates effective before the 2018 tax year as a hedge against possible tax increases in future years.

**1. What are the values for ROIC<sub>2017</sub> and its component parts?**

$$EBIT_{OPS} = (\text{Total Operating Income} - \text{Total Operating Expenses}) = 24,810 - 16,200 = 8,610$$

$$NOPLAT = EBIT * (1 - T_{EBIT}) = 8,610 * (1 - .34) = 5,682.60$$

$$\text{Invested Capital}_{OPS} = FA_{OPS} + NWC = 28,570 + (7,400 - 3,440) = 32,530$$

$$ROIC = \frac{NOPLAT}{IC} = \frac{5,682.6}{32,530} = .1747 \text{ or } 17.47\%$$

**2. Calculate the firm's Enterprise Value and WACC as of the end of the base year.** *These should both be from a market-oriented perspective given the information at your disposal. Recall that the values noted in the firm's financials are in thousands*

$$\text{Enterprise Value} = \text{Mk Cap Common} + \text{Mk Cap Preferred} + \text{Mkt Val Long-Term Debt} - \text{Cash}$$

Let's start with the market value of the firm's long-term-debt. This includes mortgages (1,520) Lease Obligations (760), Bank Loans (9,970), and Credit Line (453) for a subtotal of \$3,730, for which we'll use the book value as the market value given that we don't have any known way of thinking about the market value of these particular items. Next we'll consider the market value of the firm's bonds:

Market Value of Bonds	\$3,226,914.97
Market Value per Bond	\$1,152.47
# Bonds	2,800.00
F	\$1,000
C	10.00%
YTM	8.00%
P/YR	2
Years Remaining	12

$$\begin{aligned} \text{Market Value}_{LTD} &= \text{Subtotal Long-Term Debt (book value)} + \text{Market Value of the firm's bonds} \\ &= \$3,730 + 3,226.91 = \$6,956.91 \end{aligned}$$

$$\text{Mkt Cap Common} = \text{Shares Outstanding} \times \text{Price Per Share} = 5,000 \times 9.105 = 45,525$$

$$\text{Mkt Cap Preferred} = \text{Shares Outstanding} \times \text{Price Per Share} = 0$$

$$\text{Cash (Cash \& Securities)} = 920 + 580 = 1,500$$

$$\text{Enterprise Value} = 45,525 + 6,956.91 - 1,500 = 50,981.91$$

With the firm's capital components calculated, we can consider the firm's WACC

$$\text{WACC} = \left(\frac{E}{V} \times R_E\right) + \left(\frac{P}{V} \times R_P\right) + \left(\frac{D}{V} \times R_D\right)(1 - T_C)$$

$$V = E + P + D = 45,525 + 0 + 6,956.91 = 52,481.91 \text{ (recall that there is no preferred stock)}$$

$$\begin{aligned} R_{\text{ECAPM}} &= R_F + (R_M - R_F)\beta \\ &= .04 + (.12 - .04)(1.2) = .1720 \text{ or } 17.20\% \end{aligned}$$

$$R_P = \frac{\text{Preferred Dividends}}{\text{Preferred Stock}} = \frac{0.00}{0.00} = 0.00 \text{ or } 0\%$$

$$R_D = \text{YTM} = .08 \text{ or } 8\%$$

$$\begin{aligned} \text{WACC} &= \left(\frac{45,525}{52,481.91} \times 0.1720\right) + \left(\frac{0.00}{52,481.91} \times 0.00\right) + \left(\frac{6,956.91}{52,481.91} \times 0.08\right)(1 - 0.34) \\ &= 0.1492 + 0.00 + 0.007 = .1562 \text{ or } 15.62\% \end{aligned}$$

- 3. What would you do with the firm's non-operating assets and how would you expect this to effect the firm in the long run. The consulting firm has suggested you can increase revenues by 5% if you do this, do you believe them? You're going to have to make a recommendation here and back it up with some relevant figures. Hint: this might be an issue of the firm's ROIC compared to the return the firm receives on these non-operating assets, and some thought of the book value of these assets compared to a calculable market. You may want to consider valuing the firm's non-operating assets using metrics similar to those you've used elsewhere.**

Leshkal's Patents Held and Rental Property generated \$300 in 2017 against a book value of \$1,850 for a return on book value of 16.22%, which might be thought of as ROIC for these non-operating assets. In a market in which debt capital can be acquired by others for 7%, this would suggest the market value of these assets may be substantially higher than the book value. One caveat to this may be the long-term relevance of the patents, as the technological advances of others may render the patents obsolete in coming years, so maybe a reduction in expected return of 25% might be appropriate, leaving us with an adjusted return on these assets of approximately 12.16% (.1622 \* [1-.25] = .1216).

If we apply a modified version of FCF model and only think about a terminal value, for these assets, one in which we take the expected income from these assets over the next year as a function of the increase in income over the last year, we think of expected GDP changes as some form of market  $g$ , and the cost of debt capital as some proxy for WACC, we come up with the following value:

$$\text{Value}_t = \frac{CF_1}{r - g} = \frac{300 \times (1 + 0.03)}{0.07 - 0.03} = 7,725.00 - \text{think of this as Book Value plus a long-term capital gain}$$

Selling these assets may result in a long-term capital gain such that the after tax benefit to the firm is equal to (Sale Proceeds - Book Value) x (1-T) = 7,725 - 1,850 x (1-.34) = 3,877.50

Would it make sense that the firm could increase revenues by 5% (\$1,240.50) as a result of deploying \$3,877.50 for a New REV/New IC ratio of 32%? All we have to do is think about the firm's existing REV/IC ratio and compare it to this new ratio. The current ratio is 24,810/32,530 or 76%... so sure, it

seems reasonable that the firm could earn much more than \$1,240.50 if it invests 3,877.50 from the sale of these assets and redeployment of the resource.

