10

Financial Measures of Performance: Return on Investment (ROI) and Economic Value Added (EVA™)[1]

RELATING PROFITS TO ASSETS EMPLOYED

In most decentralized profit centers (or strategic business units, as they are often called), the general manager has authority to not only make operating decisions on product mix, pricing, customer relationships, and production methods but also to determine the level and type of assets used in the unit. For such units, the financial measure used to evaluate managerial and business unit performance should relate the amount of profit earned to the level of assets employed. By measuring a unit's profits relative to the assets employed, corporate managers can assess whether the profits are generating an adequate return on the capital invested in the unit.

Capital always has alternative uses, so corporate managers must be concerned about whether the returns being earned on invested capital in a business unit exceed the cost of this capital, as measured by the returns available from alternative uses. A second reason for measuring the returns on capital is to promote discipline in the organization's capital-budgeting process. Most companies have elaborate systems for authorizing capital expenditures (see discussion in Chapter 12). Without some form of measurement of the ex post returns to capital, little incentive may exist, during the capital-budgeting process, for business unit managers to estimate accurately the future cash flows. Measuring returns relative to invested capital also focuses managers' attention on how to reduce the levels of working capital—particularly accounts receivable and inventory—used by the decentralized unit.

A HISTORICAL PERSPECTIVE

Despite the intuitive appeal of a measure that relates profits to employed assets, it was not until the early part of the twentieth century that the return-on-investment criterion was developed. Although business firms used net earnings to measure performance long before 1900, earnings were measured relative to either sales revenue or the costs of operations. They were not measured relative to the organization's investment in productive assets.[2] The typical nineteenth-century owner-entrepreneur—whether of a textile mill, a railroad, a steel company, or a retail organization—had to concentrate on performing only a single type of economic activity efficiently. In the short run, the owner attempted to manage operating costs in this single activity. He did not have to choose among alternative types of activities in which to make investments. He only had to determine the appropriate scale of activity in his principal line of business. For this purpose, the operating ratio of costs to revenues or the return on sales apparently provided an adequate guide for investment profitability.

The DuPont Powder Company, formed in 1903 when several previously separate and independently managed enterprises were combined, had a new organizational challenge not faced by nineteenth-century organizations: to coordinate and allocate resources to the manufacturing, purchasing, and selling activities of units performing quite different activities. In making decisions on the allocation of investment funds, the founders of the DuPont Company declared that there "be no expenditures for additions to the earning equipment if the same amount of money could be applied to some better purpose in another branch of the company's business."

The founders understood that

> a commodity requiring an inexpensive plant might, when sold only 10% above its cost, show a higher rate of return on the investment than another commodity sold at double its cost, but manufactured in an expensive plant. The true test of whether the profit is too great or too small is the rate of return on the money invested in the business and not the percent of profit on the cost.[3]

To guide their investment decisions, the DuPont Company developed the return-on-investment (ROI) criterion, measured by net earnings (after depreciation but before deduction of interest on long-term debt) divided by net assets (total assets minus goodwill and other intangibles, current liabilities, and reserves for depreciation).

Donaldson Brown, the chief financial officer of DuPont (and subsequently at General Motors starting in the 1920s), greatly extended the value of the ROI measure by showing how it could be written as the product of two ratios commonly used in nineteenth-century organizations: the profit (P), or return-on-sales, measure and the turnover (T) ratio of sales to assets:

$$\text{ROI} = \frac{\text{profit}}{\text{sales}} * \frac{\text{sales}}{\text{assets}} = PT$$

The P and T ratios could be decomposed, in turn, into their component parts, representing accounts from the income and expense statement or the balance sheet so that senior managers could understand how performance of individual activities contributed to the overall measure of organizational effectiveness. A copy of an actual chart describing operations for the year 1923 is shown in Exhibit 10-1.

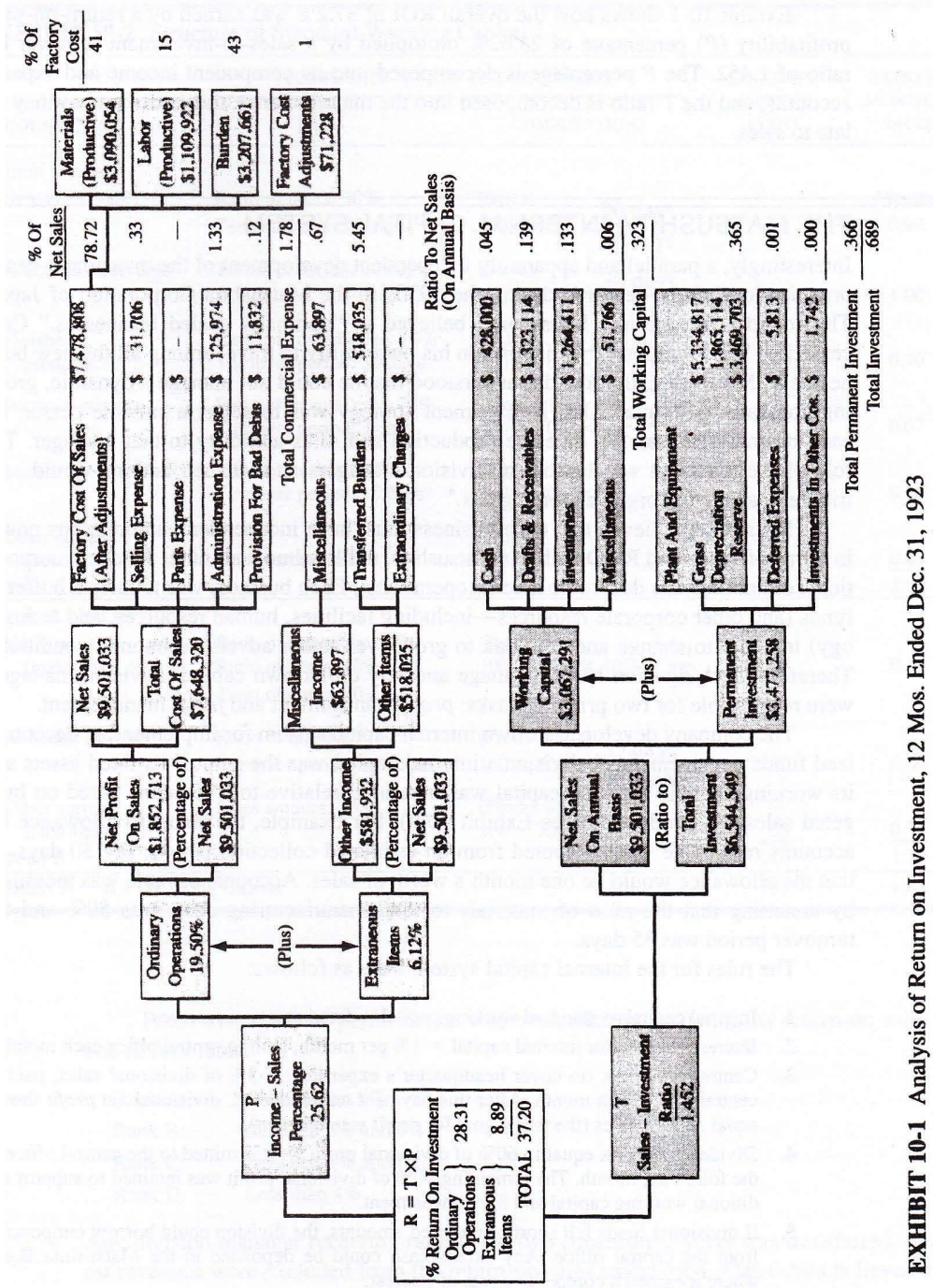

EXHIBIT 10-1 Analysis of Return on Investment, 12 Mos. Ended Dec. 31, 1923

Exhibit 10-1 shows how the overall ROI of 37.2% was earned by a return-on-sales profitability (P) percentage of 25.62% multiplied by a sales-to-investment turnover (T) ratio of 1.452. The P percentage is decomposed into its component income and expense accounts, and the T ratio is decomposed into the major balance sheet accounts as they relate to sales.

THE MATSUSHITA INTERNAL CAPITAL SYSTEM

Interestingly, a parallel and apparently independent development of the investment-center organizational form occurred during the 1930s in the Matsushita Corporation of Japan. The founder, Kohnosuke Matsushita, believed in "optimally scaled businesses." Concerned by health-imposed restrictions on his own ability to travel among all the new businesses of Matsushita, the founder understood that he could not manage a dynamic, growing company by himself. His management strategy was to select a suitable person for each business field and to delegate production and sales authority to that manager. The role of the president was to control division managers so that their actions would contribute to achieving organizational goals.[4]

Matsushita believed that each business must have independent, autonomous power in terms of funds and R&D ability. (Matsushita, unlike almost all other Japanese corporations, did not rely on debt to finance its operations.) Each business was to have a buffer of funds (and other corporate resources—including facilities, human resources, and technology) to adapt to change and continue to grow even under adverse economic conditions. Therefore, each division had to manage and rely on its own capital. Division managers were responsible for two principal tasks: *profit* management and *funds* management.

The company developed its own internal capital system for implementing decentralized funds management. A division's internal capital was the sum of its fixed assets and its working capital. Working capital was measured relative to a standard based on budgeted sales and production (see Exhibit 10-2). For example, the standard allowance for accounts receivable was computed from an estimated collection period, say 30 days, so that the allowance would be one month's worth of sales. Accounts payable was measured by assuming that the ratio of materials to total manufacturing costs was 50% and the turnover period was 35 days.

The rules for the internal capital system were as follows:

1. Internal capital = standard working capital + fixed assets − reserves.
2. Interest charged for internal capital = 1% per month, paid to central office each month.
3. Central office tax (to cover headquarter's expenses) = 3% of divisional sales, paid to central office each month. After this payment was deducted, divisional *net profit* should equal 10% of sales (the target goal for *profit management*).
4. Dividends and tax equal to 60% of divisional profit were remitted to the central office in the following month. The remaining 40% of divisional profit was retained to support additional working capital and fixed investment.
5. If divisional funds fell short of required amounts, the division could borrow temporarily from the central office. Any excess cash could be deposited in the Matsushita Bank, where it earned a competitive rate of interest.
6. When a division required large funds for a major new investment, the proposal was submitted to the central office for approval and funding.

