CHAPTER 17

DIVISIONAL PERFORMANCE EVALUATION

CHAPTER SUMMARY

This chapter is the second of two chapters on performance evaluation. It focuses on the measurement of divisional performance. It begins by discussing the various ways firms measure subunit performance. It provides a detailed analysis of transfer pricing and discusses issues relating to the use of the internal accounting system in performance evaluation.

CHAPTER OUTLINE

MEASURING DIVISIONAL PERFORMANCE
  Cost Centers
  Expense Centers
    Managerial Application: Eliminating an Expense Center
  Revenue Centers
  Profit Centers
  Investment Centers
    Accounting ROA
    Accounting Residual Income
    Managerial Application: EVA Often Is Linked to a Change in the Compensation Plan

TRANSFER PRICING
  Managerial Application: Transfer Pricing and Taxes
  Economics of Transfer Pricing
    Transfer Pricing with Costless Information
    Managerial Application: Dual Transfer Pricing System?
    Transfer Pricing with Asymmetric Information
  Common Transfer-Pricing Methods
    Market-Based Transfer Prices
    Marginal-Cost Transfer Prices
    Full-Cost Transfer Prices
    Negotiated Transfer Prices
    Reorganization: The Solution If All Else Fails

INTERNAL ACCOUNTING SYSTEM AND PERFORMANCE EVALUATION
  Uses of the Accounting System
    Managerial Application: Internal Auditing in Law Firms
  Trade-offs between Decision Management and Decision Control
    Managerial Application: Massive Financial Fraud at Cendant
SUMMARY

TEACHING THE CHAPTER

This chapter continues to focus on the third leg of the stool, performance evaluation. Whereas the previous chapter focused on individual evaluation, this chapter’s focus is on evaluation of divisions within the firm. The quantitative analysis of transfer prices builds on the costs of production analysis, introduced in chapter 5, and the profit-maximization analysis, introduced in chapters 5 and 6. The chapter opens with a discussion of the different unit types within the firm (cost centers, expense centers, revenue centers, profit centers, and investment centers); this material is summarized in Table 17.2. The most challenging part of the chapter is the middle section on transfer pricing. Instructors should make use of the two Managerial Applications that highlight this topic and the thorough presentation of the quantitative analysis used to determine transfer prices. The section of the chapter on “Common Transfer-Pricing Methods” lacks Managerial Applications so instructors may want to find examples to supplement this material. The final section of the chapter focuses on the use of internal accounting systems in evaluation. There are two Managerial Applications that can be used to generate class discussion about this topic.

Instructors will likely want to assign or review in class the Self-Evaluation Problems and several of the Review Questions before assigning the Analyzing Managerial Decisions scenarios to check whether students understand the concepts of the chapter and the quantitative techniques. The Self-Evaluation Problems focus on the quantitative analysis but the Review Questions cover both the core concepts and the quantitative analysis.

There are three Analyzing Managerial Decisions scenarios presented in the chapter. The first, “The Copper Box Company,” asks students to evaluate the pricing policy of the firm. This scenario focuses more on the underlying concept rather than the quantitative analysis. The second, “Hitek Bikes,” emphasizes the quantitative tools that should be used to determine the firm’s optimal pricing strategy. This scenario, in particular, may be challenging for students. The final scenario, “Celtex” is a more comprehensive scenario that asks students to consider a variety of factors before making a recommendation about what actions, if any, the manager should take to resolve the situation.

REVIEW QUESTIONS

17–1. Auto-fit is a multidivisional firm that produces auto parts. It has the capacity for annual production of 100 units of a particular part. The marginal cost of producing each unit is $10. These units can be sold internally to other divisions or to external customers. The external market price is $20. The allocated share of corporate overhead for each part produced is $5. Total corporate overhead expenditures do not vary with the production of the part. How many units of the part should the company produce? What is the theoretically correct transfer price (should the company decide to transfer the part internally)? Explain.
The company should produce 100 units since it can produce them at a marginal cost of $10 and sell them on the open market for $20. The transfer price should be $20. Using a unit internally forgoes a market price of $20. The sunk costs are irrelevant for the decision.

17–2. High Tech, Inc. has strong patent protection on a particular type of computer chip. High Tech uses the chip for the internal production of PCs. It also sells the chip to other manufacturers on the open market. Does High Tech necessarily want to charge the same price to both external and internal customers? Explain.

No — the company would like to extract all monopoly profits from the external market. Alternatively, it wants to sell internally at the opportunity cost. For instance, if the company can produce the chip at a constant cost of $50/unit, it might sell the unit for substantially above this cost in the open market. However, the internal price should be $50. This price provides incentives to internal buyers to use the chip as long as the marginal benefit exceeds the marginal production cost of $50.