- 4. Given the Market Analysis data at your disposal and based on the assumption that Leshkal's management agrees with your recommendation, with respect to the non-operating assets, what would be your revenue forecast for the firm over the next ten years? Be very specific here. Provide a year-by-year set of revenue forecasts including each revenue category available. Be sure to provide the year, category, forecast %, and expected revenue for each category item.**

I'll start this by using the expected industry growth and adding to it assumed values resulting for Asset Repositioning, Industry Leadership and New Product offerings (Asset Repositioning and New Products are the result of the market consultants input) to create a forecast for years 1-5 (2018-2022) and will then provide values for 2023-2027 based on the 2022 forecast decremented by 2% (nominal) each year. I'll then provide the 2028 value (year 1 of the continuation period) by advancing the 2027 value by the expected long-run growth rate of 5%.

#### Explicit Forecast 2018-2022

Revenue Category	2018			Expected Category Growth	Expected Category Revenue	Current Year Weight	Weighted Average Growth
	Expected Industry growth	Asset Reposition	Industry Leadership				
Renewables	18.00%	5.00%	2.00%	25.00%	2,937.50	10.10%	2.53%
Batteries	15.00%	5.00%	2.00%	22.00%	7,015.00	24.13%	5.31%
Systems	12.00%	5.00%	2.00%	19.00%	11,412.10	39.26%	7.46%
Services	8.00%	0.00%	0.00%	8.00%	6,663.60	22.92%	1.83%
Interest	12.00%	0.00%	0.00%	12.00%	728.00	2.50%	0.30%
Consulting	5.00%	0.00%	0.00%	5.00%	315.00	1.08%	0.05%
New Product					-		-
					29,071.20		17.48%
	2019						
Renewables	20.00%	5.00%	2.00%	27.00%	3,730.63	10.31%	2.78%
Batteries	17.00%	5.00%	2.00%	24.00%	8,698.60	24.05%	5.77%
Systems	15.00%	5.00%	2.00%	22.00%	13,922.76	38.49%	8.47%
Services	8.00%	0.00%	0.00%	8.00%	7,196.69	19.90%	1.59%
Interest	15.00%	0.00%	0.00%	15.00%	837.20	2.31%	0.35%
Consulting	5.00%	0.00%	0.00%	5.00%	330.75	0.91%	0.05%
New Product	5.00%	0.00%	0.00%	5.00%	1,453.56	4.02%	0.20%
					36,170.19		19.21%
	2020						
Renewables	23.00%	5.00%	2.00%	30.00%	4,849.81	11.48%	3.44%
Batteries	20.00%	5.00%	2.00%	27.00%	11,047.22	26.14%	7.06%
Systems	17.00%	5.00%	2.00%	24.00%	17,264.22	40.85%	9.80%

Services	8.00%	0.00%	0.00%	8.00%	7,772.42	18.39%	1.47%
Interest	17.00%	0.00%	0.00%	17.00%	979.52	2.32%	0.39%
Consulting	5.00%	0.00%	0.00%	5.00%	347.29	0.82%	0.04%
New Product	8.00%	0.00%	0.00%	8.00%	1,569.84	3.71%	0.30%
					42,260.49		22.51%

**2021**

Renewables	20.00%	5.00%	2.00%	27.00%	6,159.26	12.18%	3.29%
Batteries	18.00%	5.00%	2.00%	25.00%	13,809.03	27.32%	6.83%
Systems	13.00%	5.00%	2.00%	20.00%	20,717.07	40.98%	8.20%
Services	8.00%	0.00%	0.00%	8.00%	8,394.22	16.61%	1.33%
Interest	13.00%	0.00%	0.00%	13.00%	1,106.86	2.19%	0.28%
Consulting	5.00%	0.00%	0.00%	5.00%	364.65	0.72%	0.04%
New Product	8.00%	0.00%	0.00%	8.00%	1,695.43	3.35%	0.27%
					50,551.09		20.23%

**2022**

Renewables	18.00%	5.00%	2.00%	25.00%	7,699.08	12.95%	3.24%
Batteries	15.00%	5.00%	2.00%	22.00%	16,847.01	28.34%	6.23%
Systems	10.00%	5.00%	2.00%	17.00%	24,238.97	40.77%	6.93%
Services	8.00%	0.00%	0.00%	8.00%	9,065.75	15.25%	1.22%
Interest	10.00%	0.00%	0.00%	10.00%	1,217.55	2.05%	0.20%
Consulting	5.00%	0.00%	0.00%	5.00%	382.88	0.64%	0.03%
New Product	7.00%	0.00%	0.00%	7.00%	1,814.11	3.05%	0.21%
					59,451.25		18.07%

**Decremental Revenue % Change**

Revenue Category	2023	2024	2025	2026	2027	2028
<b>Renewables</b>	3.24%	2.88%	2.52%	2.16%	1.80%	1.45%
<b>Batteries</b>	6.23%	5.54%	4.85%	4.16%	3.47%	2.78%
<b>Systems</b>	6.93%	6.16%	5.40%	4.63%	3.86%	3.10%
<b>Services</b>	1.22%	1.08%	0.95%	0.81%	0.68%	0.54%
<b>Interest</b>	0.20%	0.18%	0.16%	0.14%	0.11%	0.09%
<b>Consulting</b>	0.03%	0.03%	0.03%	0.02%	0.02%	0.01%
<b>New Product</b>	0.21%	0.19%	0.17%	0.14%	0.12%	0.10%
	18.07%	16.07%	14.07%	12.07%	10.07%	8.07%
<b>Decremental</b>	-2.00%	-2.00%	-2.00%	-2.00%	-2.00%	
	16.07%	14.07%	12.07%	10.07%	8.07%	5.00% <b>Long Run Growth</b>