EXHIBIT 10-2 Structure of Standard Working Capital

ACCOUNT TITLE	COMPUTATION BASIS FOR STANDARDS: BASIS	COMPUTATION BASIS FOR STANDARDS: COMPUTATIONS	STANDARD AMOUNT (YEN)	RATIO TO MONTHLY SALES
Current Assets				
Notes receivable	Ratio of notes: 30% Term of notes: 90 days	(Sales) $100 \times 30\% \times \frac{90 \text{ days}}{30 \text{ days}}$	90	Months 0.90
Accounts receivable	Turnover period: 30 days	(Sales) $100 \times 70\% \times \frac{30 \text{ days}}{30 \text{ days}}$	100	1.00
Finished products	Ratio of cost of sales: 70% Turnover period: 30 days	(Sales) $100 \times 70\% \times \frac{30 \text{ days}}{30 \text{ days}}$	70	0.70
Work-in-process	Ratio of manual cost: 70% Turnover period: 3 days	(Production) $100 \times 70\% \times \frac{3 \text{ days}}{30 \text{ days}}$	7	0.07
Materials	Ratio of materials: 50% Turnover period: 15 days	(Production) $100 \times 50\% \times \frac{15}{30}$	25	0.25
Other current assets	Sales amount: 3%	(Sales) $100 \times 3\%$	3	0.03
Total A			295	2.95
Current Liabilities				
Notes payable (materials)	Ratio of materials: 50% Ratio of notes: 10% Term of notes: 90 days	(Production) $100 \times 50\% \times 10\% \times \frac{90}{30}$	15	0.15
Accounts payable	Ratio of materials: 50% Turnover period: 35 days	(Production) $100 \times 50\% \times \frac{35 \text{ days}}{30 \text{ days}}$	60	0.60
Other current liabilities	Sales amount: 35%	(Production) $100 \times 35\%$	35	0.35
Total B			110	1.10
Balance: A − B = Working Capital			185	1.85

Profit management performance was evaluated by assigning its return on sales to one of four ranks:

Rank A: Greater than 9%
Rank B: Between 6% and 9%
Rank C: Between 4% and 6%
Rank D: Less than 4%

Any division manager receiving rank D for two consecutive years was transferred. Interest revenues were excluded from the return-on-sales calculation. Matsushita believed that profits should be earned from manufacturing high-quality goods at low cost, not from financial transactions.

THE DANGER OF ROI CONTROL

In the original uses of ROI at the DuPont Company and subsequently at General Motors, the measure was used to supplement the intuition and insight of managers who were quite familiar with the technology and competitive conditions of the operating divisions. Even in its use to encourage decentralized decision making at Matsushita, the operating divisions were working with products, processes, and customer markets that were well understood by senior corporate executives. In the post–World War II era, however, companies began to diversify their scope of operations, especially by acquiring companies in other industries. This massive increase in diversification meant that top managers often had little specific knowledge of, or experience with, the technology and markets of many of the businesses they had acquired. Also, the large number of different businesses acquired created huge demands for decision making that could no longer be performed by the corporate office. As noted by a leading business historian:

> Statistical ROI data about performance, profit, and long-term plans were no longer the basis for discussion between corporate and operating management. Instead, ROI became a reality in itself—a target sent down from the corporate office for division managers to meet. Since managers' compensation and promotion prospects depended on the ability to meet targets, these middle managers had a strong incentive to adjust their data accordingly.[5]

A Simple Example

The opportunity to manipulate the ROI measure can be illustrated with the following numerical example. Consider the performance of a division during a consecutive three-quarter period:

QUARTER	ROI	PROFITABILITY	TURNOVER
1	12.6%	17.1%	0.736
2	13.4	20.2	0.664
3	15.4	22.7	0.679

At first glance, the operating performance seems excellent, with a nice increase in ROI each quarter. The decomposition, however, reveals a sharp increase in profitability (return on sales) that overcomes a drop in asset turnover. Upon investigating the reasons for the increase in profitability and decrease in turnover, central management learned that the division manager had greatly increased production in quarters 2 and 3, with excess production accumulating as finished goods inventory. The much higher rates of production enabled period costs to be absorbed into inventory, allowing for a higher return on sales percentage on the goods actually sold. The buildup of inventory relative to sales was signaled by the decrease in the asset turnover ratio. Thus, by analyzing the contrary trends in profitability and turnover, central management was able to discover how the division manager had attempted to manipulate his performance evaluation.

In many diversified corporations, the ROI measure gave the illusion of insight and control, when, in fact, managers were taking actions that increased ROI but decreased the long-run value of their business units. Many of these problems have already been discussed in earlier chapters, in which we pointed out that excessive focus on any single short-run measure, such as profits, can motivate undesirable actions by decentralized managers. These shortcomings led to development of the Balanced Scorecard (see Chapter 8), in which short-term financial measures could be supplemented with measures that drive future financial performance.

TECHNICAL SHORTCOMINGS OF THE ROI MEASURE

In addition to the problems introduced by the inadequacy of the profit measure to assess the creation of long-term economic value, problems arise even when using ROI for evaluating short-term profit performance. Actions that increase the divisional ROI can make the corporation worse off and, conversely, actions that decrease divisional ROI may increase the economic wealth of the corporation.[6] These perverse effects can occur whenever performance is measured by a percentage or a ratio, such as with ROI, in which operating income is normalized by a measure of investment. Consider a division with assets of $90,000 and net income before taxes (NIBT) of $20,000. Its ROI will be measured at 22.2%:

$$\text{ROI} = \frac{\text{NIBT}}{\text{assets}} = \frac{20{,}000}{90{,}000} = 0.222$$

Suppose the cost of capital for the division is 15% and a new opportunity appears that requires an investment of $15,000, yielding an annual profit improvement of $3,000 per year. The return from this new investment opportunity is 20%, which is well above the division's cost of capital. But the new ROI for the division, should the project be funded, would be

$$\begin{aligned}\text{ROI} &= \frac{20{,}000 + 3{,}000}{90{,}000 + 15{,}000} \\ &= \frac{23{,}000}{105{,}000} \\ &= 0.219\end{aligned}$$

a decrease from the previous level of 22.2%. The ROI measure causes the division manager to be motivated to refuse this investment, since, even though it returns in excess of the cost of capital (it generates $750 per year in additional profits after paying the investment financing cost of 15%), the project lowers the divisional ROI. If left uncorrected, this defect alone may cause ROI to be an inappropriate measure of divisional performance.

Problems arise when contemplating asset disposal as well. If the division has an asset carried at a $20,000 cost that earns $3,600 per year (an 18% return), the division can increase its ROI by disposing of the asset even though it is earning above the division's

cost of capital. The division manager can perform the following calculation of the postdisposal ROI:

$$\begin{aligned} \text{ROI} &= \frac{20{,}000 - 3{,}600}{90{,}000 - 20{,}000} \\ &= \frac{16{,}400}{70{,}000} \\ &= 0.234 \end{aligned}$$

A similar problem arises when two divisions with different investment bases are compared. For example, a second division with assets of $50,000 and net income of $12,500 will show an ROI of 25%. It might appear that the second division is more profitable, since its ROI of 25% exceeds the 22.2% ROI of the first division. But, on closer inspection, we see that the first division has $40,000 more in assets, on which its incremental earnings are $7,500 (from $20,000 − $12,500). Therefore, its incremental ROI is 7,500/40,000, or 18.75%, well above the cost of capital of 15%. Hence, the first division is more profitable, after subtracting capital costs, than the second division.

The above problems are caused by evaluating divisional performance by a ratio (ROI). Managers who wish to maximize a ratio can either increase the numerator (by earning more profits with existing assets) or decrease the denominator (by shrinking the investment base). The investment base is shrunk when managers decline profitable new investment opportunities that can earn in excess of the divisional cost of capital but whose returns are below the current average ROI of the division. In general, any project or asset whose return is below the average ROI of the division will be a candidate for disposal or will not be recommended for funding, because its inclusion in the investment base would lower the divisional ROI measure. Carrying this process to its logical but absurd limit, the division manager shrinks the investment base to the single project that earns the highest ROI but on an extremely low capital base.

ECONOMIC VALUE ADDED (RESIDUAL INCOME)

The limitations and dysfunctional actions associated with using a ratio to evaluate the performance of a manager or division have been known and discussed for decades. Businesses, such as General Electric in the 1950s, and academics[7] have shown how to overcome these limitations by using an alternative performance measure, originally called residual income. To implement the residual income approach, corporate managers must specify an additional parameter, the risk-adjusted cost of capital for the division, which is then multiplied by division's net investment base to obtain a capital charge for the division. Careful readers will note that the residual income computation is identical to the calculation developed at the Matsushita Company. The capital charge is subtracted from net income before taxes, and the remainder is called the residual income: the income remaining after charging for the cost of capital. The residual income also corresponds closely to the economist's (but not the accountant's) measure of income.

For the examples of the two divisions described above, the residual income (RI) calculation is presented in Exhibit 10-3.

EXHIBIT 10-3 Residual Income Calculation

	DIVISION 1	DIVISION 2
Invested capital	$90,000	$50,000
Net income before taxes	$20,000	$12,500
Capital charge (@15%)	13,500	7,500
Residual income	$ 6,500	$ 5,000

The residual income calculation in Exhibit 10-3 shows that Division 1 is indeed more profitable than Division 2, since its residual income is higher. The RI difference of $1,500 is precisely due to the return in excess of the cost of capital of 0.0375 (obtained from 0.1875 − 0.15) applied to the incremental investment of $40,000 [since 0.0375 * 40,000 = 1,500] in Division 1.

Also, if Division 1 takes its 20% project opportunity ($15,000 investment, $3,000 annual return), its RI will increase, whereas if it disposes of the $20,000 asset earning $3,600 per year, its RI will decrease (see Exhibit 10-4).

The RI measure will always increase when we add investments earning above the cost of capital or eliminate investments earning below the cost of capital. Therefore, it produces goal congruence between the evaluation of the division and the actions that maximize the economic wealth of the division and the firm. The firm will always prefer the division to have a higher rather than a lower residual income. In this regard, RI offers significant advantages over the ROI measure; we have already found examples in which actions that increased divisional ROI made the firm worse off. The RI measure is also more flexible, because a different percentage can be applied to investments of different risks. The cost of capital for divisions in different lines of business may differ, and even assets within the same division may be in different risk classes (contrast the risk of cash or accounts receivable with the risk of long-lived highly specialized fixed assets). The RI evaluation allows managers to recognize different risk-adjusted capital costs that the ROI measure cannot.

Despite the appeal of the residual income calculation and its apparent theoretical superiority over the ROI measure, virtually no company used it extensively for measure-

EXHIBIT 10-4 Options for Division 1

	NOW	OPTION 1 (NEW $15,000 INVESTMENT)	OPTION 2 (DISPOSE OF $20,000 ASSET)
Invested capital	$90,000	$105,000	$70,000
Net income before taxes	$20,000	$ 23,000	$16,400
Capital charge (@15%)	13,500	15,750	10,500
Residual income	$ 6,500	$ 7,250	$ 5,900

ment of business unit performance. But a revolution in thinking occurred starting in the late 1980s, when several financial consulting firms published studies that showed a high correlation between the changes in companies' residual incomes and changes in their stock market valuation. These correlations were significantly higher that the correlations between changes in ROI and stock price changes. The move toward the RI measure received even greater publicity when it was renamed into a far more accessible and acceptable term—Economic Value Added—by the Stern Stewart consulting organization, a prime advocate for the Economic Value Added concept. Their ideas were publicized in the *Journal of Applied Corporate Finance*[8] and culminated in a cover story in the September 20, 1993, issue of *Fortune* magazine, entitled "EVA—The Real Key to Creating Wealth." The article described the apparent success that many companies had enjoyed by using economic value added to motivate and evaluate corporate and divisional managers.

