Using @RISK to Forecast Feasibility of a Strategic Expansion: A Case
The Case

- Retail operation in California
  - two locations – main store and downtown
  - annual sales of $1.2 million in FY2010
- Opportunity
  - expand into property next door at downtown location
  - expansion to allow sales of more specialty items
- Reconstruction of space would cost $150,000
  - paid entirely out of equity
  - equity would be rebuilt through revenues
The Steps

- Create set of historic financials
  - using percent of sales method
- Organize data on growth rates, cash flow parameters
- Create pro-forma forecast of base financials
  - following percent of sales method
- Forecast revenues and costs associated with project
- Combine base forecast with project forecast
- Perform NPV analysis
- Create @Risk overlay for key inputs and outputs
- Describe results, interpret information, recommend action
The Feasibility Study

- Management needs study
  - forecast of revenues under uncertain economic conditions
  - test management assumptions (growth, impact of expansion)
- Expansion must pay for itself
  - sufficient revenue to recover equity investment?
  - any surprises or unexpected results?
- Management very confident in assumptions
  - does not want a full-blown strategic analysis
- Goal: persuade board to approve investment
Some Problems

- Store is a division of non-profit corporation
- Management reports to board of parent
  - conservative and not focused on profitability
  - not sophisticated in terms of finance, forecasting, or investment
- Use internal data only
- Study cannot resemble a black box
  - how to employ monte carlo analysis?
A Simple (but Effective) Solution

- Focus on pro-forma income statements (simple model)
  - no balance sheets or statements of cash flow
- To justify investment
  - recapture initial investment through net income
  - identify appropriate growth rate and specialty sales levels
  - find conditions for minimum NPV
- Use simple distributions throughout; minimize inputs
- For assumptions:
  - growth – use current and historic data
  - forecast – use percent of sales method
Internal Data Available

- Five years’ historic income statements (audited)
  - FY 2006 through Q3 2011
  - 75 different revenue and expense items
- Known revenues and costs:
  - annual sales and annual specialty sales per square foot
  - existing costs, additional rent, capital expenditures, depreciation, COGS as percent of sales
- Cost of Capital: 4.75% (UST$_{30}$ rate, March 25, 201
- Construction Timing: September 2011 to October 201
Building the Base Forecast Model

- Start with existing line items
- Percent of sales method used
  - calculated each line item with historic average proportion
- Choose conservative growth rate
  - management FY 2011 estimate of 10.1%
  - historic average of 7.6%
- Determine specialty sales levels
Add in New Revenue and Costs

- All additional revenue from one source
  - Specialty merchandise sales in new space
- Three sources for additional costs
  - COGS for new merchandise
  - new lease
  - new depreciation
- Capital Expenditures
Defining the Inputs – Base Growth Rate

- **Growth Rate for Base Forecast**
  - management expects 10.1%
  - used RiskTriang(−7.6%, 3.8%, 10.1%)
    - historic low, half historic average, management rate

- **Resulting expected growth rate of 2.1%**
  - applies to revenues and costs
  - inflation at 2.7% in March 2011 (US DoL CPI)
Simulation of Base Growth Rate

Annual Grow...
Triang(-0.0757,0.0378,0.10...
Defining the Inputs – Specialty Sales

- **Annual specialty sales per Ft²**
  - management expects $162 per year
  - average annual total sales of $400 per ft²
  - used RiskTriang($2.62, $81, $196)
    - historic low, 50% expected
    - used Goal Seek to set upper bound
- **Resulting expected sales of $93 per Ft²**
Simulation of Specialty Sales per Square Foot

Specialty Sales / 20...
Comparison with Triang(2.61,81,1...
Output – Forecast Net Income

Forecast Change in Net Assets

<table>
<thead>
<tr>
<th>FYE 2012</th>
<th>FYE 2013</th>
<th>FYE 2014</th>
<th>FYE 2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>$203,784</td>
<td>$212,602</td>
<td>$221,903</td>
<td>$231,402</td>
</tr>
</tbody>
</table>

Historic Change in Net Assets

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>$110,376</td>
<td>$174,757</td>
<td>$189,399</td>
<td>$162,976</td>
<td>$206,751</td>
</tr>
</tbody>
</table>
Forecast Net Income Summary

2012 to 2015

- Mean
- +/- 1 Std. Dev.
- 5% - 95%
Using Net Present Value to Determine Feasibility

- Think of problem in Time Value of Money terms
  - PV = project initial investment ($150,000)
  - FV = terminal value ($160,084 = $7604 ÷ 4.75%)
  - PMTs = annual net income levels (project only)
  - i = Weighted Average Cost of Capital (WACC = 4.75%)
  - n = years in forecast
Using Net Present Value to Determine Feasibility

- All variables known except future cash flows
  - minimum acceptance condition is NPV = $0
  - under that condition, WACC = IRR
  - find minimum cash flows necessary to justify project
- Use Goal Seek
  - define upper estimate for specialty sales; set NPV to $0
- Project Cash Flows (Minimum Necessary)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Net Income</td>
<td></td>
<td>$1,881</td>
<td>$4,331</td>
<td>$5,872</td>
<td>$7,446</td>
</tr>
<tr>
<td>TV</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$160,084</td>
</tr>
<tr>
<td>Cash Flows</td>
<td>($150,000)</td>
<td>$1,881</td>
<td>$4,331</td>
<td>$5,872</td>
<td>$167,530</td>
</tr>
</tbody>
</table>
Output Results: Project NPV Profile
Output Results

- Given minimum cash flow estimates
  - Net Present Value = $0 when WACC = 4.75%
- Of 5000 iterations, 47.2% (2360) result in positive NPV
Interpretation of Results

- Specialty sales are the key to making this work
  - broad range of concern; $93 is good target
- Low growth rate (less than inflation) needed
  - plenty of room for more aggressive growth
- Sufficient net income available to recapture capex
- NPV shows project should work
  - provided specialty sales target can be met
  - fewer than half of iterations met target
Analysis Leads to Strategic Conclusions

- Go ahead with investment
  - average sales per ft² are $400

- Create comprehensive strategic business plan to:
  - improve likelihood of success
  - thoroughly analyze risks; minimize downside and losses
  - develop marketing strategy for specialty items
  - deliver minimum growth (2.1%) in FY12 and subsequent years
  - develop alternate scenarios and plans for extended recession
  - better analyze and understand competitive environment
  - create and fund reserve account for recaptured capex
Some Useful References

- For building pro-forma forecasts
  - *Financial Models Using Simulation and Optimization*
    Wayne Winston, Palisade Corporation, 1998

- For dealing with political issues
  - “Valuing Life Science Investments Using Simulation,
    Robert Ameo, Palisade Health Risk Analysis Forum, 2010

- Tech Specs
  - iMac, OS X Lion v 10.7.2
  - MS Excel 2010, Windows 7, VirtualBox v 4.1.6
  - @Risk v 5.1.7 Industrial Version
Contact Information

Cal Poly, San Luis Obispo

Steven Slezak, Lecturer
Agribusiness Department
Room 22-310
College of Agriculture, Food, and Environmental Sciences
Cal Poly
San Luis Obispo, California 93407
Phone: 805-756-5008
sslezak@calpoly.edu