<b>Forecasted Revenue</b>	69,007.11	78,718.78	88,222.85	97,109.92	104,950.03	110,197.53
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**5. What are the Forecast Ratios (FR<sub>i</sub>) for Production Labor, Materials, Sales & Marketing, Administration, Facilities, Leases, Depreciation and Interest Expenses?**

$$FR_{\text{PROD LABOR}} = \frac{\text{Production Labor}_t}{\text{Revenue}_t} = \frac{5,440}{24,841} = .2193 \text{ or } 21.93\%$$

$$FR_{\text{MATERIALS}} = \frac{\text{Non-Labor COGS}_t}{\text{Revenue}_t} = \frac{2,180}{24,841} = .0879 \text{ or } 8.79\%$$

$$FR_{\text{SALES/MKT}} = \frac{\text{Sales/Mkt}_t}{\text{Revenue}_t} = \frac{2,700}{24,841} = .1088 \text{ or } 10.88\%$$

$$FR_{\text{ADMIN}} = \frac{\text{Admin}_t}{\text{Revenue}_t} = \frac{2,170}{24,841} = .0875 \text{ or } 8.75\%$$

$$FR_{\text{FACILITIES}} = \frac{\text{Facilities}_t}{\text{Revenue}_t} = \frac{450}{24,841} = .0181 \text{ or } 1.81\%$$

$$FR_{\text{LEASES}} = \frac{\text{Leases}_t}{\text{Revenue}_t} = \frac{500}{24,841} = .0202 \text{ or } 2.02\%$$

$$FR_{\text{DEP}} = \frac{\text{Depreciation}_t}{\text{Revenue}_t} = \frac{2,760}{24,841} = .1112 \text{ or } 11.12\%$$

$$FR_{\text{Interest}} = \frac{\text{Interest}_t}{\text{Debt}_{t-1}} = \frac{970}{7,620} = .1273 \text{ or } 12.73\%$$

**6. Identify how you would go about applying a 3% scale benefit to any one of the firm's relevant expenses for 2018, 2019, and 2020. Be sure to both explain how you would go about this and provide a specific example using the firm's Sales & Marketing expense.**

Start with the firm's expected revenues of 29,071.20 for 2018 and multiply it by the firm's Sales & Marketing forecast ratio of .1088 or 10.88%. Then take the resultant value and multiply it by 1 minus the expected scale benefit to arrive at the forecasted Sales & Marketing expense.

$$\text{Sales \& Marketing Expense}_{2018} = (29,071.20 \times .1088) \times (1-.03) = 3,068.06$$

If the scale benefit is expected to persistent and increasing as the firm's output continues to expand, the scale benefit would be increased each year by multiplying the benefit (1-adjustment) for each additional year in the forecast as follows:

$$\text{Sales \& Marketing Expense}_{2019} = (36,170.19 \times .1088) \times (1-.03)(1-.03) = 3,702.74$$

$$\text{Sales \& Marketing Expense}_{2020} = (42,260.49 \times .1088) \times (1-.03)^3 = 4,196.42$$

7. Based on forecast ratio methods and assuming operating revenue growth forecast as calculated in #3, provide a full Debt, Revenue, Expense (all categories) IC, NOPLAT, NMC, FA, FCF, ROIC and ECON  $\pi$  for the base year through the first year of the continuation period. This should not include any best owner premium adjustments and should be thought of as being from the standpoint of the existing operation managed by the current firm's management team.

CV Year	Explicit Year	Year	Debt	Revenue	Production Labor	Materials	Sales & Mkt	Admin	Facilities	Leases	Dep	EBIT	Interest Expense <sup>6</sup>	Invested Capital <sup>4</sup>	NOPLAT	NWC <sup>5</sup>	FA <sup>5</sup>	FCF	ROIC	ECON $\pi$
	0	2017	6530.00	24810.00	5440.00	2180.00	2700.00	2170.00	450.00	500.00	2760.00	8610.00	970.00	32530.00	5682.60	3960.00	28570.00	1912.60	17.47%	601.44
	1	2018	7651.55	29071.20	6374.34	2554.42	3163.73	2542.70	527.29	585.88	3234.04	10088.80	831.25	38117.14	6658.61	4640.14	33476.99	1071.47	17.47%	704.75
	2	2019	9520.00	36170.19	7930.91	3178.19	3936.30	3163.62	656.05	728.94	4023.77	12552.41	974.02	47425.08	8284.59	5773.23	41651.84	-1023.35	17.47%	876.84
	3	2020	11122.98	42260.49	9266.31	3713.34	4599.09	3696.30	766.51	851.68	4701.29	14665.98	1211.86	55410.47	9679.54	6745.33	48665.15	1694.14	17.47%	1024.48
	4	2021	13305.06	50551.09	11084.16	4441.81	5501.33	4421.44	916.89	1018.76	5623.58	17543.12	1415.92	66280.81	11578.46	8068.61	58212.20	708.12	17.47%	1225.46
	5	2022	15647.59	59451.25	13035.66	5223.85	6469.91	5199.89	1078.32	1198.13	6613.68	20631.81	1693.69	77950.39	13617.00	9489.20	68461.19	1947.42	17.47%	1441.22
	6	2023	18162.69	69007.11	15130.94	6063.50	7509.84	6035.69	1251.64	1390.71	7676.73	23948.05	1991.88	90479.70	15805.72	11014.44	79465.26	3276.41	17.47%	1672.87
	7	2024	20718.81	78718.78	17260.39	6916.85	8566.74	6885.12	1427.79	1586.43	8757.11	27318.37	2312.05	103213.30	18030.12	12564.55	90648.75	5296.52	17.47%	1908.30
	8	2025	23220.28	88222.85	19344.31	7751.95	9601.04	7716.39	1600.17	1777.97	9814.39	30616.63	2637.43	115674.69	20206.98	14081.52	101593.18	7745.58	17.47%	2138.70
	9	2026	25559.36	97109.92	21292.94	8532.83	10568.19	8493.69	1761.36	1957.07	10803.04	33700.78	2955.86	127327.11	22242.52	15500.01	111827.10	10590.10	17.47%	2354.14
0	10	2027	27622.88	104950.03	23012.02	9221.73	11421.41	9179.43	1903.57	2115.08	11675.21	36421.59	3253.62	137606.79	24038.25	16751.40	120855.39	13758.58	17.47%	2544.20
1	11	2028	29004.03	110197.53	24162.62	9682.81	11992.48	9638.40	1998.75	2220.83	12258.98	38242.67	3516.30	144487.13	25240.16	17588.96	126898.16	18359.83	17.47%	2671.41