The economic value added concept extended the classic residual income measure in several ways. First, it built upon recent developments in financial economics, particularly the capital asset pricing model (CAPM), to derive a cost of capital based on the industry and risk characteristics of individual divisions. Therefore, rather than using an average corporatewide rate, perhaps based on the traditional weighted average cost of capital (WACC), the CAPM could be used to derive a specific, market-based evaluation of risk for an individual business unit. Second, EVA is calculated after adjusting for distortions introduced by generally accepted accounting principles (GAAP) required for financial reporting. Several of these will be discussed in this chapter.

It is interesting to speculate about why it took companies so long to see the benefits from a relatively simple change that is able to overcome well-documented difficulties with the ROI calculation introduced at the DuPont Corporation almost a century ago.

1. The types of dysfunctional behavior from concentration on either accounting income or ROI were not perceived for many years as a real problem in practice. This perception changed, probably under the influence of the leveraged-buy-out (LBO) and management-buy-out (MBO) activities in the 1980s. These activities were directed at companies that were not exploiting effectively their capital base for shareholders. The LBO and MBO activities provided an external, market-based visibility and discipline to corporate decisions on retention and investment of capital. This visibility and discipline helped to encourage corporate managers in the 1990s to pay much more attention to maximizing returns to shareholders, not maximizing purely accounting-based measures.
2. Economic value added requires that companies specify a cost of capital either overall for themselves or for their individual divisions and business units. Senior managers were for many years unwilling to specify the company's or divisions' cost of capital, especially if they must make explicit calculations about appropriate risk adjustments for divisions and classes of assets. Until the widespread knowledge and acceptance of the CAPM approach, which was developed in academic finance departments in the mid-1960s, corporate managers had only arbitrary, somewhat ad hoc techniques for estimating a risk-adjusted cost of capital.
3. In an EVA calculation, the cost of equity capital is explicitly recognized. As this capital cost is subtracted from divisions' net incomes, the combined total of divisional net income falls far short of the corporation's financial accounting net income, as reported under GAAP to shareholders, because the cost of equity capital is not considered an expense (or profit reduction) under GAAP. Most companies want complete consistency be-

tween internal and external accounting numbers and hence rejected for many years a procedure for internal purposes that they could not employ in their published financial statements.

Perhaps managers preferred a percentage measure of profitability, such as that obtained with ROI, rather than the absolute EVA measure. A percentage profitability measure could be more convenient when comparing a division's profitability with other financial measures, such as inflation rates, interest rates, and the profit rates of other divisions in the company or outside.

Interestingly, however, despite the long-time lack of acceptance of residual income or EVA for divisional evaluation, we will see in Chapter 13 that the bonus plans for senior executives were often based on an EVA-type measure. In these plans, the bonus pool is defined as a percentage (say 10%) of net income in excess of a prespecified rate of return on invested capital.

The discussion so far has focused on properties that distinguish EVA from the ROI measure. Both measures, however, have additional significant problems that should be addressed to improve their usefulness as measures of divisional and business-unit performance.

EXPENSE VERSUS CAPITALIZE

For certain expenditures, especially on intangibles, discretion exists as to whether the expenditures should be expensed in the period in which they are incurred or should be capitalized and amortized over the future periods when their benefits are expected to be realized. The Financial Accounting Standards Board (FASB) discourages the capitalization of most intangible expenditures (see, for example, Statement 2 on Accounting for Research and Development Costs[9]), but internal performance evaluation need not be bound by regulations established for external reporting. In a steady-state situation, in which roughly equal expenditures on intangibles are made each year, net income is not affected, because the sum of amortization expenses of current and past expenditures will equal the current year's expenditures. But the failure to capitalize expenditures with expected future benefits will penalize earnings in the short run until the steady state is reached and will overstate the ROI and EVA in the steady state, because the expenditures on intangibles will not be included in the measured investment base.

We can illustrate these distortions by considering a division with five identical assets of different ages. Each asset costs $30,000 and generates a net cash flow (revenues less variable costs and traceable fixed cash costs) of $10,000 per year for five years. After five years of operation, the asset is worthless and is scrapped for zero salvage value. The division has reached a steady state; each year a five-year-old asset is scrapped and a new one is purchased. To keep the analysis simple, we will ignore tax effects, and we will assume that all cash flows and investment occur at a single point in time, on the last day of the year.[10] Also, we assume that the division uses straight-line depreciation (of $6,000 per year per asset) for financial reporting purposes.

With five assets, each generating a depreciation charge of $6,000 per year (computed as $30,000 divided by five years), the total depreciation charge equals $30,000 per year. Subtracting depreciation from the net cash flow of $50,000 per year (from the five

assets) yields a net income of $20,000. The net book value of the division can easily be derived, as shown below:

AGE OF ASSET (YEARS)	BOOK VALUE
0	$30,000
1	24,000
2	18,000
3	12,000
4	6,000
Total book value	$90,000

Therefore, the ROI of this division equals 20,000/90,000, or 22.2%.[14]

Assume that our five-asset division also engages in research each year. This research costs $3,000 but produces incremental cash flows of $1,000 for each of the next five years. (Note that this research is analogous to purchasing an additional 10% of one of our basic assets.) If this expenditure is expensed, we will observe the following sequence of net income measures:

	YEAR					
	0	1	2	3	4	5
Cash flows	$47,000	$48,000	$49,000	$50,000	$51,000	$52,000
Depreciation	30,000	30,000	30,000	30,000	30,000	30,000
Net income	$17,000	$18,000	$19,000	$20,000	$21,000	$22,000

Initially, the $3,000 expenditure reduces net income with no compensating benefit. By year 5, the annual $3,000 expenditure is more than offset by the five $1,000 increments in cash flows from the research expenditures in the previous five years, and overall the net income has increased by $2,000 from these cumulative investments in new products and processes.

If the annual $3,000 expenditure had been capitalized and amortized over five years, the sequence of net income figures would be:

	YEAR					
	0	1	2	3	4	5
Cash flows	$50,000	$51,000	$52,000	$53,000	$54,000	$55,000
Depreciation/ amortization	30,000	30,600	31,200	31,800	32,400	33,000
Net income	$20,000	$20,400	$20,800	$21,200	$21,600	$22,000

Thus, the two methods eventually reach the same net income figure in the steady state, but the capitalization/amortization alternative has a more gradual transition.

When used to evaluate investment-center performance, however, the two methods yield quite different measures, as shown below for each of the first five years:

GAAP TREATMENT: EXPENSE R&D EXPENSE AS INCURRED					
Year	1	2	3	4	5
ROI	18.9%	20.0%	21.1%	22.2%	24.4%
EVA	$3,500	$4,500	$5,500	$6,500	$8,500

CAPITALIZE AND AMORTIZE R&D SPENDING					
Year	1	2	3	4	5
ROI	21.5%	21.4%	21.5%	21.8%	22.2%
EVA	$6,090	$6,220	$6,440	$6,750	$7,150

We conclude from this exercise that divisions that treat expenditures with future-period benefits as current-period expenses will:

1. Show depressed profits either until a steady-state level of such expenditures is reached or at any time an unusually large expenditure is made in a year
2. Report a higher ROI and EVA than are actually being earned in the steady state because of the failure to properly classify such expenditures as investments

Divisions with a high proportion of expenditures on intangibles such as research and development, customer and market development, and employee skill enhancement will tend to show higher EVA and ROI in the steady-state than, say, divisions in which most expenditures with future-period benefits tend to be tangible; that is, one can see and touch what the division acquired for these expenditures. This is why marketing divisions with heavy advertising and promotional expenditures, or divisions with large numbers of professional employees (whose human capital is not recorded on the balance sheet), will show unusually high ROI and EVA performance measures. These divisions are not as profitable as they appear. Their currently high profitability (as measured by either EVA or ROI) occurs because profitability in earlier years was understated, as all expenditures on intangibles were expensed as incurred. In the current years, the firms are enjoying the benefits from these previous investments in intangibles, but the current benefits are not being related to the intangible investment base developed in previous years. Thus, these divisions' EVA and ROI appear to be higher because they have many assets that are not being counted as part of their investment base.

Leased Assets

Another version of the expense versus capitalize option occurs when clever managers, knowing that they will be evaluated by an ROI or EVA measure, lease assets instead of purchasing them. We have already noted the pervasive tendency for divisional accounting procedures to

be driven by the procedures for external reporting. The limited capitalization of leases that existed before FAS 13[12] provided an incentive for managers to acquire assets through leases because the leases would not appear in the division's investment base. The flexible conditions in FAS 13 (plus all subsequent modifications and interpretations) still enable managers to structure many leases so that the assets need not be capitalized for financial reporting purposes and hence will probably be excluded from the divisional investment base.

The incentive for leasing instead of purchasing assets can easily be illustrated in the context of our five-asset division. Suppose that, at the end of the year, instead of purchasing a new asset to replace the one just retired, the division manager finds a supplier willing to provide the asset on a five-year lease. The supplier has the same 15% cost of capital as the division and computes the equivalent annual lease payment using the five-year 15% annuity factor, 3.3522, as

$$\text{Annual lease payment} = \frac{\$30{,}000}{3.3522} = \$8{,}950$$

After one year with the leased asset, the division has the same physical assets and revenues but an extra cash expense of $8,950, a decrease in recorded investment of $30,000, and a decrease in (straight-line) depreciation expense of $6,000. The ROI and EVA for the first several years is shown in Exhibit 10-5.

The ROI of the division increases dramatically as leased assets are substituted for purchased assets. Eventually, when all the assets are leased, the division will show an infinite ROI because it will be earning net income of $5,250 with no recorded assets. The EVA of the division also increases initially but eventually declines as the higher lease payments from the leased assets more than offset the lower capital charges on owned assets. These fluctuations in ROI and EVA are purely an artifact of excluding leased assets from the investment base. The size of the division and its profitability are identical to the situation in which all five assets were purchased and owned by the division. Regardless of what the company does for financial reporting purposes, there seems to be no reason for it to exclude leased assets from the divisional investment base. The exclusion provides an incentive for a division to substitute leased assets for

EXHIBIT 10-5 Effect of Substituting Leased Assets for Owned Assets

	YEAR			
	0	1	2	3
Investment	$90,000	$60,000	$36,000	$18,000
Net cash flows	$50,000	$41,050	$32,100	$23,150
Depreciation	30,000	24,000	18,000	12,000
Net income	$20,000	$17,050	$14,100	$11,150
Capital charge	13,500	9,000	5,400	2,700
EVA	$ 6,500	$ 8,050	$ 8,700	$ 8,450
ROI	22.2%	28.4%	39.2%	61.9%

purchased assets even when no apparent economic advantage exists for such a substitution; that is, the division faces equivalent purchase price and cost of capital whether the assets are owned or leased.

