Excessive Optimism, Framing Effects, and Cost Accounting

The following discussion provides students with an opportunity to deepen their understanding about two behavioral issues that pertain to capital budgeting: excessively optimistic cash flow forecasts and the use of cost accounting data.

A3.1 USING FORECASTS PREPARED BY OTHERS

In most organizations, the managers who make decisions about capital budgeting rely on the forecasts of others. To introduce some key issues, Concept Preview Question A3.1 asks you some questions in regard to Exhibit A3.1.

CONCEPT PREVIEW
Question A3.1

Assume you are the vice president of product development in a firm. You are evaluating eight new product proposals. For each proposal you will have information about

a. Research and development costs.
b. Average annual sales in the first five years after product introduction.

You have made it a practice to ask two persons in research and development (R&D), A and B, in whom you have equal confidence, to give you independent forecasts of research and development costs. You also ask two persons in marketing, X and Y, in whom you have equal confidence, to give you independent forecasts of sales. These forecasts, for both R&D costs and sales, are given in Exhibit A3.1 for the eight proposals. In order to make financial analysis of each proposed product, you must make your own forecast for R&D costs and sales. Your forecasts can be based on the estimates provided to you, although the actual figures you choose do not have to be identical to any of the forecasts given to you. Write down your forecasts for the eight R&D costs and the eight sales figures. Then indicate your agreement with the following statements:

To what extent do you agree or disagree with the following statements:

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree Nor Disagree	Somewhat Agree	Agree	Strongly Agree
Research and development managers typically overestimate R&D costs	1	2	3	4	5	6	7
Research and development managers typically underestimate R&D costs	1	2	3	4	5	6	7
Marketing managers typically overestimate sales	1	2	3	4	5	6	7
Marketing managers typically underestimate sales	1	2	3	4	5	6	7

Source: Meir Statman and Tyzoon Tyebjee, "Optimistic Capital Budgeting Forecasts: An Experiment," *Financial Management,* Autumn 1985, pp. 27–33.

EXHIBIT A3.1 Forecasting Table

Source: Meir Statman and Tyzoon Tyebjee, "Optimistic Capital Budgeting Forecasts: An Experiment," *Financial Management,* Autumn 1985, pp. 27–33.

	Research-and-Development Costs		Sales		Enter Your Forecast	
Project No.	A's Forecast $	B's Forecast $	X's Forecast	Y's Forecast	Research-and-Development Cost Forecast	Sales Forecast
I	$167,000	$272,000	594,000 units	194,000 units		units
II	274,000	783,000	901,000 units	396,000 units		units
III	529,000	433,000	113,000 units	609,000 units		units
IV	357,000	866,000	894,000 units	796,000 units		units
V	146,000	659,000	311,000 units	108,000 units		units
VI	937,000	446,000	451,000 units	848,000 units		units
VII	906,000	811,000	641,000 units	836,000 units		units
VIII	483,000	379,000	162,000 units	257,000 units		units

Exhibit A3.2 displays a typical response pattern to the last part of Concept Preview Question A3.1 from MBA students with at least 10 years of executive experience. The general sense is that those involved in research and development underestimate costs, whereas those involved in marketing overestimate sales.

EXHIBIT A3.2 Typical Perceptions About the Biases of Others

Source: Meir Statman and Tyzoon Tyebjee, "Optimistic Capital Budgeting Forecasts: An Experiment," *Financial Management,* Autumn 1985, pp. 27–33.

	Mean	Median	Stdev
Research-and-development people typically overestimate R&D costs	3.2	3	1.52
Research-and-development people typically underestimate R&D costs	4.6	5	1.67
Marketing people typically overestimate sales	5.3	6	1.28
Marketing people typically underestimate sales	3.0	3	1.25

In terms of the specific projects, if people view the research-and-development estimates from the two people in Concept Preview Question A3.1 to be unbiased, then their best estimate would be the midpoint of the two forecasts. If people view the estimates as featuring downward bias, they should weight the higher forecast more heavily than the lower forecast. Exhibit A3.3 provides a typical response pattern for MBA students with at least 10 years of executive experience.

EXHIBIT A3.3 Typical R&D Forecasts Based on the R&D Forecasts of Others

Project	Midpoint	Mean	Median
1	$219,500	$246,315	$250,000
2	$528,500	$619,448	$600,000
3	$481,000	$517,885	$500,000
4	$611,500	$705,838	$697,110
5	$402,500	$499,259	$458,850
6	$691,500	$789,224	$788,310
7	$858,500	$909,446	$875,000
8	$431,000	$466,692	$450,000

As can be seen in the exhibit, both the mean and median responses tend to be higher than the midpoints of the two estimates.

When it comes to sales forecasts, the responses are usually more mixed. Typically, the mean responses tend to be lower than the midpoints in about 60 percent of the projects. These responses are consistent with evidence reported in Chapter 3.