<sup>1</sup> Forecast ratio for revenue is average annual Revenue growth rate as detailed in Rev Forecast sheet calculations

<sup>2</sup> Explicit revenue forecasts for years 1-5; for years 6 - 10 revenue growth projected to decline by Revenue Adjustment percentage, as noted, per year from 2022 forecasted growth levels

<sup>3</sup> Revenue and Interest Expense adjustments are nominal; operating expense adjustments are proportional

<sup>4</sup> Invested Capital calculated as FA + NWC (operations approach)

<sup>5</sup> FA and NWC growth mirrors the growth of revenue (adjusted for compounded Capital Efficiency Adjustment)

<sup>6</sup> Interest Expense adjustment is a direct, nominal adjustment to forecasted interest rate

8. So you can better understand the valuation expectations of the firm's existing stakeholders, provide estimated values for the firm based on the Revenue forecast created for #5 using the firm's WACC (from the perspective of the current ownership). This should include full Economic Profit, FCF, KVD, APV, and FMM (observed EV/EBIT) valuation estimates in a multi-columnar format.

Economic Profit = IC + PV <sub>EXPLICIT</sub> + PV <sub>CV</sub>				FCF			KVD			V <sub>FCF</sub>			V <sub>TAX</sub>			FMM (EV/EBIT 2014 observed)			
Year	Econ Profit	PV <sub>ECON<math>\pi</math></sub>	Total PV <sub>ECON<math>\pi</math></sub>	FCF	PV <sub>DCF(FCF)</sub>	Total PV <sub>DCF(FCF)</sub>	FCF	PV <sub>DCF(FCF)</sub>	Total PV <sub>DCF(FCF)</sub>	FCF	PV <sub>DCF(FCF)</sub>	Total PV <sub>DCF(FCF)</sub>	Tax Shield	PV <sub>Tax Shield</sub>	Total PV <sub>Tax Shield</sub>	FCF	PV <sub>DCF(FCF)</sub>	Total PV <sub>DCF(FCF)</sub>	
	2017	601.44		1,912.60			1,912.60			1,912.60			329.80			1,912.60			
1	2018	704.75	609.54	609.54	1,071.47	926.72	926.72	1,071.47	926.72	926.72	1,071.47	910.42	910.42	282.62	251.77	251.77	1,071.47	926.72	926.72
2	2019	876.84	655.93	1,265.46	(1,023.35)	(765.52)	161.19	(1,023.35)	(765.52)	161.19	(1,023.35)	(738.83)	171.59	331.17	262.81	514.59	(1,023.35)	(765.52)	161.19
3	2020	1,024.48	662.84	1,928.30	1,694.14	1,096.11	1,257.30	1,694.14	1,096.11	1,257.30	1,694.14	1,039.28	1,210.87	412.03	291.30	805.89	1,694.14	1,096.11	1,257.30
4	2021	1,225.46	685.76	2,614.05	708.12	396.26	1,653.56	708.12	396.26	1,653.56	708.12	369.11	1,579.97	481.41	303.20	1,109.08	708.12	396.26	1,653.56
5	2022	1,441.22	697.54	3,311.59	1,947.42	942.53	2,596.09	1,947.42	942.53	2,596.09	1,947.42	862.51	2,442.48	575.85	323.09	1,432.17	1,947.42	942.53	2,596.09
6	2023	1,672.87	700.27	4,011.86	3,276.41	1,371.52	3,967.61	3,276.41	1,371.52	3,967.61	3,276.41	1,232.99	3,675.47	677.24	338.50	1,770.67	3,276.41	1,371.52	3,967.61
7	2024	1,908.30	690.91	4,702.77	5,296.52	1,917.62	5,885.23	5,296.52	1,917.62	5,885.23	5,296.52	1,693.61	5,369.08	786.10	350.02	2,120.69	5,296.52	1,917.62	5,885.23
8	2025	2,138.70	669.71	5,372.48	7,745.58	2,425.46	8,310.69	7,745.58	2,425.46	8,310.69	7,745.58	2,104.45	7,473.53	896.73	355.69	2,476.38	7,745.58	2,425.46	8,310.69
9	2026	2,354.14	637.59	6,010.07	10,590.10	2,868.18	11,178.87	10,590.10	2,868.18	11,178.87	10,590.10	2,444.80	9,918.33	1,004.99	355.13	2,831.51	10,590.10	2,868.18	11,178.87
10	2027	2,544.20	595.97	6,606.04	13,758.58	3,222.90	14,401.77	13,758.58	3,222.90	14,401.77	13,758.58	2,698.84	12,617.17	1,106.23	348.23	3,179.74	13,758.58	3,222.90	14,401.77
	2028	2,671.41		18,359.83			18,359.83			18,359.83			1,195.54			18,359.83			
			IC <sub>0</sub>	32,530.00		PV <sub>DCF(FCF)</sub>	14,401.77		PV <sub>DCF</sub>	14,401.77		PV <sub>DCF(FCF)</sub>	12,617.17		PV <sub>DCF(TS)</sub>	3,179.74	Observed EV/EBIT	PV <sub>DCF</sub>	14,401.77
			PV <sub>EXPLICIT</sub>	6,606.04		CV <sub>FCF</sub>	172,881.26		CV <sub>KVD</sub>	169,641.90		CV <sub>FCF</sub>	172,881.26		CV <sub>TS</sub>	16,483.41	5.92	CV <sub>FMM</sub>	226,444.22
			CV <sub>ECON<math>\pi</math></sub>	23,956.93		PV <sub>CV(FCF)</sub>	40,496.91		PV <sub>CV</sub>	39,738.10		PV <sub>CV(FCF)</sub>	33,911.91		PV <sub>CV(TS)</sub>	5,188.81		PV <sub>CV</sub>	53,043.87
			PV <sub>CV</sub>	5,611.84		VALUE <sub>FCF</sub>	54,898.68		VALUE <sub>KVD</sub>	54,139.87		VALUE <sub>FCF</sub>	46,529.09		VALUE <sub>TAX</sub>	8,368.54		VALUE <sub>FMM</sub>	67,445.64
			VAL <sub>ECON<math>\pi</math></sub>	44,747.88															
												APV	54,897.63						