This condition can be remedied by including leased assets in the investment base at their fair market value. If an independent estimate of the cost of the asset is not available, then the leased asset can be valued at the discounted present value of the lease payments, although this calculation sounds simpler than it actually is. Considerable controversy still exists as to the appropriate discount rate for evaluating the leasing option. Tax effects that we are ignoring here become important.

Once the annual lease payment is on the books, the firm has two options on how to treat it. It would be incorrect to charge the full $8,950 lease payment as an expense of the period, because much of this payment represents a financing cost and financing costs are not charged to specific assets in an ROI or EVA computation. We would be double counting interest expense: once as a subtraction from operating cash flows and a second time as the capital charge in computing EVA. This is the same reason why interest costs are not subtracted when performing a discounted cash flow analysis for evaluating a proposed capital acquisition. The preferable method would be to have the depreciation schedule follow the amortization of the debt as represented by the capitalized lease payments. The amortization and depreciation schedule appears below:

YEAR	DEBT—START OF YEAR	LEASE PAYMENT	EFFECTIVE INTEREST EXPENSE	DEBT AMORTIZATION (DEPRECIATION EXPENSE)
1	$30,000	$8,950	$4,500	$4,450
2	25,550	8,950	3,833	5,117
3	20,443	8,950	3,065	5,885
4	14,548	8,950	2,182	6,768
5	7,780	8,950	1,167	7,783*

**Rounding error caused by using annual lease payment of $8,950 instead of $8,949.50.*

Only the depreciation expense, shown in the last column, would be charged as an expense to the division.

Most companies, however, will depreciate capitalized leased assets using the traditional straight-line method. In this case, the depreciation expense will be $6,000 per year (just as for owned assets), and the annual depreciation charge will have no particular relationship with the annual $8,950 lease payment. As we subsequently show, straight-line depreciation distorts both the ROI and EVA calculations, but at least the firm will be consistent in distorting owned and leased assets in the same manner.

In summary, companies will need to modify the practices they use for external financial reporting to obtain more economically meaningful ROI and EVA measures of divisional performance. Adjusting for investments in intangibles (such as R&D) that yield multiperiod benefits and for leased versus owned assets are just two examples of the types of adjustments that corporate managers should be making when evaluating divisional performance.

PRICE-LEVEL ADJUSTMENTS

A third source of distortion arises from assuming a stable price level over time. During and after inflationary periods, both ROI and EVA measures will be highly overstated unless special care is taken to compensate for known changes in the price level. The principal distortion arises because revenues and cash costs are measured in current-year currency values (e.g., current dollars or cruzeiros), whereas the investment base and depreciation charges are measured in the currency units of the year in which the asset was acquired (e.g., 1985 dollars or cruzeiros). Depreciation based on historical costs considerably underestimates what the depreciation charge would be on the basis of either restated or current-dollar costs. This understatement of depreciation expense causes the net income of the firm to be overstated. At the same time, the investment of the firm is understated because most of the firm's assets were acquired in previous years at lower price levels than those currently prevailing. The combination of overstated net income and understated investment causes both the ROI ratio and the EVA measure to be much higher than if inflation had not occurred. The increase in ROI and EVA measure is not a signal of higher profitability; it is due solely to a failure to adjust for the money illusion caused by inflation. We add together 1985 dollars and 1995 dollars as if they were the same units, when in fact they are more different than dollars and deutsche marks.

During the high inflation of the 1970s, some steel companies claimed that their operations were finally yielding a good return to shareholders (i.e., ROI had increased) but that conditions still did not support new investment. This apparent contradiction (deciding not to invest when returns exceeded the cost of capital) clearly arose from the companies' failure to adjust both their income and their investment base for inflationary effects. The distortions from not adjusting for inflation are easy to demonstrate with our simple five-asset division. Recall that we calculated the ROI of this division as 22.2%. The calculation of the 22.2% ROI, however, assumed that the price level remained constant over a five-year period. Suppose, however, that a 10% per year inflation exists in the economy and that the price of the division's asset also increases at this 10% per year inflation rate. During this inflationary period, the division is not able to raise prices fast enough to keep pace with either its asset costs or its variable input costs. Its net cash flow increases by only 6% per year during the four-year inflationary period. After four years, the net cash flow of the division will be

$$\$50{,}000 \times (1.06)^4 = \$63{,}124$$

The investment and associated depreciation charges for the assets acquired in each of the past years are shown in Exhibit 10-6.

The ROI and EVA of the division are now calculated as follows:

Investment	$116,847
Net cash flows	$ 63,124
Depreciation	36,631
Net income	$ 26,493
Capital charge (15%)	17,527
EVA	$ 8,966

$$\text{ROI} = \frac{26{,}493}{116{,}847} = 22.7\%$$

EXHIBIT 10-6 Investment and Depreciation: 10% Annual Inflation

AGE OF ASSET (YEARS) (1)	ASSET COST (2) = 30,000 × $(1.1)^{4-(1)}$	ANNUAL DEPRECIATION (3) = (2)/5	NET BOOK VALUE, END OF YEAR 4 (4) = (2) − (1)(3)
0	$30,000\,(1.1)^4$ = $ 43,923	$ 8,785	$ 43,923
1	$30,000\,(1.1)^3$ = 39,930	7,986	31,944
2	$30,000\,(1.1)^2$ = 36,300	7,260	21,780
3	$30,000\,(1.1)^1$ = 33,000	6,600	13,200
4	30,000 = 30,000	6,000	6,000
	$183,153	$36,631	$116,847

After four years of a general 10% yearly inflation, during which the division was able to increase its net cash flows by only 6% per year, the division shows an ROI of 22.7%, a figure that exceeds its preinflationary ROI. Its most recent EVA of $8,966 also exceeds its preinflationary figure of $6,500. Finally, the net income of $26,493 also exceeds the preinflationary figure of $20,000. Thus, the financial results seem to have improved significantly over this four-year period. Clearly, however, these reported numbers make no economic sense. Apart from misrepresenting the underlying economics of the business, the distorted signals might delude corporate and division management into thinking that, despite an inability to pass on cost increases to the marketplace, the division seems to be coping rather well during a difficult inflationary period.

The apparent increases in net income, ROI, and EVA are all caused by the failure to restate the assets' historical acquisition cost into units of current costs or current purchasing power. Were the inflation rate to cease suddenly at the end of year 4 (a situation analogous to the precipitous drop in inflation rates in the United States and other countries in the early 1980s), the division would maintain its then-current net operating cash flows, replace its older assets—one per year—at the most recent price ($43,923), and eventually see the consequences from its failure to keep net cash flows in line with the past inflation:

Investment*	$131,769
Net cash flows	$ 63,124
Depreciation†	43,923
Net income	$ 19,201
Capital charge (15%)	19,765
EVA	$ (564)

**Investment, at (price-level adjusted) net book value, equals $43,923 * (1 + 4/5 + 3/5 + 2/5 + 1/5) = $131,769.*

†From $8,784.60 * 5.

$$\text{ROI} = \frac{19{,}201}{131{,}769} = 14.6\%$$

Net income has declined, economic value added is now negative, and the postinflation ROI of 14.6% is well below the preinflationary figure. The postinflation figures of both ROI and EVA are now below the misleading high figures reported at the end of the inflation cycle when the firm had yet to replace its older assets. The effect is dramatic when inflation suddenly stops as in the above example. Were inflation to continue at its previous high rates, with the division's cash flows continuing to trail the inflation rate, the division might continue to show satisfactory profits for a while but it would find itself running out of cash to purchase new assets to replace the ones being retired.

The message from this example is simple and direct. During inflationary periods, the use of historical cost to compute depreciation expense and to measure the investment base causes net income, ROI, and EVA to be deceptively high. During inflationary periods, divisions and companies find it easy to look highly profitable with these unadjusted measures. Worse, managers may be misled into thinking that asset returns are much better than they actually are. Reality sets in when the inflationary cycle is broken and assets have to be replaced at the now higher price level but price increases can no longer be sustained in the marketplace.

The failure to adjust for price-level changes affects not only the measurement of a single division over time but also the comparison among different divisions at the same point in time. Divisions with newer assets will tend to show lower ROI and EVA measures than equally (or even less) profitable divisions whose assets were acquired at lower price levels. Unless some provision is made to neutralize such inflationary biases, managers will be reluctant to make new investments because of the negative impact on their ROI and EVA. Conversely, managers will tend to delay the replacement of their low (historical) cost assets because of the misleading high ROI and EVA apparently being earned on these assets.

Adjusting financial statements for the effects of inflation has been a contentious accounting issue. Hundreds of books and articles have been written on the subject; mandatory external disclosure was implemented for several years and then rescinded in the United States; and many authoritative people still show confusion about the difference between movements in the general price level and changes in relative prices. Therefore, one can safely conclude that a consensus hardly exists on the subject. Even during the period when inflation adjustments had to be disclosed for external reporting purposes (so the information was already being produced in virtually all large U.S. firms), only a handful—literally one handful—of companies opted to use inflation-adjusted statements for internal evaluation of divisions and their managers.[13]

One final issue on this subject is the effect of inflation on the cost of capital. During a period of anticipated inflation, investors and creditors will demand a higher rate of return from their invested capital to compensate them for the lower purchasing power of the dollars or cruzeiros they will receive in the future. The nominal cost of capital, therefore, which is derived from data on market interest rates and expected rates of return on equity capital, is a function of anticipated inflation. Understanding the economics of adjusting assets for the effects of inflation and the cost of capital for changes in nominal interest rates and equity returns is not a trivial exercise. We present (without proof) the following advice to guide managers, students, and their teachers on this subject.[14]

We assumed a 15% cost of capital in our initial example when no inflation or price-level changes existed.[15] Then we assumed an environment with 10% annual inflation. Investors and creditors are not dummies. They are not going to leave their capital with com-

panies during periods of inflation unless they are compensated, with higher expected returns, when they receive cash in future years. The exact relation between expected inflation and the cost of capital is not known precisely, but an excellent approximation is to assume that today's cost of capital equals the cost of capital in the absence of inflation (15% in our example) plus the expected inflation rate (10%), for a total of 25%. Many managers believe that the 25% rate they would currently be observing in the marketplace provides the benchmark to evaluate their operations. But if inflation adjustments have already been made to asset values, it would be double counting to use the nominal 25% cost of capital. One should use the real rate of 15% as a benchmark in an ROI calculation or for calculating a capital charge in a residual income calculation after the assets' costs have been adjusted for the effects of inflation.

