

## Ralph's nonseparable valuation

Ralph is committed to supply 100 units of his product to a customer during the first period and 200 units of the same product during the second period. Proceeds equal to \$220 per unit are received at the end of period one and proceeds equal to \$266.20 per unit are received at the end of period two. Production combines capital and labor. Capital is acquired at time zero at a cost of \$200 per unit. Labor the first period costs \$100 per unit and is paid at the end of period one. Labor the second period costs \$110 per unit and is paid at the end of period two. Capital is limited to 150 units. Ralph's opportunity cost of financing is 10% per period. Ralph's production technology is

$$\begin{aligned}q_1 &\leq \sqrt{KL_1} \\q_2 &\leq \sqrt{KL_2} \\K &\leq \bar{K}\end{aligned}$$

where  $q_j$  is the quantity of output  $j$  produced,  $K$  is the quantity of capital employed,  $L_j$  is the quantity of labor employed for product  $j$ , and  $\bar{K}$  is the upper limit on capital. Ralph's valuation of assets is based on present value of future cash flows.

Suggested:

1. Determine Ralph's optimal production plan.
2. Determine Ralph's valuation of capital at time zero.  
— at time one.

Now, suppose Ralph can build inventory to satisfy future demand.

2. Determine Ralph's optimal production plan with inventory. (hint: is production balanced between the two periods?)
3. Determine Ralph's valuation of capital at time zero.  
— at time one.
4. What is the value of inventory at time one?
5. What does this suggest about accountants' ability to individually value a firm's assets (and equities)?