9. Provide a full forecast of the firm's Debt, Revenue, Expense (all categories) similar to that provided in #7, but reflective of the firm's scale adjustments in each expense category and the expected 1% improvement in both the firm's Debt Capital Utility and Invested Capital Efficiency. Be sure to include IC, NOPLAT, NMC, FA, FCF, ROIC and ECON  $\pi$  for the base year through the first year of the continuation period.

CV Year	Explicit Year	Year	Debt	Revenue	Production Labor	Materials	Sales & Mkt	Admin	Facilities	Leases	Dep	EBIT	Interest Expense <sup>6</sup>	Invested Capital <sup>4</sup>	NOPLAT	NWC <sup>5</sup>	FA <sup>5</sup>	FCF	ROIC	ECON $\pi$
	0	2017	6530.00	24810.00	5440.00	2180.00	2700.00	2170.00	450.00	500.00	2760.00	8610.00	970.00	32530.00	5682.60	3960.00	28570.00	1912.60	17.47%	-172.80
	1	2018	7499.28	29071.20	6310.59	2528.88	3068.82	2441.00	516.74	580.02	3234.04	10391.11	1205.42	37735.96	6858.13	4593.74	33142.22	1652.17	18.17%	65.66
	2	2019	9053.43	36170.19	7773.08	3114.95	3703.66	2915.59	630.07	714.44	4023.77	13294.63	1384.34	46016.50	8774.46	5601.76	40414.74	493.92	19.07%	491.48
	3	2020	10161.03	42260.49	8991.09	3603.05	4197.46	3270.25	721.44	826.39	4701.29	15949.53	1671.23	52167.86	10526.69	6350.59	45817.27	4375.33	20.18%	1136.48
	4	2021	11558.72	50551.09	10647.40	4266.79	4870.29	3755.33	845.71	978.62	5623.58	19563.38	1875.69	59943.18	12911.83	7297.11	52646.07	5136.51	21.54%	2122.06
	5	2022	12798.27	59451.25	12396.79	4967.83	5555.93	4239.85	974.71	1139.41	6613.68	23563.05	2133.70	67041.88	15551.62	8161.26	58880.62	8452.91	23.20%	3484.08
	6	2023	13846.20	69007.11	14245.48	5708.67	6255.49	4724.48	1108.76	1309.33	7676.73	27978.18	2362.52	73263.93	18465.60	8918.70	64345.24	12243.55	25.20%	5278.09
	7	2024	14574.60	78718.78	16087.81	6446.95	6921.78	5173.80	1239.50	1478.66	8757.11	32613.18	2555.96	77897.07	21524.70	9482.70	68414.36	16891.56	27.63%	7503.22
	8	2025	14921.62	88222.85	17849.86	7153.07	7524.75	5566.52	1361.37	1640.61	9814.39	37312.28	2690.42	80557.39	24626.10	9806.56	70750.83	21965.79	30.57%	10125.78
	9	2026	14854.24	97109.92	19451.47	7794.89	8034.27	5882.17	1468.53	1787.82	10803.04	41887.73	2754.48	81003.66	27645.90	9860.88	71142.78	27199.62	34.13%	13065.24
0	10	2027	14373.30	104950.03	20811.66	8339.97	8422.42	6102.78	1555.35	1912.84	11675.21	46129.80	2742.04	79172.72	30445.67	9637.99	69534.72	32276.61	38.45%	16194.58
1	11	2028	14941.05	110197.53	21633.72	8669.39	8578.23	6151.60	1600.46	1988.39	12258.98	49316.75	2653.26	83131.36	32549.06	10119.89	73011.46	28590.42	39.15%	17585.41

<sup>1</sup> Forecast ratio for revenue is average annual Revenue growth rate as detailed in Rev Forecast sheet calculations

<sup>2</sup> Explicit revenue forecasts for years 1-5; for years 6 - 10 revenue growth projected to decline by Revenue Adjustment percentage, as noted, per year from 2022 forecasted growth levels

<sup>3</sup> Revenue and Interest Expense adjustments are nominal; operating expense adjustments are proportional

<sup>4</sup> Invested Capital calculated as FA + NWC (operations approach)

<sup>5</sup> FA and NWC growth mirrors the growth of revenue (adjusted for compounded Capital Efficiency Adjustment)

<sup>6</sup> Interest Expense adjustment is a direct, nominal adjustment to forecasted interest rate

10. Estimate the value of the firm through each of the models indicated in #8 using the investor's required return as the discount rate, employing each of the expected scale economy adjustments to the firm's expenses, and based on the assumption that with the expert input from your firm, the firm's Debt Capital Utility and Invested Capital Efficiency can each be improved by 1%. This should include full Economic Profit, FCF, KVD, APV, and FMM (observed EV/EBIT) valuation estimates in a multi-columnar format.