For example, suppose the nominal cash flows projected from a three-year project are:

YEAR	CASH FLOW
1	10,600
2	11,236
3	11,910

These cash flows reflect an anticipated annual rate of inflation of 6%. The deflated cash flows (measured in current-year dollars) are:

YEAR	CASH FLOW
1	10,000
2	10,000
3	10,000

and the present value of this three-year project, using a real interest rate of 10% per year, is $24,869.

Alternatively, we could use a nominal interest rate of

$$[(1 + 0.10) * (1 + 0.06)] - 1 = 16.6\%$$

to discount the nominal annual cash flows we first forecast

YEAR	CASH FLOW	PRESENT VALUE @ 16.6%
1	10,600	9,091
2	11,236	8,265
3	11,910	7,513
Total		24,869

to get exactly the same answer.

DEPRECIATION METHOD

The accounting rate of return obtained from an ROI calculation is frequently assumed to be an estimate of the division's economic rate of return on invested capital. Unfortunately, except in very special circumstances, the accounting ROI will not equal the underlying yield of the assets in the division. The difference between the asset's yield and its accounting ROI is easily illustrated by returning to our division with $90,000 in assets and annual net income of $20,000. Although the accounting ROI equals 22.2%, each asset actually generates a return of about 20%. Exhibit 10-7 shows that the discounted present value, using an interest rate of 20%, of five annual cash flows of $10,000, is just short of the $30,000 initial investment.[16]

Even in this simple example, the accounting ROI of 22.2% does not equal the actual rate of return of slightly less than 20%. Therefore, we cannot infer the actual yield of assets in a division or company from the accounting ROI. The difference between these two measures arises from using a financial depreciation method—straight-line, in this case—that bears no relation to the periodic loss in present value of the asset. In order for the accounting ROI to equal the actual yield, a depreciation method derived from the decline in present value of the asset must be used.

The perverse incentives that are created by inappropriately using financial accounting depreciation methods for a managerial ROI calculation are also easy to demonstrate. Observe how the manager of our division can increase his ROI measure by working less hard—that is, by deciding to stop investing in a new asset each year to replace the five-year-old asset just scrapped (see Exhibit 10-8). The ROI steadily increases each year as the asset base shrinks, because the book value of the assets decreases faster than the net income falls. Note, however, that the manager of this division should hope for a promotion or transfer some time before the end of the fourth year after adopting this ROI-increasing policy. After that time, the division will be rather short of operating assets.

We would not expect that many managers would manipulate their ROI measures so transparently; nevertheless, the example serves to demonstrate how, on the margin, managers can improve their ROI measure by postponing new investment and continuing to operate with fully or nearly fully depreciated assets.[17] Conversely, we see that managers who invest in new equipment will show a lower ROI than their counterparts who operate with older equipment. The penalty arises not just from acquiring assets at the higher price

EXHIBIT 10-7 Discounted Present Value of Cash Flows

YEAR	CASH INFLOW	PRESENT VALUE FACTOR AT 20%	DISCOUNTED CASH FLOW
1	$10,000	0.8333	$ 8,333.33
2	10,000	0.6944	6,944.44
3	10,000	0.5787	5,787.04
4	10,000	0.4823	4,822.53
5	10,000	0.4019	4,018.78
	$50,000	2.9906	$29,906.12

EXHIBIT 10-8 ROI by Year, No Asset Replacement, Straight-Line Depreciation

	YEAR				
	0	1	2	3	4
Net cash flow	50,000	40,000	30,000	20,000	10,000
Depreciation	30,000	24,000	18,000	12,000	6,000
Net income	20,000	16,000	12,000	8,000	4,000
Investment	90,000	60,000	36,000	18,000	6,000
ROI	22.2%	26.7%	33.3%	44.4%	66.7%

level, as we discussed in the preceding section, but also because financial accounting depreciation methods artificially produce lower accounting ROIs in the initial years that an asset is placed into service.

Because of the bias against new investment when using straight-line depreciation and an ROI performance measure, several companies measure assets at their gross book value rather than net book value, a practice followed by the DuPont Corporation for many decades starting in the 1920s. When assets are measured at gross book value, the incentive to avoid investing in new assets is eliminated. In fact, a new incentive—to replace existing assets with new assets—is created, since the measured increase in investment is only the difference between the historical cost of the existing asset and the purchase cost of the new asset. This difference is well below the actual net outlay for the new asset, as measured by the purchase cost less trade-in or salvage value of the existing asset.

It is certainly possible to devise a depreciation schedule, based on the decline in present value of the asset each year, so that the accounting ROI will equal the economic rate of return of the asset. The economic or present value depreciation method can be derived directly from the cash flow schedule used to justify the acquisition of the asset.[18] But using the present value depreciation method would require that companies use a depreciation method for managerial accounting purposes completely different from the methods used for financial and tax accounting purposes. During the 1970s when inflation rates exceeded 10%, fewer than 1% of U.S. companies adjusted their accounting statements for inflation for internal purposes—even though data already existed from mandated supplementary disclosure. Therefore, we are not optimistic about managers' receptivity to implement an entirely new depreciation method for internal motivation and evaluation. Consequently, we will not burden readers with the derivation of economic depreciation methods.

The lack of interest in economic or present value depreciation methods for assets is curious, since the technology for performing such calculations is well known and, in fact, is already being used in financial statements, but to amortize liabilities, not to depreciate assets. The amortization of principal in a mortgage calculation, or the amortization of bond discounts and premiums, generates a nonlinear amortization schedule in order to maintain a constant yield-to-maturity of the liability. We are unsure why such a constant yield-to-maturity approach is easily accepted for liabilities but is considered unacceptable when one moves from the right to the left side of the balance sheet to amortize the cost of asset acquisitions. Lacking such insight, we can only alert readers to the pitfalls lurking when using financial accounting depreciation methods for managerial accounting calcula-

tions but without offering much hope that the pitfalls will be eliminated by using more cash flow-based depreciation methods.

SUMMARY OF TECHNICAL ADJUSTMENTS TO ROI AND EVA™ CALCULATIONS

Clearly, to obtain improved measures of return on investment and economic value added, financial managers may have to make numerous adjustments to expenses that have been recorded in their general ledger. The information for financial reporting or even for short-run operational control may not be the most useful for assessing the economic performance of business units. We have discussed adjustments that could be made for

- cost of capital on assets employed
- investments in intangible assets (e.g., R&D, advertising, training)
- leased assets
- changes in general and specific price levels
- depreciation method

And these are just a few of the many adjustments that could be made to GAAP-prepared financial statements. Stern, Stewart has a list of 164 different issues that could be used, depending on circumstances and the materiality of the adjustment, to modify reported accounting results in order to improve the accuracy with which EVA measures real economic income.[19]

The message is clearly that effective management accounting requires that financial managers understand the assumptions behind the numbers they report. They should not mechanically make a calculation which could lead to a distorted and misleading signal to managers who are not familiar with the assumptions and limitations behind practices adopted for financial accounting purposes.

LINKING ABC TO ECONOMIC VALUE ADDED: ASSIGNING ASSETS

The greatest leverage for improving ROI or EVA may come from making decisions not at the business unit (SBU) or corporate level but at the level of activities, products, and customers—activity-based management—as we discussed in Chapter 5. It is simple to extend activity-based costing (ABC) to the assignment of assets as well as to operating expenses. After all, many expenditures, such as for plant and equipment and to acquire materials, are temporarily classified as assets before they flow through the income statement as expenses. Many assets represent expenditures on their way to becoming expenses.

We can illustrate the integration of ABC and EVA with a simple example. Take an SBU with the income statement shown below in Exhibit 10-9.

This statement reveals a marginally profitable business unit, with a net operating margin of 9% of sales. After assigning a cost of capital of 12% to the net assets employed, this business unit has destroyed economic value during the year; that is, its earnings are below the cost of capital employed to generate the earnings.

Executives' initial reaction to a negative EVA business unit, as shown in Exhibit 10-9, may be to search for ways to raise margins (through price increases and cost cutting)

EXHIBIT 10-9 Business Unit Income Statement

	INCOME STATEMENT	(%)
Sales	$1,000,000	100%
Cost of Goods sold	480,000	48
Gross margin	520,000	52
Selling expense	210,000	21
Disn. expense	116,000	12
Admin. expense	108,000	11
Operating profit	86,000	9
Capital employed	840,000	84
Capital charge (@12%)	100,800	10
Economic Value Added	$($14,800)	−1%

or to increase asset intensity. They may instruct the business unit managers to cut selling expenses or administrative expenses as a percentage of sales, or they may raise prices across the board, cut production support expenses, and demand lower inventory levels and accounts receivable in their attempt to increase reported EVA. But such across-the-board actions, designed to cut away fat and waste, may end up also cutting into muscle and bone. Consider a situation in which the business unit consists of two distinct product lines. One product line is well established, runs on efficient, focused production processes, and is sold to customers with whom the business unit has long-standing relationships. The other product line was developed to enter into new customer markets, is a highly customized business with many product variants and short production runs, and has heavy marketing and selling expenses to service existing customers and to reach new ones. An activity-based cost analysis permits the product line income statements shown in Exhibit 10-10.

The ABC financial report in Exhibit 10-10 shows the danger of using a meat cleaver to cut costs. No problem exists for product line 1. Its efficient processes and loyal customer base enables it to earn high gross and operating margins. Any attempt to cut costs further or to raise prices may seriously compromise this highly attractive segment. The business unit's profitability and EVA problems arise from product line 2. Managers' attention should not be focused on across-the-board spending reductions; it needs to be focused on specific actions to make product line 2 profitable.