Implications

Most managers are aware that cost estimates tend to be understated and sales forecasts tend to be overstated. The survey evidence involving the responses to Concept Preview Question A3.1 illustrates this awareness. However, the persistence of systematic bias in project cash flow forecasts suggests that while managers who review projects might adjust estimates for bias, they do not adjust sufficiently. Perhaps managers anchor onto cash flow forecasts that are presented to them by others and do not adjust sufficiently.

The survey evidence based on Concept Preview Question A3.1 also reveals that managers with experience are more aware of cash flow biases than MBA students with little or no working experience, or undergraduate students with no working experience.

A3.2 COST ACCOUNTING

The cost accounting system constitutes the major source of cost information for preparing project cash flows. Cost accounting has a different focus from financial accounting. Financial accounting frames costs into two main categories: cost of goods sold (COGS), and sales, general, and administrative (SG&A). Cost accounting frames costs in terms of direct costs and overhead and may also frame costs into variable costs and fixed costs. Typically COGS is not the same as direct cost and SG&A is not the same as overhead.

The Framing of Costs

The cost data used to prepare project cash flow forecasts is typically based on information derived from the firm's cost accounting system. At its heart, accounting is a framing activity and therefore renders financial managers vulnerable to framing biases. In order to understand the nature of these biases, it is important to understand accounting frames.

Project cash flows are incremental, meaning that they represent the difference to the firm's overall cash flows as a result of the project being adopted rather than rejected. In this respect, managers need to focus on how costs will vary as a result of the project being adopted. Therefore, the frame most appropriate for capital budgeting is one that emphasizes the decomposition of costs into variable and fixed components.

Cost Drivers

cost driver
Any variable that affects costs.

Cost accounting is more complex in practice than in theory. A **cost driver** is defined to be any variable that affects costs. Examples of cost drivers are labor hours, hours of machine time, and units of production. In practice, managerial accountants do not focus on every cost driver. Instead they try to focus only on the most important drivers and to characterize how costs behave as a function of these drivers.

A variable cost is a cost that is assumed to change in proportion to a cost driver. On the other hand, a fixed cost is assumed not to change in respect to changes in the cost

driver. The term *unit cost,* or *average cost,* is simply total costs divided by the number of units. In theory, the graph of total variable cost against its cost driver is linear with a positive slope. The graph of a total fixed cost against any cost driver is horizontal.

Direct and Indirect Costs

Cost accounting systems divide costs into two broad categories: direct costs and indirect costs. Direct costs are costs that can be specifically identified with some cost object, in a way that is economically feasible. Indirect costs are costs that cannot be specifically identified with a particular cost object in an economically feasible way. Direct costs are "traced" to a specific cost object. However, indirect costs are overhead and as such are allocated to a cost object using some heuristic.

Managers preparing project cash flows face important challenges when using cost accounting data. What managers want to know is incremental cost, how the firm's costs will change as a result of the project being adopted (or continued). In this respect, managers would like to have cost data neatly divided into variable and fixed components. However, having cost data framed in this way is rare. Typically, costs are framed as direct costs and overhead, not as variable and fixed. As a practical matter, direct costs may not be purely variable and overhead may include both variable and fixed components.

Heuristics

Cost Allocation

Allocating costs is akin to dividing up the bill at a restaurant. Splitting the bill equally is akin to what managerial accountants call *process costing,* where costs are averaged across different products. This is one extreme. At the other extreme is maintaining separate checks so that everyone pays for what he or she ordered. This is akin to what managerial accountants call *job order costing.* However, when some of the costs are indirect, it may be impossible to do job order costing exactly right. In the restaurant analogy, this may happen when diners share bottles of wine or large desserts. The group of items over which costs are averaged is known as a *cost pool.*

In order to find the cost of a job, it may be necessary to allocate overhead using a heuristic. During budgeting, companies often use what is called *normal costing.* Under normal costing, a company forecasts what future overhead costs will be and then allocates this forecasted overhead across jobs in proportion to some *cost allocation base* (also known as *activity base*). The usual procedure is to take total expected overhead and allocate on the basis of some driver such as direct labor time.

Margins and Framing

Accountants define *contribution margin* as revenues minus variable costs, and they define *gross margin* as revenues minus cost of goods sold (or revenue minus variable costs and allocated overhead). Managers often confuse the two and use the term contribution margin when they mean gross margin. Or they may use heuristics based on gross margin as the basis for a decision, when they should use contribution margin. Why? Because of availability bias. Financial accounting data are more salient than cost accounting data.

In respect to overhead, accountants take pains to point out that overhead expenditures are not always fixed. Because expenditures on some overhead items can be avoided, accountants use the term *avoidable costs.* Recall that in the long run, all costs are variable, while in the short run only some costs are variable, the others being fixed.

Estimating Variable Costs

There are several heuristics that managers use to decompose total costs into variable and fixed components. One method is to plot costs against volume and estimate the intercept and slope of a straight line fitted to the scatter plot of costs graphed against volume. The slope of the straight line is used as an estimate of unit variable cost, and the intercept is used as an estimate of fixed cost.