	Economic Profit = IC + PV <sub>EXPLICIT</sub> + PV <sub>CV</sub>				FCF			KVD			V <sub>FCF</sub>			V <sub>TAX</sub>			FMM (EV/EBIT 2017 observed)		
	Year	Econ Profit	PV <sub>ECON<math>\pi</math></sub>	Total PV <sub>ECON<math>\pi</math></sub>	FCF	PV <sub>DCF(FCF)</sub>	Total PV <sub>DCF(FCF)</sub>	FCF	PV <sub>DCF(FCF)</sub>	Total PV <sub>DCF(FCF)</sub>	FCF	PV <sub>DCF(FCF)</sub>	Total PV <sub>DCF(FCF)</sub>	Tax Shield	PV <sub>Tax Shield</sub>	Total PV <sub>Tax Shield</sub>	FCF	PV <sub>DCF(FCF)</sub>	Total PV <sub>DCF(FCF)</sub>
	2017	(172.80)			1,912.60			1,912.60			1,912.60			329.80			1,912.60		
1	2018	65.66	55.64	55.64	1,652.17	1,400.14	1,400.14	1,652.17	1,400.14	1,400.14	1,652.17	1,403.83	1,403.83	409.84	365.11	365.11	1,652.17	1,400.14	1,400.14
2	2019	491.48	352.98	408.62	493.92	354.72	1,754.86	493.92	354.72	1,754.86	493.92	356.59	1,760.42	470.68	373.53	738.64	493.92	354.72	1,754.86
3	2020	1,136.48	691.69	1,100.31	4,375.33	2,662.96	4,417.83	4,375.33	2,662.96	4,417.83	4,375.33	2,684.06	4,444.49	568.22	401.72	1,140.35	4,375.33	2,662.96	4,417.83
4	2021	2,122.06	1,094.53	2,194.85	5,136.51	2,649.36	7,067.18	5,136.51	2,649.36	7,067.18	5,136.51	2,677.38	7,121.87	637.74	401.65	1,542.01	5,136.51	2,649.36	7,067.18
5	2022	3,484.08	1,522.92	3,717.77	8,452.91	3,694.85	10,762.03	8,452.91	3,694.85	10,762.03	8,452.91	3,743.76	10,865.63	725.46	407.03	1,949.03	8,452.91	3,694.85	10,762.03
6	2023	5,278.09	1,955.17	5,672.94	12,243.55	4,535.40	15,297.43	12,243.55	4,535.40	15,297.43	12,243.55	4,607.55	15,473.18	803.26	401.48	2,350.51	12,243.55	4,535.40	15,297.43
7	2024	7,503.22	2,355.45	8,028.39	16,891.56	5,302.68	20,600.11	16,891.56	5,302.68	20,600.11	16,891.56	5,401.23	20,874.41	869.03	386.94	2,737.46	16,891.56	5,302.68	20,600.11
8	2025	10,125.78	2,693.84	10,722.23	21,965.79	5,843.74	26,443.85	21,965.79	5,843.74	26,443.85	21,965.79	5,968.02	26,842.43	914.74	362.84	3,100.30	21,965.79	5,843.74	26,443.85
9	2026	13,065.24	2,945.64	13,667.87	27,199.62	6,132.32	32,576.17	27,199.62	6,132.32	32,576.17	27,199.62	6,279.24	33,121.67	936.52	330.93	3,431.23	27,199.62	6,132.32	32,576.17
10	2027	16,194.58	3,094.21	16,762.08	32,276.61	6,166.91	38,743.08	32,276.61	6,166.91	38,743.08	32,276.61	6,331.29	39,452.96	932.29	293.48	3,724.70	32,276.61	6,166.91	38,743.08
	2028	17,585.41			28,590.42			28,590.42			28,590.42			902.11			28,590.42		
			IC <sub>0</sub>	32,530.00		PV <sub>DCF(FCF)</sub>	38,743.08		PV <sub>DCF</sub>	38,743.08		PV <sub>DCF(FCF)</sub>	39,452.96		PV <sub>DCF(TS)</sub>	3,724.70	Observed EV/EBIT	PV <sub>DCF</sub>	38,743.08
			PV <sub>EXPLICIT</sub>	16,762.08		CV <sub>FCF</sub>	219,926.32		CV <sub>KVD</sub>	218,403.76		CV <sub>FCF</sub>	219,926.32		CV <sub>TS</sub>	12,437.74	5.92	CV <sub>FMM</sub>	292,016.55
			CV <sub>ECON<math>\pi</math></sub>	128,830.87		PV <sub>CV(FCF)</sub>	42,020.10		PV <sub>CV</sub>	41,729.20		PV <sub>CV(FCF)</sub>	43,140.14		PV <sub>CV(TS)</sub>	3,915.27		PV <sub>CV</sub>	55,793.99
			PV <sub>CV</sub>	24,615.00		VALUE <sub>FCF</sub>	80,763.18		VALUE <sub>KVD</sub>	80,472.28		VALUE <sub>FCF</sub>	82,593.10		VALUE <sub>TAX</sub>	7,639.98		VALUE <sub>FMM</sub>	94,537.07
			VAL <sub>ECON<math>\pi</math></sub>	73,907.08															
													APV	90,233.08					

**11. Given the calculated (observed) Enterprise Value for this firm, the estimated values reflective of the firm's expectations and the estimated values from the perspective of your firm's potential ownership of the firm, how much would you be prepared to offer for this firm. Recall that it's likely you'll be required to pay more than the firm's current enterprise value to acquire the rights to all of the firm's future cash flows.**

The firm's Enterprise Value of \$50,981.15 is less than the FCF (54,898.68), KVD (54,139.87), APV (54,897.63) and FMM (67,445.64 - observed EV/EBIT) model estimated values from the standpoint of the firm. It is also substantially less than the estimated FCF (80,763.18), KVD (80,472.28), APV (90,233.08) and FMM (94,537.07 - observed EV/EBIT) model values given the expense and capital efficiency adjustments you would expect to offer the firm were it a part of your firm's portfolio.