The connection of ABC to EVA appears in the bottom section of Exhibit 10-10. The EVA analysis reinforces the message beyond the profitability analysis alone. It points managers to a range of opportunities to improve both margins *and* asset intensity for product line 2. The ABC analysis of assets employed reveals that product line 1 requires only $0.70 of assets per dollar of sales, whereas product line 2 requires $1.05 per dollar of sales. This differential arises because product line 1's managers have established close relationships with a few suppliers, so raw materials shipments are generally made on a just-in-time basis; its predictable demand pattern enables machines to operate near capacity levels (so it has little to no unused capacity); and its dedicated efficient and JIT production processes enable it to operate with low work-in-process and finished goods inventory lev-

EXHIBIT 10-10 Applying ABC to EVA Analysis

	TRADITIONAL		PRODUCT GROUP 1		PRODUCT GROUP 2	
	INCOME STATEMENT	(%)	INCOME STATEMENT	(%)	INCOME STATEMENT	(%)
Sales	1,000,000	100	600,000	100	400,000	100
Cost of Goods sold	480,000	48	240,000	40	240,000	60
Gross margin	520,000	52	360,000	60	160,000	40
Selling expense	210,000	21	90,000	15	120,000	30
Disn. expense	116,000	12	36,000	6	80,000	20
Admin. expense.	108,000	11	48,000	8	60,000	15
Operating profit	86,000	9	186,000	31	−100,000	−25
Capital employed	840,000	84	420,000	70	420,000	105
Capital charge (@12%)	100,800	10	50,400	8	50,400	13
Economic Value Added	($14,800)	−1%	135,600	23%	($15,400)	−38%

els. Further, its excellent customer relationships keep accounts receivable to a minimum. Product line 2, in contrast, requires $1.05 of assets per dollar of sales because it uses high inventory levels at all production processes, it has extensive setups and idle time on machines, and its customers pay slowly. Thus, there is a large differential—13% of sales versus 8% for product line 1—in the EVA capital charges applied to the two product lines.

Driving EVA from a divisional or business unit level down to activities and calculating individual product and customer EVA gives managers far more leverage to increase total EVA for the unit. Instead of using a meat-cleaver—cutting all expenses, assets, products, and customers—managers can apply a surgical scalpel to the particular activities and to individual products or customers that exhibit negative EVAs.

The assignment of many assets to individual products should be straightforward. Some assets, such as inventory, are already directly attributable to individual products. Dedicated assets, such as specialized production equipment, tooling, and test equipment, can be assigned to the narrow range of products that use those resources. Other assets, such as general purpose equipment, may be used by a wide range of products. In this case, the asset assignment can be done with the same cost drivers—machine hours—used to drive the operating expenses (depreciation, maintenance, power) of the equipment to individual products. The Stern Stewart methodology for EVA also encourages companies to capitalize many expenditures—such as research and development, marketing, and promotion—and amortize them over a specified useful life.[20] The assignment of such intangible assets to individual products should be obvious.

As with operating expenses, not all asset assignments should be made to individual products. Some assets can be causally attributed to individual customer behavior. The easiest example of a customer-specific asset is accounts receivable. As another example, some customers may cause their suppliers to hold specific inventory for them. In such cases, the asset (inventory) may be better attributed to the customer, not to the product. Also, the company may have purchased specific equipment, done specific research and product and process development, or developed specific software for an individual customer or identifiable segment of customers. The capitalized value of these intangible assets can then be attributed to specific customers or segments.

The integration between ABC and EVA is natural. Both ABC and EVA were developed to solve a distortion in the financial reporting of company economics. ABC corrected the arbitrary allocations of factory overhead to products and the failure to assign other indirect expenses to products and customers. EVA corrected the failure of financial accounting statements to recognize the cost of capital as an economic expense before arriving at a profitability figure (see example in Exhibit 10-9, in which a division shows an accounting profit while failing to earn a return sufficient to repay its use of capital employed). When ABC and EVA are used together, managers obtain a clearer map of economic profitability and losses and can direct their attention and specific actions—through operational and strategic activity-based management—to operations where economic losses are incurred, and they can retain, protect, and expand economically profitable operations.

SUMMARY

Investment centers are decentralized units or divisions for which the manager has maximum discretion in determining not only the short-term operating decisions on product mix, pricing, and production methods but also the level and type of investment in the center. The accounting return on investment (ROI) is the most common measure used to evaluate investment-center performance, but this measure suffers from many defects. Managers, in attempting to maximize their ROI measure, have an incentive to reject investments that will earn below the division's average ROI but are still above the divisional cost of capital. This particular problem can be avoided by using the economic value added (EVA) measure (formerly, or alternatively, known as residual income), which is obtained by subtracting a capital charge for the average investment in the division from divisional net income. Both measures, ROI and EVA, can be greatly distorted by failing to adjust financial accounting practices. Financial managers should attempt to adjust financial accounting practices to obtain managerial information that is closer to economic reality.

ENDNOTES

1. EVA™ is a trademark of Stern Stewart & Co., New York.
2. See the discussion in H. T. Johnson and R. S. Kaplan, *Relevance Lost: The Rise and Fall of Management Accounting* (Boston: Harvard Business School Press, 1987), chap. 2.
3. Quotations taken from original records at the DuPont Corporation as referenced in H. T. Johnson, "Management Accounting in an Early Integrated Industrial E I. duPont de Nemours Powder Company, 1903–1912," *Business History Review* (Summer 1975), pp. 187–88.
4. This discussion of the Matsushita history and control system was derived from Y. Monden, "Japanese Management Control Systems," in *Innovations in Management: The Japanese Corporation*, ed. Y. Monden et al., (Institute of Industrial Engineers, Industrial Engineering and Management Press, 1985), pp. 41–58.
5. A. D. Chandler Jr., "The Competitive Performance of U.S. Industrial Enterprises Since the Second World War," *Business History Review* (Spring 1994), p. 19.
6. Technical limitations to the ROI measure have been pointed out in D. Solomons, *Divisional Performance: Measurement and Control* (Homewood, IL: Richard D. Irwin, 1968), chap. 5; J. Dearden, "The Case against ROI Control," *Harvard Business Review* (May–June 1969); and J. Dearden, "Measuring Profit Center Managers," *Harvard Business Review* (September–October 1987).

7. See Solomons, *Divisional Performance*, chap. 5.
8. See, for example, G. B. Stewart, "EVA®: Fact and Fantasy," *Journal of Applied Corporate Finance* (Summer 1994), pp. 71–84.
9. Financial Accounting Standards Board, *FASB Statement No. 2*, Accounting for Research and Development Costs (Issue Date 10/74), Stamford, CT.
10. This last assumption is made to eliminate the need to use continuous discounting procedures and does not reduce the generality of the analysis that follows.
11. This division could have been the one used to illustrate the difference between ROI and residual income earlier in this chapter.
12. Financial Accounting Standards Board, *FASB Statement No. 13*, Accounting for Leases (Issue Date: 11/76).
13. See J. Hertenstein, "Management Control System Change: The Adoption of Inflation Accounting," in *Accounting & Management: Field Study Perspectives*, ed. W. J. Bruns Jr., and R. S. Kaplan (Boston: Harvard Business School Press, 1987); also J. Hertenstein, *FMC Corporation's Use of Current Cost Accounting* (Montvale, NJ: National Association of Accountants, 1988).
14. The arguments can be found in F. Modigliani and R. Cohn, "Inflation, Rational Valuation and the Market," *Financial Analysts Journal* (March–April 1979), pp. 24–44.
15. Fifteen percent was used for illustrative purposes only. As will be discussed in Chapter 12, the weighted-average real cost of capital for most organizations will be well under 10%.
16. The discounted present value would have been exactly $30,000 had we used an interest rate of 19.86% in the calculations.
17. German companies commonly charge depreciation, based on their replacement value, for assets still in use even if the assets have been fully depreciated for financial and tax purposes.
18. Present value depreciation is discussed in Dearden, "Case against ROI Control," and Solomons, *Divisional Performance*.
19. Stewart "EVA®: Fact and Fantasy," p. 73.
20. Stewart, "EVA®: Fact and Fantasy," p. 77.

■ PROBLEMS

10-1 ROI and Divisional Performance

The Solomons Company uses ROI to measure the performance of its operating divisions. A summary of the annual reports from two divisions is shown below. The company's cost of capital is 12%.

	DIVISION A	DIVISION B
Capital invested	$2400	$4000
Net income	$ 480	$ 720
ROI	20%	18%

Required

(1) Which division is more profitable?
(2) At what cost of capital would the two divisions be considered equally profitable?

(3) What performance measurement procedure would more clearly show the relative profitability of the two divisions?

(4) Suppose the manager of Division A were offered a one-year project that would increase his investment base (for that year) by $1,000 and show a profit of $150. Would the manager accept this project if he were evaluated on his divisional ROI? Should he accept this project?

10-2 *Evaluating Divisional Performance (CMA, Adapted)*

Darmen Corporation is one of the major producers of prefabricated houses in the home building industry. The corporation consists of two divisions:

1. Bell Division, which acquires the raw materials to manufacture the basic house components and assembles them into kits
2. The Cornish Division, which takes the kits and constructs the homes for final home buyers. The corporation is decentralized, and the management of each division is measured by its income and return on investment.

Bell Division assembles seven separate house kits using raw materials purchased at the prevailing market prices. The seven kits are sold to Cornish for prices ranging from $45,000 to $98,000. The prices are set by corporate management of Darmen using prices paid by Cornish when it buys comparable units from outside sources. The smaller kits with the lower prices have become a larger portion of the units sold because the final house buyer is faced with prices that are increasing more rapidly than personal income. The kits are manufactured and assembled in a new plant purchased by Bell this year. The division had been located in a leased plant for the past four years.

All kits are assembled upon receipt of an order from the Cornish Division. When the kit is completely assembled, it is loaded immediately on a Cornish truck. Thus, Bell Division has no finished goods inventory.

The Bell Division's accounts and reports are prepared on an actual-cost basis. There is no budget, and standards have not been developed for any product. A factory overhead rate is calculated at the beginning of each year. The rate is designed to charge all overhead to the product each year. Any under- or overapplied overhead is allocated to the cost of goods sold account and work-in-process inventories.

Bell Division's annual report is presented below. This report forms the basis of the evaluation of the division and its management by the corporation management.

Additional information regarding corporate and division practices is as follows:

- The corporation office does all the personnel and accounting work for each division.
- The corporate personnel costs are allocated on the basis of number of employees in the division.
- The accounting costs are allocated to the division on the basis of total costs excluding corporate charges.
- The division administration costs are included in factory overhead.
- The financing charges include a corporate-imputed interest charge on division assets and any divisional lease payments.
- The division investment for the return-on-investment calculation includes division inventory and plant and equipment at gross book value.

