Revised Shockley, Chapter 1 Answers:

1.

a. Expected Cash Inflow: 200*{25%*[$40.00/(1+10%) + $45.00/(1 + 10%)^2] + 25%*[$40.00/(1+10%) + $40.00/(1 + 10%)^2] + 25%*[$35.00/(1+10%) + $35.00/(1 + 10%)^2] + 25%*[$30.00/(1+10%) + $25.00/(1 + 10%)^2]} = $12,582.64

NPV = $12,582.64 - $12,800.00 = -$217.36

b. NPV = $12,582.64 - $6,400.00 - $6,400.00/(1 + 10%) = $364.46

c. NPV (Price is $35.00) = 200*$35.00/(1 + 10%) - $6,400.00 = -$36.36
NPV (Price is $30.00) = 200*$25.00/(1 + 10%) - $6,400.00 = -$1,854.55

d. NPV ($40.00) = 50%*[200*$45.00/(1 + 10%) + 200*$40.00/(1 + 10%)] - $6,400.00 = $1,327.28. Notice, under either future price, the project has a positive NPV. Consequently, there is no risk of failure making the 10% discount rate too high for this portion of the project.

2.

a. The off campus facility provides more flexibility because it is more appealing to tenants other than General Mills.

b. If the real estate value or the revenues generated from leasing to someone other than General Mills become more valuable than the benefit of General Mills being there.

c. Static NPV cannot capture the flexibility component of being able to use the off campus building for something else.

d. Yes, by still having the on campus building option available, the cost of moving from the off campus building lowers because there are no search costs in vacating the off campus property. This means the option to leave the off campus building can occur at a lower value threshold that if the on campus site did not exist.

3.

a. Static NPV cannot capture the flexibility of the flexible plant.

b. The flexible plant has the ability to use the less expensive of the two fuel sources.

c. No, the flexibility is only valuable when prices are more volatile. When prices are stable, the problems with static NPV are mitigated.

4.

a. It is justifiable because the flexibility allows an option to grow the thermal bonding lines if need be. Given the assumption of expansion potential within the thermal bonding line, this becomes a likely scenario.

b. No, because the value of being able to grow the thermal bonding line seems unlikely.

c. Yes, because having the ability to use the cheaper of two processes keeps costs down and can be a true strategic advantage if other manufacturers do not have the same ability.

d. This lowers the value of flexibility because birthrates correspond to diaper sales meaning the likelihood of needing to expand the thermal bonding line lowers.

5.

a. The NPV analysis of building the plant in India is more consistent with static NPV analysis. The importing of cars into India provides the opportunity to learn about the market. The benefit of learning is not captured well in a static NPV analysis.

b. If the NPV of building the plant is very positive or is based on assumptions that are very likely to occur (i.e. there is a great amount of certainty about the market; meaning, there is little gain in learning more about the market).

c. The direct cost of importing one more year must be compared to the benefit of being able to understand the Indian market better. If the value of the benefit (not necessarily in actual cash) is greater than the losses from importing, the project does increase shareholder value. Suzuki should import cars for one more year if too much uncertainty about the market still exists.

   If, with a high degree of certainty, there is no potential in the market (i.e. the consumer does like the product or the market niche does not exist), Suzuki should leave the market without importing or building a plant. However, if the market potential is high with a high degree of certainty, Suzuki should build the plant. In these two cases, the market uncertainty has been resolved and the benefit of importing to learn more about the market is inconsequential.

6.

a. A peaker is turned on whenever the demand for energy becomes so large that purchasing the electricity from another source is prohibitively expensive (i.e. a price higher than the expense of turning on the peaker).

b. You get a call option type diagram in which the strike price is the cost per megawatt for the peaker. Below the strike, the option value is zero because the peaker would not be on. Above the strike price the value of turning the peaker on is the price less the strike.

c. It is difficult to capture the volatility of the weather (how often is it too hot or too cold) and the availability of supply in a DCF context.

d. Wherever weather is difficult to predict (and can be extreme), where energy supplies from other sources are scarce, and where there is great population density. This includes: northeast, north central, southwest, and southeast U.S. and large Canadian cities. One could make a case for Mexico, but the infrastructure does not exist.