17–3. A firm has a demand curve: \( P = 50 - Q \). Its total costs are:

\[
TC = 110 + Q + 3Q^2
\]

Prepare a table that computes the profit-maximizing quantity. What quantity minimizes average cost? (Hint: prepare a table like 17.1 for \( Q = 1, 2, ..., 10 \).)

The following table computes the profit maximizing quantity to be \( Q = 6 \) and the quantity that minimizes average cost to also be \( Q = 6 \). Note that it is generally not the case that the profit maximizing and the average cost minimizing quantities are the same.
The Xtrac Computer Company is organized into regional sales offices and a manufacturing division. The sales offices forecast sales for the upcoming year in their territories. These figures are then used to set the manufacturing schedules for the year. Prices of the computers are determined by corporate headquarters, and the salespeople are paid a fixed wage and a commission on sales. The regional sales offices are evaluated as revenue centers. The regional sales manager is paid a small wage (about 30 percent of total pay) and a commission on all sales in her territory (about 70 percent of total pay) that exceeds the budget.

17–4. The Xtrac Computer Company is organized into regional sales offices and a manufacturing division. The sales offices forecast sales for the upcoming year in their territories. These figures are then used to set the manufacturing schedules for the year. Prices of the computers are determined by corporate headquarters, and the salespeople are paid a fixed wage and a commission on sales. The regional sales offices are evaluated as revenue centers. The regional sales manager is paid a small wage (about 30 percent of total pay) and a commission on all sales in her territory (about 70 percent of total pay) that exceeds the budget.

Xtrac has a notoriously bad track record for forecasting computer sales. Its budgets always underforecast sales, and then, during the year, manufacturing scrambles to produce more units, authorizes labor overtime, and buys parts on rush orders. This drives up manufacturing costs. At first, management thought the underforecasting problem was due to high unexpected growth in the computer industry. But Xtrac even underforecasts sales when the economy is slow and the industry growth is below its long-run average.

a. What is the likely reason Xtrac persistently underforecasts sales?

The sales offices have an incentive to underforecast sales revenues because they are paid on the difference between actual and forecasted sales. By underforecasting sales they make the difference larger. Hence, it is easier to make their target and to receive a larger commission.
b. What are some likely explanations for the reason in part (a)?

Both the compensation scheme and the performance evaluation systems are combining to create the incentives to underforecast sales. Commissions are tied to the performance measure and performance is measured as the difference between actual and forecasted sales.

c. Propose three likely solutions, and critically evaluate each of them.

Possible solutions:

- Base commissions on actual sales, not the difference between actual and forecast. A problem with this solution is that the commission per additional unit sold must be lower to prevent paying the manager more than her market salary. Since the price per unit sold is lower, the manager will not exert as much effort on making the marginal sale (assuming the sales manager would have expected to be above forecasted sales under the old system).

- Take the sales manager’s forecast and adjust it for the expected amount of bias. For example, if the sales manager has traditionally biased her estimate by 20 percent, take her future estimates and increase them by 20 percent. The problem with this solution is once the sales manager learns that her estimates are increased by 20 percent, she will bias it downward 25 percent. Also, how do you estimate the extent of the bias? If you use the average bias across all sales managers, you end up penalizing those who have been more honest in the past.

- Compensate each sales manager based on how much his/her actual sales exceed those of the other sales managers. In other words, use relative, not absolute performance evaluation. The problem with this solution is that the sales regions may be too dissimilar in terms of size or projected growth rates to use as a benchmark. In addition, use of relative performance can cause the regional sales managers to collude to keep actual sales low or to sabotage each other.

- Devise a scheme that rewards the managers on both their sales and accuracy in forecasting (similar to IBM Brazil in the 1970s). Appropriately structured, such a compensation scheme might motivate both effort and unbiased forecasting. Designing such a scheme is not easy. Also, experience suggests that employees can sometimes manipulate these plans to their advantage.

- Require more detail in the forecast and monitor the forecast preparation more carefully.
17–5. Suppose a firm has two different accounting systems. For example, suppose it uses EVA to measure and reward management performance. To calculate EVA, annual spending on research and development is recorded as an asset and then depreciated in calculating earnings. In reporting earnings to shareholders, R&D spending in any given year is expensed against earnings.

Describe some of the likely consequences that can arise if the firm tries to maintain two different accounting systems.