Bell Division Performance Report for the Year Ended December 31, 1997

			INCREASE (OR DECREASE) FROM 1996	
	1997	1996	AMOUNT	PERCENT CHANGE
Summary Data				
Net income ($000 omitted)	$ 34,222	$ 31,573%	$ 2,649	8.4
Return on investment	37%	43%	(6)%	(14.0)
Kits shipped (units)	2,000	2,100	(100)	(4.8)
Production Data (in units)				
Kits started	2,400	1,600	800	50.0)
Kits shipped	2,000	2,100	(100)	(4.8)
Kits in process at year-end	700	300	400	133.3
Increase (decrease) in kits in process at year end	400	(500)	—	—
Financial Data ($000)				
Sales	$138,000	$162,800	$(24,800)	(15.2)
Production costs of units sold				
Raw material	$ 32,000	$ 40,000	$ (8,000)	(20.0)
Labor	41,700	53,000	(11,300)	(21.3)
Factory overhead	29,000	37,000	8,000)	(21.6)
Cost of units sold	$102,700	$130,000	$(27,300)	(21.0)
Other Costs: Corporate Charges for				
Personnel services	$228	$ 210	$ 18	8.6
Accounting services	425	440	(15)	(3.4)
Financing costs	300	525	(225)	42.9
Total other costs	$953	$1,175	$(222)	(18.9)
Adjustments to Income				
Unreimbursed fire loss	—	$52	$(52)	(100.0)
Raw material losses due to improper storage	$125	—	125	—
Total adjustments	$125	$52	$73	(140.0)
Total deductions	$103,778	$131,227	(27,449)	(20.9)
Division income	$ 34,222	$ 31,573	$ 2,649	8.4
Division investment	$ 92,000	$ 73,000	$ 19,000	26.0
Return on investment	37%	43%	(6)%	(14.0)%

Required

(1) Discuss the value of the annual report presented for the Bell Division in evaluating the division and its management in terms of
   (a) The accounting techniques employed in the measurement of division activities
   (b) The manner of presentation

(c) The effectiveness with which it discloses differences and similarities between years

Use the information in the problem to illustrate your discussion.

(2) Make specific recommendations to the management of Darmen Corporation that would improve its accounting and financial reporting system.

10-3 *Effect of Depreciation on ROI Computations*

The Streetorn Corporation is contemplating the purchase of a new piece of equipment. The equipment has an expected life of five years and is expected to produce the following after-tax cash flow savings for the following five years:

YEAR	AFTER-TAX CASH FLOW SAVINGS
1	$50,000
2	46,000
3	42,000
4	36,000
5	30,000

The asset will cost $138,300 and thus has an after-tax yield of 16%, which is above the company's after-tax cost of capital of 15%. The declining pattern of annual cash flow savings is caused by higher maintenance costs as the equipment ages, as well as the reduction in tax benefits from use of the sum-of-years-digits (SYD) method for depreciation. For example, the gross cash flow savings in year 3 (before depreciation and before taxes) is $51,560. The net after-tax cash flow savings is obtained by the following computation:

Gross cash flow savings	$51,560
Depreciation (138,300)(3/15)	27,660
Taxable income	23,900
Taxes (@ 40%)	9,560
Net income after taxes	14,340
+ Depreciation	27,660
After-tax cash flow savings	$42,000

(Optional Assignment: Compute the gross cash flow savings for years 1–5.)

The president's bonus is based on the company's return-on-investment (net income after taxes/investment at start of year). The company prides itself on its conservative accounting policies and therefore uses the same depreciation method for financial reporting

as it does for its tax return. The controller of Streetorn has prepared the following table to show the president the annual ROI from the new piece of equipment:

YEAR	BOOK VALUE START OF YEAR (1)	NET CASH FLOW AFTER TAXES (2)	SYD DEPRECIATION (3)	NET INCOME AFTER TAXES (4) = (2) − (3)	ROI (5) = (4)/(1)
1	$138,300	$50,000	$46,100	$ 3,900	2.8%
2	92,200	46,000	36,880	9,120	9.9%
3	55,320	42,000	27,660	14,340	25.9%
4	27,660	36,000	18,440	17,560	63.5%
5	9,220	30,000	9,220	20,780	225.4%
Average (5 years)	$ 64,540	$40,800	$27,660	$13,140	20.4%

The president is astonished by this table. He says, "Something's very wrong here. According to your cash-flow analysis, this piece of equipment has a 16% after-tax yield. Yet our financial statements show a different yield each year, and the low ROI in the first two years is going to keep me out of bonus money. Sure the equipment shows a fantastic ROI in its last two years, but I may not be with the company by then. I need results right away, not four years from now!"

The controller decides that the trouble may be with the firm's conservative accounting practices. Perhaps if the firm used straight-line depreciation for financial reporting, as do most of the other firms in the industry, the numbers would look better. He proceeds to produce the following table:

YEAR	BOOK VALUE START-OF-YEAR	NET CASH FLOW AFTER TAXES	STRAIGHT-LINE DEPRECIATION	NET INCOME AFTER TAXES	ROI
1	$138,300	$50,000	$27,660	$22,340	16.2%
2	110,640	46,000	27,660	18,340	16.6%
3	82,980	42,000	27,660	14,340	17.3%
4	55,320	36,000	27,660	8,340	15.1%
5	27,660	30,000	27,660	2,340	8.5%
Average	$ 82,980	$40,800	$27,660	$13,140	15.8%

The president is much happier with this presentation, especially since now the asset shows good returns in the earlier years. But he is still puzzled as to why an asset with a yield of 16% does not show a 16% ROI each year.

Required

(1) Verify that this piece of equipment does have a 16% yield.
(2) Show, using the present-value depreciation method, how the equipment can have a 16% ROI for each of the five years of the asset's life.

(3) Why did the ROI using the straight-line depreciation method approximate the actual yield reasonably well (for at least the first four years of the asset's life)?

10-4 *Effects of Inflation on ROI*

The Carter Company uses the ROI criterion to evaluate the performance of its divisions. The company prides itself on the formal capital-budgeting procedures it uses for approving new investments and the subsequent control procedures it has implemented to measure the performance of those new investments. Recently, however, the ROI measure has been producing performance statistics quite at variance with the criterion used to screen the investments. The company believes that recent high inflation rates may be contributing to the erratic performance evaluation measures. The problem is well illustrated by comparing the performance of two divisions.

Division Y made a major investment 10 years ago. This investment cost $3,000,000 and had an expected life of 15 years and annual after-tax cash flows of $525,000. The rate of return of slightly more than 15% was above the Carter Company's cost of capital. During the past 10 years, the price level had risen by 67%, and the after-tax cash flows from the investment had increased to an annual level of $800,000. The ROI for Division Y for the most recent year was computed as:

Investment book value (start-of-year)	$1,200,000
Investment book value (end-of-year)	1,000,000
Average investment	$1,100,000
Net cash flow	$ 800,000
Depreciation	200,000
Net income	$ 600,000
ROI—Division Y	54.5%

Division Z, in a different region than Division Y, made a major investment of a very similar type just two years ago. Because of the increase in construction and equipment costs, the investment now had cost $4,500,000. The expected life of this investment was 10 years, and the annual after-tax cash flow was $900,000. This investment also had a yield slightly in excess of 15%, so the performance measure of Division Z was expected to be similar to that of Division Y. In fact, Division Z's investment appeared to be much less profitable than Division Y's and did not even reach the expected 15% ROI cutoff figure. The most recent year's data show:

Investment book value (start-of-year)	$4,050,000
Investment book value (end-of-year)	3,600,000
Average investment	$3,825,000
Net cash flow	$1,000,000
Depreciation	450,000
Net income	$ 550,000
ROI—Division Z	14.4%

The price index was 120 10 years ago when Division Y's investment was made. Two years ago, when Division Z made its investment, the index was 180, and in the most recent year, for which the above data were prepared, the index averaged 200.

Required

Analyze this situation explaining why two divisions with such similar investments (15% after-tax returns from the discounted cash flow analysis) are showing such disparate ROIs.

10-5 ROI and Leasing

The Malone Division of the Stoudt Corporation is organized as an investment center. Because of excellent operating results, the division manager, Terry Trocano, has been given considerable freedom in investment decisions. Terry knows that the top management of the Stoudt Corporation measures the performance of the operating divisions using an ROI criterion and that it is important for her to maintain a divisional ROI of 20% before taxes and 14% after taxes. Her annual bonus depends on achieving these targeted levels, and her compensation can increase considerably if she is able to obtain even higher ROIs.

Trocano has just completed a five-year forecast of annual operating performance for the Malone Division. The best estimate is that the current net investment level of $20,000,000 will be maintained over this period (that is, new investment will about equal the depreciation charge each year) and that the net income before taxes will be $4,000,000 and net income after taxes will be $2,800,000 each year.

Although Trocano is pleased that her forecasted results indicate that she will achieve both the before- and after-tax ROI targets, she is actively looking for projects that will enable her to exceed the targeted rates. A new investment proposal has recently emerged that seems particularly promising. The project requires an initial investment of $15,000,000 and will generate annual before-tax cash flows of $6,000,000 for five years. The discounted cash flow analysis indicates that the project has a before-tax yield in excess of 28% and an after-tax yield of more than 19%. (The Stoudt Corporation has a marginal tax rate of 40% and uses sum-of-years-digits depreciation for computing taxable income.) Both of these yields are well in excess of the company's targeted ROI, so the proposed project seems like an excellent investment.

Before making a final decision on the $15,000,000 investment, Trocano has asked the division controller to forecast the first year's operating results for the Malone Division, including the income generated by the new project. She is surprised when she receives the following proforma results:

Before-Tax Analysis (000)	
Net income from existing projects	$ 4,000
Cash flow—new project	6,000
Less: Depreciation (straight-line, 5-year life)	(3,000)
Net income	$ 7,000
Investment: Existing projects	$20,000

continued

New project	15,000
Total investment	$35,000
ROI	20%
After-Tax Analysis (000)	
Net income after taxes—existing projects	$ 2,800
Net income before tax—new project	3,000
Taxes on new project*	
(sum-of-years-digits depreciation)	(400)
Net income after taxes	$ 5,400
Total investment	35,000
ROI	15.4%

**The company uses actual tax expense, based on the accelerated depreciation schedule, in allocating tax expense to divisions.*

The project does not hurt the measured performance of the Malone Division, but it certainly does not show the large increase in divisional ROI that Trocano had hoped for.

The controller proposes an alternative scheme for undertaking the investment. He has learned that another company is willing to acquire the buildings and equipment for the new project and lease them to the Malone Division at an annual rental payment of $5,200,000 for five years. The terms of the lease can be structured so that it is considered an operating lease and hence will not be capitalized on the Stoudt Corporation's financial statements. The controller has prepared the following proforma analysis of the lease option.

Before-Tax Analysis (000)	
Net income from existing projects	$ 4,000
Cash flow—new project	6,000
Less: Lease payment	(5,200)
Net income	$ 4,800
Investment—existing projects	20,000
ROI	24%
After-Tax Analysis (000)	
Net income after taxes—existing projects	$ 2,800
Income from new project—net of lease payment	800
Taxes—new project	(320)
Net income after taxes	$ 3,280
Investment	20,000
ROI	16.4%

The lease option seems much more attractive to Trocano, since it generates a significant increase in both before- and after-tax ROI for her division. She submits the proposed new project, with a recommendation to lease the new facilities, to the central administration staff. She expects a routine approval for this attractive investment opportunity.