Were you to offer a premium of 20% over the current Enterprise Value you would expect to earn a super-economic profit with an internal rate of return well in excess of your required return of 18%.

For example, if you offered \$61,177.38 (a 20% premium to the current Enterprise Value).

**12. In the event you make an offer for Leshkal based on a 20% premium over the current Enterprise Value, what would you expect your NPV, IRR and MIRR to be for each of the valuation models in #8 and #10?**

		Econ Profit	FCF	KVD	APV	FMM <sub>OBSERVED</sub>	FMM <sub>BASE</sub>	FMM <sub>TARGET</sub>
	<b>Initial Investment</b>	<b>(61,178.30)</b>	<b>(61,178.30)</b>	<b>(61,178.30)</b>	<b>(61,178.30)</b>	<b>(61,178.30)</b>	<b>(61,178.30)</b>	<b>(61,178.30)</b>
1	2018	65.66	1,652.17	1,652.17	2,062.01	1,652.17	1,652.17	1,652.17
2	2019	491.48	493.92	493.92	964.59	493.92	493.92	493.92
3	2020	1,136.48	4,375.33	4,375.33	4,943.55	4,375.33	4,375.33	4,375.33
4	2021	2,122.06	5,136.51	5,136.51	5,774.25	5,136.51	5,136.51	5,136.51
5	2022	3,484.08	8,452.91	8,452.91	9,178.37	8,452.91	8,452.91	8,452.91
6	2023	5,278.09	12,243.55	12,243.55	13,046.80	12,243.55	12,243.55	12,243.55
7	2024	7,503.22	16,891.56	16,891.56	17,760.59	16,891.56	16,891.56	16,891.56
8	2025	10,125.78	21,965.79	21,965.79	22,880.53	21,965.79	21,965.79	21,965.79
9	2026	13,065.24	27,199.62	27,199.62	28,136.15	27,199.62	27,199.62	27,199.62
10	2027	303,370.88	252,202.93	250,680.37	265,572.96	324,293.16	295,091.51	411,898.13
	<b>NPV</b>	<b>10,452.97</b>	<b>19,584.89</b>	<b>19,293.98</b>	<b>29,054.78</b>	<b>33,358.77</b>	<b>27,779.37</b>	<b>50,096.97</b>
	<b>IRR</b>	<b>20.01%</b>	<b>21.96%</b>	<b>21.91%</b>	<b>22.94%</b>	<b>24.13%</b>	<b>23.29%</b>	<b>26.34%</b>
	<b>MIRR</b>	<b>19.88%</b>	<b>19.08%</b>	<b>19.02%</b>	<b>22.09%</b>	<b>21.32%</b>	<b>20.46%</b>	<b>23.63%</b>