A second heuristic is to use the method of *elasticities,* comparing the percentage rate of change in different types of costs. Here is an example. Imagine that there are two overhead items: rent and stationery. Suppose that the managers compare costs in two successive months and notice an interesting pattern. Between the two months, direct costs increased by 10 percent, stationery costs increased by 5 percent, and rental expenditures did not change. Because rental costs did not change, managers might conclude that the rental item in overhead is a fixed cost. Because stationery costs increased by 5 percent when direct costs increased by 10 percent, managers might conclude that stationery costs contain both fixed and variable components, and that stationery costs increase at half the rate of direct costs.

Potential Decision Traps

Textbooks warn managers about falling into specific decision traps. Many of these examples are associated with availability bias, where the salient cost items are full costs, featuring allocated overhead, rather than variable costs. Consider some common decision errors.

Failing to Add a Profitable New Product Line. Imagine that a bakery with excess capacity is considering adding a new product line, say raisin bread. The market price for the raisin bread is $2.80 per loaf, the contribution margin per loaf is 80 cents per loaf, and there are no additional costs involved to adding raisin bread as a product line. However, given the allocation rate, the full cost of raisin bread is $3.00 per loaf. If the bakery's managers are to choose between adding raisin bread as a product line and not adding raisin bread as a product line, what should they do? Given their excess capacity, they should add raisin bread as a product line. Doing so increases their cash flow by 80 cents per loaf. Failing to add raisin bread, based on the 20 cent difference between the $3.00 full cost and the $2.80 price would constitute an error.

Spurious Change in Product Rank Ordering. Imagine a bakery that produces several different breads, among them rye and raisin. It sells raisin bread at a price of $3.10 per loaf and rye bread at a price of $2.70. Cost data are provided in Exhibit A3.4. Notice that each type of bread has three associated cost components: direct materials, direct labor, and allocated overhead. Here overhead is determined using an allocation heuristic, where the allocation heuristic uses an overhead

EXHIBIT A3.4
Gross Margin Framing Example

Overhead allocation rate 2003	434%	
Overhead allocation rate 2004	576%	
	Raisin	**Rye**
Expected price/unit	$3.10	$2.70
Direct material cost/unit	$0.80	$1.35
Direct labor cost/unit	$0.30	$0.15
Overhead	$1.30	$0.65
Gross margin 2003	$0.70	$0.55
Gross margin/sales price 2003	**22.5%**	**20.3%**
Overhead	$1.73	$0.86
Gross margin 2004	$0.27	$0.34
Gross margin/sales price 2004	**8.8%**	**12.5%**

allocation rate based on direct labor. For example, in year 2003, the overhead allocation rate was 434 percent. Therefore, the $1.30 of overhead for raisin bread is determined as $4.34 \times \$0.30$.

Unit gross margin is the difference between price and the three unit costs. In 2003, unit gross margin for raisin bread was $0.70, and for rye bread it was $0.55. Per dollar sold, gross margin on raisin bread was 22.5 percent, while for rye bread gross margin was 20.3 percent. Clearly, raisin bread was the higher-margin product line.

Suppose that total overhead expenses for the bakery rise between 2003 and 2004, so that the overhead allocation rate rises from 434 percent to 576 percent. However, suppose that neither prices, nor direct materials, nor direct labor change between years 2003 and 2004. Consider the impact of the change in overhead on gross margins. As Exhibit A3.4 demonstrates, now rye bread has become the higher-margin item. The question is why this should be so, given that neither prices nor direct costs have changed. The answer is that overhead has changed. Because raisin bread has double the direct labor cost of rye bread, it absorbs double the overhead.

Is it reasonable that the rank ordering based on gross margin should be reversed? There is no clear answer to this question. If overhead costs have a large variable component that truly is correlated with labor costs, but not traced, then it probably does make sense. However, if overhead costs are fixed for the most part, then reversing the rank ordering would not make sense.

Using the Wrong Measure for Contribution Margin. Managers can frame contribution margin in several ways. For example, they can frame it on a per unit of production basis, or they can frame it on a per dollar of revenue basis. However, suppose that machine capacity is constrained. In this case, neither of the two frames described might be appropriate. Rather, the appropriate frame might be contribution margin per hour of machine time. The critical issue involves how to allocate the scarcest resource. Per unit of machine time, which product line offers the higher contribution margin, raisin bread or rye bread? Suppose that the answer is rye bread. In that case, using scarce machine time to produce and sell raisin bread results in lower profits than producing and selling rye bread.

Debiasing for Better Decisions

Errors or biases: Misinterpreting cost accounting data.
Why does it happen? Opaque framing.
How does it happen? Accountants use heuristics to allocate overhead, making it difficult for managers to understand how much it costs to produce particular items, or how much value is added by particular projects.
What can be done about it? Develop variable income statements that frame costs into fixed and variable components rather than cost of goods sold and SG&A, or even direct costs and overhead.