

Valuing distressed firms

Our class today

- Characteristics of declining companies
- Distressed firm valuation
 - Distressed sale
 - When there are survival chances
 - Estimating probability of bankruptcy

Characteristics of declining firms

Figure 1: A Financial Balance Sheet for a Declining Business

| Assets | | | Liabilities | |
|---|----------------------------|--|-------------|---|
| Existing Investments Generate cashflows today | Investments already made | All of the value comes from existing assets, but some of these asset may be worth more liquidated. | Debt | if the firm has high debt, there is the possibility of distress |
| Expected Value that will be created by future investments | Investments yet to be made | | Equity | |
| | | Little or no value from growth. Can even be negative, if firm pursues bad investments | | |

Source: Damodaran 2009

Characteristics of declining firms

- Declining revenues
- Negative cash flows
- Shrinking or negative margins
- Asset divestitures
- Big payouts: Dividends or stock buy backs
- Difficulty servicing debt or unserviceable debt
- **Discussion: What are the causes?**

Valuation issues

- Earning less than cost of capital
- Divestiture effects
- Discount rates
- Imploding terminal value
- Bankruptcy costs



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Valuing distressed firms

- Distress sale/Liquidation of asset value
- Firm with survival chances
 - Equity as an option
 - Expected value per share = Value per share as going concern $(1 - \text{Prob. of distress}) + \text{Value of per share in distress} (\text{Prob. of distress})$
 - Adjusted PV approach = Unlevered firm value + PV of tax benefits – Expected bankruptcy costs
- Estimating probability of bankruptcy



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Las Vegas Sands: Background

- Las Vegas Sands owns and operates the Venetian Casino and Sands Convention Center in Las Vegas and the Sands Macau Casino in Macau, China. While the firm does not fit the classic profile of a declining company – its revenues increased from \$1.75 billion in 2005 to \$4.39 billion in 2008 and it had two other casinos in development – it ran into significant financial trouble in the last quarter of 2008. Fears about whether the firm would be able to meet its debt obligations pushed down both stock prices (almost 90%) and bond prices (about 40%) in 2008.
- By January 2009, the firm was operating under the threat of defaulting on its debt and both its debt and equity prices reflected that fear.



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Las Vegas Sands: Background

- The debt was rated B2 by Moody's (and B+ by S&P) and a bond issued by Las Vegas Sands, expiring in 2015, was trading at a yield to maturity of 19.82%.
- Debt to total capital ratio = 74%
- The regression beta, estimated using two years of weekly returns from January 2007 to January 2009 was 2.78. Using a riskfree rate of 3% (the ten-year bond rate at the time of the analysis) and an equity risk premium of 6%, we derive a cost of equity of
- 19.68% for the firm.
- Cost of equity = $3\% + 2.78(6\%) = 19.68\%$
- Discussion: $k_d > k_s$, what does this mean?



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Distress sale

- What is the price another casino operator may pay?
- Using the average operating income of \$401.91 million, estimated using four years of data from 2005 to 2008 for Las Vegas Sands, as a reasonable measure of earnings from existing assets, we used a corporate tax rate of 38% and the cost of capital of 9%

$$\text{Value of existing assets} = \frac{\text{EBIT}(1-t)}{\text{Cost of Capital}} = \frac{401.91(1-.38)}{.09} = \$2,769 \text{ million}$$

- What is the price of outright liquidation?
- Distress sale value – BV(1-price depreciation)(1-illiquidity discount) = 11,275 (1-0.4)(1-0.1) = 6,089 mn
- If outstanding BV debt is worth \$10.47 bn and firm has cash of \$3.04, how much would shareholders receive?



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LVS: On-going vs distress value mix

- Performance history

| Year | Revenues | Operating Income | Pre-tax Margin | Capital invested | ROC |
|------|----------|------------------|----------------|------------------|--------|
| 2004 | 1197 | 233 | 19.47% | 1575 | 9.17% |
| 2005 | 1741 | 491 | 28.20% | 1810 | 16.82% |
| 2006 | 2237 | 577 | 25.79% | 2791 | 12.82% |
| 2007 | 2951 | 331 | 11.22% | 2049 | 10.02% |
| 2008 | 4390 | 209 | 4.76% | 8974 | 1.44% |

- Correction 2008 ROC
- = $209(1-0.26)/8,975 = 1.72\%$



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LVS: On-going vs distress value mix

Table 7: Expected Revenues and Operating Income – LVS

| Year | Revenue growth | Revenues | Operating Margin | Operating Income | Tax rate | After-tax Operating Income |
|---------|----------------|----------|------------------|------------------|----------|----------------------------|
| Current | | \$4,390 | 4.76% | \$209 | 26.00% | \$155 |
| 1 | 1% | \$4,434 | 5.81% | \$258 | 26.00% | \$191 |
| 2 | 2% | \$4,523 | 6.86% | \$310 | 26.00% | \$229 |
| 3 | 20% | \$5,427 | 7.90% | \$429 | 26.00% | \$317 |
| 4 | 20% | \$6,513 | 8.95% | \$583 | 26.00% | \$431 |
| 5 | 20% | \$7,815 | 10.00% | \$782 | 26.00% | \$578 |
| 6 | 5% | \$8,206 | 11.40% | \$935 | 28.40% | \$670 |
| 7 | 5% | \$8,616 | 12.80% | \$1,103 | 30.80% | \$763 |
| 8 | 5% | \$9,047 | 14.20% | \$1,285 | 33.20% | \$858 |
| 9 | 5% | \$9,499 | 15.60% | \$1,482 | 35.60% | \$954 |
| 10 | 5% | \$9,974 | 17.00% | \$1,696 | 38.00% | \$1,051 |

- Estimates based on advisor's assumptions.



