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REAL OPTION ANALYSIS: AN OVERVIEW OF THE PROCESS AND HOW IT CAN BE APPLIED TO AGRIBUSINESS: PART II

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- *Ag Application*
- *Traditional valuation says, "no"*
- *RO says, "wait and see"*

In this second part of the Real Options series, we will provide an agricultural application to demonstrate how real option analysis (RO) can provide better answers in your capital budgeting decisions.

***Agricultural Application*:**

Suppose that a group of vegetable producers would like to purchase a cold storage facility in order to better market their fresh vegetables. The facility may be expanded into a processing plant in three years time if it's profitable to do so. The group has all of the information needed to conduct a standard NPV for the entire operation. As shown in Tables 1 and 2, using a traditional discounting method, the project's overall NPV when both the cold storage and processing plant are totaled together is negative, which would indicate that the project should not be undertaken. Yet, the group feels several subtleties are lacking in their investment analysis. First, the volatility in vegetable sales is fixed in the NPV analysis, but may actually change in the future. Population growth in their region, urban sprawl, and new competitors all may change the underlying volatility. Second, the NPV analysis assumes little or no flexibility in decision making – in essence, expansion or abandonment are not alternatives. However, if the group of producers properly analyzes the situation, they could, in fact, find this to potentially be a very profitable undertaking.

Table 1 shows that the NPV for the cold storage facility is positive or a "go," but when the NPV of the processing plant (Table 2) is added in, the NPV becomes negative. One important point to consider that has not been discussed thus far is the discount rate, which is applied to the processing plant investment in year three. Cash flows that depend on market conditions such as future revenues should be discounted at the firm's six percent cost of capital (as in the NPV approach), however, the market is not willing to compensate the firm with this same level of risk for its private costs such as those associated with inputs. After all, that should be under the control of the firm. Thus it's important to use a risk-free rate when discounting cash flows. In this case, should the producers decide to invest in the processing plant, the investment of $500,000 in year three should be discounted at the current Treasury rate of 3.5 percent. This would give an even worse NPV outcome than that provided by the firm's 6 percent cost of capital!

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Table 1 The NPV Traditional Approach: Cold Storage ('000s)

Time	*0*	*1*	*2*	*3*	*4*	*5*	*6*
Outflow	($40)						
Inflow		$10	$10	$10	$10	$10	$10
DR	0.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%
NPV	$9.17						

Table 2 The NPV Traditional Approach: Processing Plant (000's)

Time	*0*	*1*	*2*	*3*	*4*	*5*	*6*
Outflow				($500)			
Inflow					$20	$20	$20
Salvage							$300
DR				3.50%	6.00%	6.00%	6.00%
NPV	($194.60)						
Total NPV	($185.43)						

Another important consideration with real option analysis is that the producers ***do not*** have an obligation to proceed with the processing plant should conditions look bad in three years; rather they have the *option* to proceed. By using the option valuation approach discussed throughout this paper, we find that there actually is value in considering the processing plant purchase in year three. That option value amounts to $24,710 giving the entire project a *possible* total valuation of $33,880 (Table 3). This is quite different from the negative ($185,420) NPV provided by the traditional approach. Herein lies the overall value afforded to the producers through real option analysis. Instead of calculating the numbers and showing only a positive NPV for the cold storage facility of $9,170 and thus discarding the entire idea of the processing plant, the producers can keep this option open and continue to study and re-evaluate the project as time goes on. In this way, they will keep the potential open to enriching their business down the road. Real option analysis allows the producer to remain flexible in an ever-changing and very volatile agricultural environment.

Table 3: Option Value Summary (000's)

NPV for Cold Storage	*$9.17*
NPV for the Processing Plant	($194.60)
NPV for Both Projects	($185.42)
Call Value—Real Option Analysis	$24.71
Value of Entire Project	$33.99

Conclusions

Real option analysis is a useful capital budgeting tool for investment decisions in agribusiness, and is preferred to traditional methods (e.g., NPV) because managerial flexibility and changing revenue volatility are explicitly modeled. Just as a grain producer would not sit idly by between planting and harvesting, good agribusiness managers would not choose to manage their capital investments in a passive manner Rather, the successful managers will remain flexible and adapt to changing situations and remain responsive to the needs of their operation by using all of the tools, which are at their disposal.

The last part of this series will include the "how to" in RO analysis; in other words, where do the values come from. It will include a more detailed and mathematical explanation for those interested in the underpinnings of RO analysis.