This is a good question to start to explore some of the practical problems involved in performance measurement. Multiple accounting systems will lead to influence costs as managers try to lobby to be evaluated using the system that portrays their performance in the best light. Costs will be incurred as senior managers learn the differences among accounting methods and debate accounting nuances. If the reports to shareholders are audited, additional auditing fees will have to be incurred to audit the EVA numbers. The external auditors will have to determine if the EVA calculations are “reasonable.” Since these numbers are under the control of managers, it will require the auditors to survey other companies’ practices. For example, R&D expenditures are not recorded as assets for shareholders. If they are capitalized for EVA, the auditors must attest to whether the managers are using appropriate depreciable lives for the R&D. It is costly for the auditors to make these determinations as few other companies are using EVA and capitalizing R&D.

17–6. An organizational consultant does not like the way your company compensates profit center managers (currently a large part of their pay is based on the center’s profits). He argues that you should compensate the managers based on whether or not they made “reasonable decisions” and not based on the outcome of the decisions, which is partly beyond the control of the managers. The consultant argues that the managers will then have incentives to make good decisions but will not be subject to undue levels of risk. Evaluate this argument.

Top management is unlikely to have the specific knowledge to evaluate whether or not the profit center managers made "reasonable decisions." The reason a firm forms profit centers in the first place is because lower-level managers have better information to make decisions on pricing, product mix, production techniques, etc.

17–7. Below is a suggestion from a leading economics text on how to set optimal transfer prices. In this context, both the manufacturing and distribution divisions are profit centers. Do you think it would work? Explain.
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The manufacturing division could be supplied data on the net marginal revenue curve for the distribution division and told to use this as its relevant marginal revenue curve in determining the quantity it should supply. By choosing the output where marginal revenue equals marginal cost, firm profits are maximized. The transfer price should be the marginal cost at this output level.

If the manufacturing division followed this policy it would result in a profit-maximizing output for the firm. The manufacturing division, however, is unlikely to follow this policy. Evaluated as a profit center, the manufacturing manager is likely to care more about his unit’s profits than firm profits. He is likely to mark the price up above marginal cost.

17–8. Xerdak Inc. has a corporate jet, which it uses to fly managers from Rochester to Chicago. The associated costs (monthly) of maintaining and flying the jet are as follows:

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pilot</td>
<td>$10,000</td>
</tr>
<tr>
<td>Depreciation</td>
<td>10,000</td>
</tr>
<tr>
<td>Overhead</td>
<td>10,000</td>
</tr>
</tbody>
</table>

In addition, each round trip to Chicago costs $10,000 in fuel. Commercial airlines (for example, United) charge $600 for a round trip to Chicago. Managers consider the commercial service and the company service to be identical. The company plane flies a maximum of 20 times each month and has 50 seats. There are always more managers wanting to fly on the plane than there are seats. The company wants to buy some more planes. Unfortunately, they are back-ordered, and so the company will not be able to obtain additional capacity in the near future. According to economic theory, what is the optimal transfer price for a round trip to Chicago? Explain why.

Economic theory implies that opportunity cost is the correct transfer price. Optimally, managers consider the marginal costs and benefits in deciding how much of a resource to consume. Using opportunity costs as transfer prices implies that managers consider the true marginal cost of using a resource. In this problem, the opportunity cost of taking a seat on the plane is $600 since taking a seat forces some other manager to pay $600 to fly commercially. Managers should only take a trip on the jet if the marginal benefits are greater than $600. For instance, if the transfer price were $300 and the marginal benefit were $400 a manager would try to get a seat on the plane. This decision increases the costs to the company by $600 thus it is a suboptimal decision.
17–9. Geriatrics Inc. has a patent on a new type of hospital bed. The marginal cost of producing the beds is $400. The company has significant production capacity. Geriatrics sells the beds to customers on the open market and also uses them internally throughout its nursing home chain. The external demand for the product is given by \( P = 5,000 - Q \). Assuming that Geriatrics wants to profit-maximize, what is the optimal external market price? What is the optimal internal transfer price?

The optimal external market price is found by setting \( MR = MC \): \( 5,000 - 2Q = $400 \). The optimal \( Q \) is 2,300, implying an optimal price (found from the demand curve) of $2,700. The optimal transfer price is $400. This is the cost of production and reflects the opportunity cost of the transfer. No market sales are lost by making the transfer.

17–10. Biotech Inc. is a new company that invests in technologies relating to the use of plants in drugs. The stock market perceives that the company has the potential to generate large profits once it develops a line of products. To date, however, the company has not reported positive profits and does not anticipate doing so over the next 5 years or more. The owners of Biotech are particularly concerned about the investment choices of the managers. They are concerned that the managers do not have the right incentives to choose value-maximizing investments. They are considering adopting an EVA evaluation and compensation plan for the managers. Do you think this is a good idea? Explain.