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LVS: On-going vs distress value mix

- Negative reinvestment rate = divestiture

Table 8: Expected Free Cash flow to Firm – LVS

| Year | After-tax Operating Income | Reinvestment Rate | Reinvestment | FCFF |
|------|----------------------------|-------------------|--------------|-------|
| 1 | \$191 | -10.00% | -\$19 | \$210 |
| 2 | \$229 | -5.00% | -\$11 | \$241 |
| 3 | \$317 | 0.00% | \$0 | \$317 |
| 4 | \$431 | 5.00% | \$22 | \$410 |
| 5 | \$578 | 10.00% | \$58 | \$520 |
| 6 | \$670 | 10.00% | \$67 | \$603 |
| 7 | \$763 | 20.00% | \$153 | \$611 |
| 8 | \$858 | 25.00% | \$215 | \$644 |
| 9 | \$954 | 30.00% | \$286 | \$668 |
| 10 | \$1,051 | 33.30% | \$350 | \$701 |

- FCFF = After tax Op Income - Reinvestment



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LVS: On-going vs distress value mix

- The unlevered beta of 1.15 for casino companies as a starting point, and compute the levered beta, based on the company's existing debt to equity ratio of 277.34%, computed based upon the estimated market value of equity and debt at the time of the analysis. The market value of equity, based upon the prevailing stock price of \$4.25 and the 641.839 million shares outstanding, is \$2.728 billion.
- To estimate the market value of debt, we first estimated the cost of debt, by adding a default spread of 6% (based upon its rating of B+, from S&P) to the riskfree rate of 3%, and then used the current interest expenses (\$422 million) and face value of debt (\$10.47 billion) to arrive at a present value for the debt of \$7.57 billion:

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LVS: On-going vs distress value mix

$$\begin{aligned} \text{Estimated market value of debt} &= \text{Interest Expense} \left[\frac{1 - \frac{1}{(1+r)^n}}{r} \right] + \frac{\text{Face Value of Debt}}{(1+r)^n} \\ &= 422 \left[\frac{1 - \frac{1}{(1.09)^{81}}}{.09} \right] + \frac{10,470}{(1.09)^{81}} = \$7,565m \end{aligned}$$

$$\begin{aligned} \text{Market Debt/Equity Ratio} &= 7565/2728 = 277.34\% \\ \text{Market Debt/Capital Ratio} &= 7565 / (7565+2728) = 73.5\% \\ \text{Levered Beta} &= 1.15 (1 + (1-.38) (2.7734)) = 3.14 \\ \text{Cost of equity} &= \text{Riskfree Rate} + \text{Beta (Equity Risk Premium)} \\ &= 3\% + 3.14 (6\%) = 21.82\% \end{aligned}$$

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LVS: On-going vs distress value mix

Since the firm has positive operating income still and is expected to recover, we will assume that it will be able to get the full tax benefits of debt (based upon the marginal tax rate of 38%).

Pre-tax cost of debt = Riskfree Rate + Default Spread = 3% + 6% = 9%

After-tax cost of debt = 9% (1-.38) = 5.58%

Using the current debt ratio of 73.50%, we estimate a cost of capital of 9.88% for Las Vegas Sands:

Cost of capital = Cost of equity (1- Debt ratio) + After-tax cost of debt (Debt ratio)
= 21.82% (.265) + 5.58% (.735) = 9.88%

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LVS: On-going vs distress value mix

- Assumes debt ratio will decline and converge with industry average of 50%

Table 9: Costs of equity, debt and capital –LVS

| Year | Beta | Cost of equity | Pre-tax Cost of debt | Debt Ratio | Cost of capital |
|------|------|----------------|----------------------|------------|-----------------|
| 1 | 3.14 | 21.82% | 9.00% | 73.50% | 9.88% |
| 2 | 3.14 | 21.82% | 9.00% | 73.50% | 9.88% |
| 3 | 3.14 | 21.82% | 9.00% | 73.50% | 9.88% |
| 4 | 3.14 | 21.82% | 9.00% | 73.50% | 9.88% |
| 5 | 3.14 | 21.82% | 9.00% | 73.50% | 9.88% |
| 6 | 2.75 | 19.50% | 8.70% | 68.80% | 9.79% |
| 7 | 2.36 | 17.17% | 8.40% | 64.10% | 9.50% |
| 8 | 1.97 | 14.85% | 8.10% | 59.40% | 9.01% |
| 9 | 1.59 | 12.52% | 7.80% | 54.70% | 8.32% |
| 10 | 1.20 | 10.20% | 7.50% | 50.00% | 7.43% |