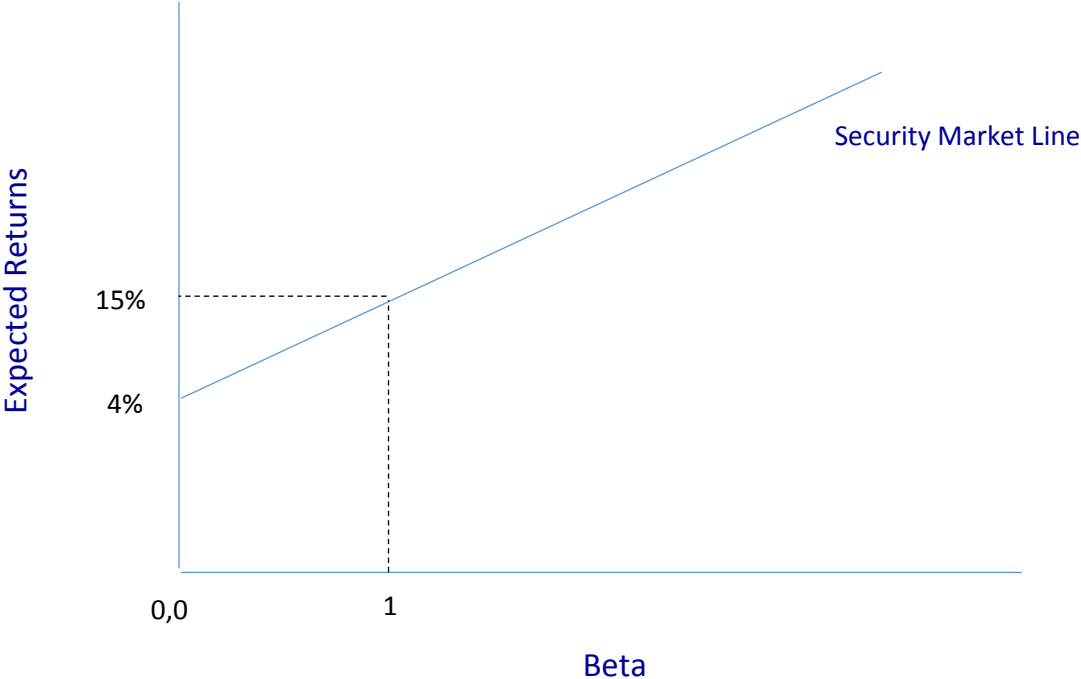
## Appendix A

	Revenue Category	Expected Industry growth	Industry Leadership	Scale Economies from Acquisition	
<b>2018</b>	Renewables	18.00%	2.00%	Debt Capital Utility	1.00%
	Batteries	15.00%	2.00%	Capital Efficiency	1.00%
	Systems	12.00%	2.00%	Production Labor	2.00%
	Services	8.00%	0.00%	Materials	3.00%
	Interest	12.00%	0.00%	Sales and Marketing	5.00%
	Consulting	5.00%	0.00%	Administration	3.00%
<b>2019</b>	Renewables	20.00%	2.00%	Facilities	6.00%
	Batteries	17.00%	2.00%	Leases	4.00%
	Systems	15.00%	2.00%		
	Services	8.00%	0.00%		
	Interest	15.00%	0.00%		
	Consulting	5.00%	0.00%		
<b>2020</b>	Renewables	23.00%	2.00%		
	Batteries	20.00%	2.00%		
	Systems	17.00%	2.00%		
	Services	8.00%	0.00%		
	Interest	17.00%	0.00%		
	Consulting	5.00%	0.00%		
<b>2021</b>	Renewables	20.00%	2.00%		
	Batteries	18.00%	2.00%		
	Systems	13.00%	2.00%		
	Services	8.00%	0.00%		
	Interest	13.00%	0.00%		
	Consulting	5.00%	0.00%		
<b>2022</b>	Renewables	18.00%	2.00%		
	Batteries	15.00%	2.00%		
	Systems	10.00%	2.00%		
	Services	8.00%	0.00%		
	Interest	10.00%	0.00%		
	Consulting	5.00%	0.00%		

## Appendix B

Leshkal Industries, Inc. Balance Sheet (\$ thousands) Year Ending December 31							Leshkal Industries, Inc. Income Statement (\$ thousands) January 1 - December 31		
	2016	2017			2016	2017		2016	2017
<b>Current Assets</b>			<b>Current Liabilities</b>				<b>Income</b>		
Cash & Securities	600	920	Wages Payable		360	410	Renewables	1,130	2,350
Marketable Securities	240	580	Taxes Payable		220	270	Batteries	4,150	5,750
Accounts Receivable	1,650	1,640	Accounts Payable		1,974	2,154	Systems	10,970	9,590
Inventory	3,930	4,260	Unearned Service Revenues		325	338	Services	5,340	6,170
<b>Total</b>	<b>6,420</b>	<b>7,400</b>	Benefits Payable		241	268	Interest	340	650
			<b>Total</b>		<b>3,120</b>	<b>3,440</b>	Consulting	290	300
<b>Fixed Operating Assets</b>			<b>Long Term Debt</b>				<b>Total Income</b>	<b>22,220</b>	<b>24,810</b>
Office Buildings	3,200	3,080	Mortgages		1,650	1,520	<b>Expenses</b>		
Warehouses	3,940	3,720	Lease Obligations		850	760	Production Labor	4,830	5,440
Production Plant	8,650	8,340	Bonds Issued		3,310	2,800	Materials	1,930	2,180
Equipment	8,190	10,160	Bank Loans		1,005	997	Sales & Mkt	2,400	2,700
Technology	1,480	3,270	Credit Line (long-term)		805	453	Admin	2,130	2,170
<b>Total</b>	<b>25,460</b>	<b>28,570</b>	<b>Total</b>		<b>7,620</b>	<b>6,530</b>	Facilities	400	450
<b>Non-Operating Assets</b>			<b>Owner's Equity</b>				Leases	500	500
Patents Held	1,250	1,250	Common Stock		5,000	5,000	Depreciation	2,420	2,760
Rental Property	600	600	Preferred Stock		-	-	<b>Total Expenses</b>	<b>14,610</b>	<b>16,200</b>
			Accumulated Retained Earnings		17,990	22,850	<b>EBIT</b>	<b>7,610</b>	<b>8,610</b>
			<b>Total</b>		<b>22,990</b>	<b>27,850</b>	<b>Non-Operating Items</b>		
<b>Total Assets</b>	<b>33,730</b>	<b>37,820</b>	<b>Total Liabilities and Owner's Equity</b>		<b>33,730</b>	<b>37,820</b>	Royalties (net)	(200)	(200)
							Rent (net)	(90)	(100)
							General Interest	1,070	650
							Bond Interest	430	320
							<b>Total Interest Paid</b>	<b>1,210</b>	<b>670</b>
							<b>Taxable Income</b>	<b>6,400</b>	<b>7,940</b>
							Tax Paid	1,580	1,870
							<b>Net Income</b>	<b>4,820</b>	<b>6,070</b>
							<b>Distribution of Earnings</b>		
							Dividends (Common)	960	1,210
							Addition to Retained Earnings	1,210	4,860
<b>Additional Financial Information</b>									
<b>Stock Value<sup>1</sup></b>		<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>		
Shares Outstanding (thousands)		5,000.00	5,000.00	5,000.00	5,000.00	5,000.00	5,000.00		
12/31 Price per Share		1.00	2.59	6.66	6.216	7.1336	9.105		
P/E Multiple		NA	7.4	7.4	7.4	7.4	7.5		
EPS		--	0.35	0.9	0.84	0.964	1.214		
Market Cap (\$ thousands)		0.00	12,950.00	33,300.00	31,080.00	35,668.00	45,525.00		
Dividends Paid		0.00	0.00	0.00	0.14	0.19	0.24		
<sup>1</sup> Firm incorporated in 2009 with 5,000,000 shares each issued at \$1.00 per share									

### Appendix C



Select Capital Data				
Bond Face Value	\$1,000		Equity Beta	1.2
Maturity Date	12/31/2029		Equity Alpha	.98
Per Bond Semi-Annual Interest Payments	\$50.00		S&P Rating	BBB
			Moody's Rating	Baa2
			Fitch Rating	BBB