An EVA plan is probably not a very good idea for this high growth firm. EVA, while it has certain advantages over GAAP earnings in performance evaluation, is still an accounting based measure. For Biotech this implies that EVA will be negative in early years and hopefully positive in later years. While the discounted value of the EVA is consistent with NPV, the managers may not plan to be around long enough at the firm to see the positive cash flows. Thus, the plan might encourage them not to invest in positive NPV projects with long-term payouts. Evaluating the managers on stock price performance is likely to be better.

17–11. Speed Company sells printers. It is divided into a manufacturing unit and a sales unit. The marginal cost of producing a printer is $200. External demand is given by \( P = 1000 - .01Q \). Selling and distribution costs total $150 per unit.

a. What is the profit maximizing retail price and quantity? What are firm profits?

The profit maximizing retail price and quantity is found by setting \( MR = MC \): \( 1000 - .02Q = 350 \). Thus the optimal quantity and price are 32,500 and $675. Profits are \((675 - 350) \times 32,500 = $10,562,500\).
b. Suppose the manufacturing unit has monopoly power to set the transfer price and knows all the information in this problem. What transfer price will it charge? What are the resulting retail price, quantity, and firm profits?

The manufacturing unit will set its own MC ($200) equal to its own MR. To find MR it must solve the distributor’s problem to find its demand curve. The distributor will set \((T + 150) = 1000 - 0.02Q\), where \(T\) is the transfer price. Thus the manufacturer’s demand curve is \(T = 850 - 0.02Q\). Thus it will set \(200 = 850 - 0.04Q\). This implies \(Q = 16,250\) and \(T = $525\). The retail price will be $837.50. Firm profits are $7,921,875.

17–12. Do you agree with the following statement? Explain.

*Obviously the correct transfer price is the opportunity cost of the resource. Any firm that uses full cost (which includes an allocation of corporate overhead) is doing it wrong.*

Conceptually opportunity cost is the correct transfer price. In the real world, however, many firms use full cost transfer pricing. There are several possible explanations for this. First, opportunity cost is hard to measure. Full cost might be a closer approximation to true marginal cost that more narrowly measured variable costs (for example, standard variable cost would not include the implications of using up capacity and foreclosing other possible opportunities, etc.). Also the divisions are likely to spend time arguing over what is variable and fixed. The full cost policy reduces these costs. Also variable cost pricing might motivate suppliers within the firm to adopt suboptimal production procedures (e.g., with less than optimal fixed costs) because a higher proportion of costs can be passed through to the buyer. In summary, it is possible that all these firms are doing it wrong. However, a more plausible explanation is that profit maximizing firms might be motivated to use full cost pricing due to the types of considerations listed above (i.e., it is the optimal policy for their particular circumstances).

17–13. You are the owner and CEO of a large divisionalized firm, with operations in a number of diverse industries. Reporting to you are a number of division managers. Division managers have considerable decision-making responsibility with respect to the day-to-day operations of their divisions, but you must approve any capital investments above $100,000 before they are made.

a. As owner, what type of capital investments would you like your division managers to be proposing to you?
All positive NPV projects, no negative NPV projects.

b. Is there a potential agency problem between you, as owner, and your division managers with respect to capital investments? What is the nature of that problem? Why is it a problem?

Division managers may propose negative NPV projects because they increase their (the division managers’) utilities even though they do not increase the owner’s utility. Also, division managers may not propose some positive NPV projects because they derive no benefit from them.

It is a problem because managers want to maximize their own utilities, not the owners’ utility.

c. How might you attempt to solve that agency problem?

- tie pay to investment performance (e.g., ROI, ROA, EVA)
- pay via stock-based compensation (but Free Rider problem if you do so)
- pay deferred compensation based on long-term performance
- acquire knowledge so you can better evaluate the projects managers propose and identify when they are not proposing projects they should be proposing.

d. Do you think you can solve the problem entirely? Why or why not?

Probably not. Anything you do to reduce the likelihood that a manager proposes a negative NPV project increases the likelihood that he or she will not propose all positive NPV projects, and vice versa.

17–14. The Jameson Company has recently formed a subsidiary, Bright Ideas, to manufacture and sell household appliances.

a. What is the difference between an investment center and a profit center?

Profit center managers have decision rights on input mix, product mix and prices. Investment center managers have these rights, as well as rights on capital invested in the center. Profit center managers are evaluated on profits of the center, while investment center managers are evaluated on ROA or residual income to account for the cost of investment capital.
b. What factors should Jameson consider in deciding whether to evaluate Bright Ideas as a profit or investment center?

The major factor will be whether the manager has specific information for making investment decisions. In either case, it is assumed that the manager has the specific knowledge for input, output and pricing decisions. Otherwise, it would not make sense to organize either as a profit or investment center.