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LVS: On-going vs distress value mix

Table 10: Capital Invested and Return on Capital – LVS

| Year | After-tax Operating Income | Reinvestment | Capital Invested | Return on capital |
|---------|----------------------------|--------------|------------------|-------------------|
| Current | \$155 | | 8975 | 1.72% |
| 1 | \$191 | -\$19 | \$8,956 | 2.13% |
| 2 | \$229 | -\$11 | \$8,944 | 2.57% |
| 3 | \$317 | \$0 | \$8,944 | 3.55% |
| 4 | \$431 | \$22 | \$8,966 | 4.81% |
| 5 | \$578 | \$58 | \$9,024 | 6.41% |
| 6 | \$670 | \$67 | \$9,091 | 7.37% |
| 7 | \$763 | \$153 | \$9,243 | 8.26% |
| 8 | \$858 | \$215 | \$9,458 | 9.07% |
| 9 | \$954 | \$286 | \$9,744 | 9.79% |
| 10 | \$1,051 | \$350 | \$10,094 | 10.41% |

Capital invested in year n= Capital invested year n-1+ Reinvestment in year n

Note that the return on capital in year 10 is 10.41%, close to the target return on capital of 10%.

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LVS: On-going vs distress value mix

- Assume ROC will be 10% in perpetuity and that g after year 10 will be 3% forever.
- Reinvestment rate = $g(\text{stable})/\text{ROC}(\text{stable}) = 3\%/10\% = 30\%$
- $\text{TV} = \text{After tax oper income}(1+g)(1-\text{reinvestment rate})/(\text{WACC}(s)-g(s))$
- $= 1051(1.03)(1-0.3)/(0.0743-0.03) = 17,129$

Table 11: Value of operating assets – LVS

| Year | FCFF | Terminal value | Cost of capital | Cumulated cost of capital | PV |
|------|-------|----------------|-----------------|-----------------------------|------------|
| 1 | \$210 | | 9.88% | 1.0988 | \$190.79 |
| 2 | \$241 | | 9.88% | 1.2075 | \$199.54 |
| 3 | \$317 | | 9.88% | 1.3268 | \$239.25 |
| 4 | \$410 | | 9.88% | 1.4579 | \$281.12 |
| 5 | \$520 | | 9.88% | 1.6021 | \$324.88 |
| 6 | \$603 | | 9.79% | 1.7590 | \$342.71 |
| 7 | \$611 | | 9.50% | 1.9261 | \$316.98 |
| 8 | \$644 | | 9.01% | 2.0997 | \$306.52 |
| 9 | \$660 | | 8.32% | 2.2744 | \$293.72 |
| 10 | \$701 | \$17,129.27 | 7.43% | 2.4433 | \$7,297.83 |
| | | | | Value of operating assets = | \$9,793.34 |

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LVS: On-going vs distress value mix

- Value per share = $(\text{PVCF} + \text{Cash} - \text{MVD})/\text{tot. no. shares}$
 $= (9,793 + 3,040 - 7,565)/641,839 = \8.21 per share
- Expected value per share = Value as going concern (1-prob distress) + value per share in distress (Prob distress) = $8.21(0.2344) + 0(1-0.2334) = \1.92

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Estimating probability of bankruptcy

- In 2009, Las Vegas Sands had 6.375% coupon bond, maturing in 2015 trading at \$529. The following estimates the probability of default (t-bond rate 3% used as risk-free)

$$529 = \sum_{t=1}^7 \frac{63.75(1-\pi)}{(1.03)^t} + \frac{1,000(1-\pi)^7}{(1.03)^7}$$

$$\pi = 13.54\%$$

- Solving for probability of bankruptcy we get,
- Cumulative prob of surviving for 10 years = $(1-0.1354)^{10} = 23.34\%$
- Cumulative prob of distress over 10 years = $1 - 0.2334 = 76.66\%$

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Estimating probability of bankruptcy

- In Jan 2009, Las Vegas Sands had a 6.375% coupon bond, maturing in Feb 2015, trading at \$529. The following estimates of probability of default (using 3% risk-free rate as reference).
- Solving yields annual prob. of default = 13.54%.
- Cumulative prob. of surviving in 10 years = $(1 - 0.1354)^{10} = 23.34\%$
- Cumulative probability of distress over 10 years = $1 - 0.2334 = 76.67\%$
- Other approach:
 - Logistic regression models
 - Prob of default = $1/\exp-(a+bZ)$
 - $Z = c1 \times (\text{Working capital/ Total Assets}) + c2 \times (\text{Retained Earnings/ Total Assets}) + c3 \times (\text{EBIT/ Total Assets}) + c4 \times (\text{Market value of equity/ Book value of total liabilities}) + c5 \times (\text{Sales/ Total Assets})$