7.

a. Not necessarily, because the probability of the price increasing making the plant profitable again may outweigh the cost of shutting down the plant.

b. Not necessarily, because the probability of the price decreasing and making the plant not profitable may outweigh the cost of re-opening the plant.

c. Because the price point of shutting down will be below the breakeven price and the price point for re-opening will be above the break-even price. Consequently, just below the break-even price, non-profitable plants will operate and just above the break-even price plants that could be profitable will remain closed if already closed.

8.

a. The value of the staged strategy increases because the launch of the second two magazines can be delayed until better economic conditions emerged. Also, the optionality within the staged launch can better accommodate the volatility of gasoline prices.

b. This situation hurts both strategies, but hurts the strategy of launching all three magazines at once more because GEN is already committed to all three publications rather than just a single publication which is the case for the staged strategy.

c. Because the Venezuelan economy is booming, it may make sense to launch *Destinos Venezuela* immediately (assuming enough expertise has been learned about the market via the Columbia DirecTV Guide). However, if there is still benefit from learning about the market of a travel magazine based on launching *Destinos Columbia* first, it may be

beneficial to wait for publishing *Destinos Venezuela* despite the booming economy.

9.

a. If large clients are not representative of the entire client base, there may be an advantage to learning more through further testing. If large clients are representative of the entire client base, the incremental knowledge gained through further testing is minimal.

b. If large clients are representative of the entire client base, the system should not be implemented. If large clients are not representative of the entire client base, further testing of the system with a different type of client may prove the system to be beneficial.

c. The benefit to the staged implementation allowed the firm to learn about the system and how to use it in the most efficient manner. Further, if the system did not work, the firm could abandon it without having made a complete commitment to it.

10.

a. One-line plant NPV:

$$NPV = \frac{1500 * \$1{,}200}{10\%}\left[1 - \frac{1}{(1+10\%)^{30}}\right] - \$15{,}000{,}000 = \$1{,}968{,}446.04$$

Two-line plant NPV:

$$NPV = \frac{3{,}000 * \$1{,}000}{10\%}\left[1 - \frac{1}{(1+10\%)^{30}}\right] - \$30{,}000{,}000 = \$3{,}936.892.08$$

With the ability to sell 2400 units, the NPV of the one-line plant does not change. The NPV of the two-line plant becomes:

$$NPV = \frac{2{,}400 * \$1{,}000}{10\%}\left[1 - \frac{1}{(1+10\%)^{30}}\right] - \$30{,}000{,}000 = -\$2{,}850{,}486.34$$

b. The NPV of the expandable plant:

$$NPV = \frac{1500 * \$1{,}200}{(1+10\%)} + \left\{\frac{2800 * \$1{,}200}{10\%}\left[1 - \frac{1}{(1+10\%)^{30}}\right]\right\} \div (1+10\%)$$

$$-\$16{,}500{,}000 - \frac{\$14{,}000{,}000}{(1+10\%)} = \$1{,}204{,}029.65$$

NPV of second one-line plant:

$$NPV = \frac{1500 * \$1{,}200}{10\%}\left[1 - \frac{1}{(1+10\%)^{30}}\right] * \left(1 + \frac{1}{(1+10\%)^{3}}\right)$$

$$-\$15{,}000{,}000 * \left(1 + \frac{1}{(1+10\%)}\right) = \$1{,}080{,}727.06$$

The expandable plant is better under this scenario.

The 10% discount rate is not appropriate because once demand is known with certainty, there is no risk (making the risk-free rate the appropriate discount rate).

11.

a. The machinery cannot be priced as if the purchase is made all at once, because there is only a commitment to buy only X% machinery immediately and an option to buy additional machinery (a call option for DaimlerChrysler).

b. Because this makes DaimlerChrysler commit to the purchase on the machinery and eliminates the call option that DaimlerChrysler desires.

c. The vendor is writing a call option for DaimlerChrysler and should be compensated for providing the optionality within the contract.

12. Financial market investments are traded securities in which the market will arbitrage away any gain or loss based on the risk of the security (i.e. the security is constantly re-evaluated and priced). Thus, financial market investments tend to be fairly compensated for risk, i.e. an NPV of zero. A real asset investment is not traded on a market, preventing arbitrage from setting a cost equivalent to the gain from risky cash flows. Consequently, the NPV is not likely to be zero.