Required

Assume that you are the newly hired assistant to the head of the corporate finance division and have been asked to review the project proposed from the Malone Division.

(1) Verify that the proposed project will yield the forecasted returns (more than 28% before tax and more than 19% after tax).
(2) Compute the before- and after-tax ROI for the Malone Division for each of the next five years for both the purchase and the lease options. The investment base for each year is the book value (using straight-line depreciation) of investment at the start of the year.
(3) At the company's after-tax cost of capital of 14%, is it better to purchase or lease the asset?
(4) Why does the leasing option generate higher ROI measures than the purchase option?
(5) Suggest an alternative scheme that will reduce the incentive to lease rather than to purchase assets. Demonstrate how your scheme would work were the Malone Division to enter into the five-year lease with annual payments of $5,200,000.

■ *CASES*

USING EVA AND MVA AT OUTSOURCE, INC.*

"I've been hearing a lot lately about something called MVA, which stands for Market Value Added, and I was curious whether it is something we can use at OSI." This was Keith Martin's comment as he finished eating his lunch. Keith is president and CEO of OutSource, Inc. His guest for lunch that day was a computer-industry analyst from a local brokerage firm. Keith invited him to lunch to get more information on MVA and its uses.

"Yes," replied the analyst, "I've heard a great deal about MVA. It's based on Economic Value Added, or EVA, which is a residual income approach where a firm's net operating profit after taxes—called NOPAT—is compared with a minimum level of return a firm must earn on the total amount of capital placed at its disposal."

"Have you seen the most recent issue of *Fortune*?" he continued, as he handed a copy of the publication to Keith. "It has an article[1] in it updating Stern Stewart's list of the top 1,000 firms ranked by MVA. You will also be interested in an earlier *Fortune* article[2] on EVA; however, don't be misled by the simplicity of the EVA calculations in that article. The after-tax operating profit—NOPAT—and the amount used for capital don't come directly off the financial statements. You have to analyze the footnotes to determine the adjustments that have to be made to come up with those amounts; Bennett Stewart calls them equity equivalents."

"Those articles sound like very interesting reading for me at the point I'm at on this topic," said Keith. "Can you send me a copy of the earlier article too?"

"Yes, I will," said the analyst. "But tell me, what is it about MVA and EVA that piqued your interest in trying them at OSI?"

*This case was prepared by Professor Paul A. Dierks of the Babcock School of Management, Wake Forest University, and appeared in *Management Accounting* (January 1997), pp. 56–59.

[1]"Who Are the Real Wealth Creators?" R. B. Lieber, *Fortune* (December 9, 1996), pp. 107–08, 110, 112, 114.

[2]The Real Key to Creating Wealth," S. Tully, *Fortune* (September 20, 1993), pp. 38–40, 44–48, 50.

"In tracking our industry," Keith replied, "I see the stock prices of some of our key competitors, like Equifax, increasing. Yet, when I compare OSI's recent growth in sales and earnings, our return on equity and earnings per share compare well, but our stock price doesn't achieve nearly the same rate of increase, and I don't understand why."

The analyst offered that "some of those firms might be benefiting from using EVA already, and the market value of their stock probably reflects the results of their efforts. It's been shown that a higher level of correlation exists between EVA and a stock's market value than has been found with the traditional accounting performance measures, like ROE or EPS."

"But the MVA 1,000 ranking probably includes only large firms," Keith observed after looking over the article the analyst had given him. "Will EVA work in a small service firm like OSI?"

"Most of the largest U.S. firms are in the Stern Stewart MVA ranking," said the analyst, "but I've read about EVA being used at smaller firms. And some firms in the ranking are service firms, such as AT&T, McDonald's, Marriott International, and Dun & Bradstreet. I'm not an expert on MVA or EVA, but I don't see any reason why it wouldn't work at OSI."

"I'd like to find out more in detail about MVA and EVA and how we can use it at OSI. For example, we've talked about a new incentive plan; will it work in that area? And, if so, will it help us in deciding how we should organize and manage our operations as we expand and grow in the future? What can you do to get more information on these things to me fairly soon?"

"An application EVA is touted for is its use in incentive plans," replied the analyst. "I have a team of MBA students from Wake Forest assigned to me this fall to do an industry-related project and I was looking for something 'meaty' for them to do. This looks like just the ticket. I'll brief them on it and have them come over to get the necessary information and interview you."

"Great! I look forward to meeting them," said Keith. "And, in that case, lunch is on me," as he reached for the check.

Company Information

OutSource, Inc. (OSI) is a computer service bureau that provides basic data processing and general business support services to a number of business firms, including several large firms in their immediate local area. Its offices are in a large city in the mid-Atlantic region, and it serves client firms in several mid-Atlantic states. OSI's revenues have grown fairly rapidly in recent years as businesses have downsized and outsourced many of their basic support services.

The CorpInfo Data Service (CIDS) classifies OSI as an information services firm (SIC 7374). This group is composed, in large part, of smaller, independent entrepreneurs that provide a variety of often disparate services to both corporate and government clients. Market analysts feel a continuously healthy economy translates into strong potential for higher earnings by members of this group. A factor sustaining an extended period of growth is the increased attention of firms to control costs and to outsource their noncore functions, such as personnel placement, payroll, human resources, insurance, and data processing. This trend is expected to continue, probably at an increasing rate, through to the end of the decade. Several firms in this industry have capitalized on their growth and geographic expansion to win lucrative contracts with large clients that previously had been awarded on a market-by-market basis.

Although OSI operates out of its own facilities, which include some computing equipment and furniture, the bulk of its computer processing power is obtained from excess computer capacity in the local area, primarily

rented time during third-shift operations at a large local bank. However, to be successful in the long-term, OSI management knows it must expand its business considerably, and, to ensure it has full control over its operations, it must set up its own large-scale computing facility in-house. These items are included in OSI's long-range strategic plan.

As OSI's reputation for accurate, reliable, quick response service has spread, the firm has found new business coming its way in a variety of data processing and support services. The issue has been deciding which services to take on or to stay out of in light of the current limitations on OSI's computing resources and to ensure that they can continue to provide high-quality service to customers. Things are definitely looking up for OSI, and industry market analysts have recently begun to look more favorably on their stock.

In 1993, OSI's board decided to pursue additional opportunities in payroll processing and tax filing services, and OSI purchased a medium-sized firm that had an established market providing payroll calculating, processing, and reporting services for several Fortune 500 firms on the East Coast. OSI is now in the midst of developing a new payroll processing system, called PayNet, to replace the outmoded system that was originally created by the firm it acquired.

Once PayNet is developed, it will give users an integrated payroll solution with a simple, familiar graphical user interface. From an administrative perspective, it will allow OSI to reduce its manual data entry personnel, speed data compilation and analysis, and simplify administrative tasks and the updating of customer files for adds, moves, and changes. PayNet will serve as the backbone for OSI's service bureau payroll processing operations in the future; however, developmental and programming costs are proving to be higher than expected and will delay the roll-out of the final version of the new payroll engine. Beta testing of the production version of PayNet is being delayed from the second to the third quarter.

Additional Accounting Information

OSI's financial statements for 1995 appear in Exhibit 1. The following is a list of information pertinent to calculating a firm's EVA extracted from the footnotes to OSI's financial statements for 1995.

A. Inventories are stated principally at cost (last-in, first-out), which is not in excess of market. Replacement cost would be $2,796 greater than in 1994 and $3,613 greater than in 1995.

B. Deferred tax expense results from timing differences in recognizing revenue and expense for tax and reporting purposes.

C. On July 1, 1993, the Company acquired CompuPay, a payroll processing and reporting service firm. The acquisition was accounted for as a purchase, and the excess of cost over the fair value of net assets acquired was $109,200, which is being amortized on a straight-line basis over 12 years. One-half year of goodwill amortization was recorded in 1993.

D. Research and development costs related to software development are expensed as incurred. Software development costs are capitalized from the point in time when the technological feasibility of a piece of software has been determined until it is ready to be put on line to process customer data. The cost of purchased software, which is ready for service, is capitalized on acquisition. Software development costs and purchased software costs are amortized using the straight-line method over periods ranging from three to seven years. A history of the accounting treatment of software development costs and purchased software costs follows:

	EXPENSED	CAPITALIZED	AMORTIZED
1993	$166,430	$9,585	0
1994	211,852	5,362	$4,511
1995	89,089	18,813	5,111
	$467,371	$33,760	$9,622

EXHIBIT 1 OSI 1995 Financial Statements

OUTSOURCE, INC. BALANCE SHEET (DECEMBER 31)

ASSETS	1995	1994
Current Assets		
Cash	$144,724	$169,838
Trade and other receivables (net)	217,085	192,645
Inventories	15,829	23,750
Other	61,047	49,239
Total current assets	$438,685	$435,472
Noncurrent Assets		
Property, plant, and equipment	$123,135	$109,600
Software and development costs	33,760	14,947
Data processing equipment and furniture	151,357	141,892
Other noncurrent assets	3,650	8,844
	$311,902	$275,283
Less: Accumulated depreciation	85,018	57,929
Total noncurrent assets	$226,884	$217,354
Goodwill	88,200	96,600
Total assets	$753,769	$749,426
Liabilities and Shareholders' Equity		
Current Liabilities		
Short-term debt + current portion of long-term note	$ 27,300	$ 31,438
Accounts payable	67,085	57,483
Deferred income	45,050	32,250
Income taxes payable	19,936	12,100
Employee compensation and benefits payable	30,155	28,950
Other accrued expenses	28,458	27,553
Other current liabilities	17,192	29,769
Total current liabilities	$235,176	$219,543
Long-term debt less current portion	98,744	117,155
Deferred income taxes	6,784	4,850
Shareholders' Equity		
Cumulative nonconvertible preferred stock, $100 par value, authorized 5,000 shares, issued and outstanding 1,000 shares	100,000	100,000
Common stock, $1 par value; 300,000 shares authorized; 219,884 shares issued and outstanding	219,884	219,884
Additional paid-in capital	32,056	32,056
Retained earnings	61,125	55,938
Total shareholders' equity	413,065	$407,878
Total liabilities and shareholders equity	$753,769	$749,426

continued

	1995
Statement of Income for Year Ended December 31, 1995	
Operating revenue	$2,604,530
Less: Costs of services	1,466,350
Gross profit	$1,138,180
Less: Operating expenses	
Selling, general and administrative	902,388
Research and development	89,089
Other expense (income)	59,288
Write-off of goodwill and other intangibles	13,511
Earnings (loss) before interest and taxes	$73,904
Interest income	1,009
Interest expense	12,427
Earnings (loss) before income taxes	$62,486
Income tax provision	21,870
Earnings (loss)	$40,616
Statement of Cash Flows for Year Ended December 31, 1995	
Cash Flows from Operating Activities	
Net Earnings (Loss)	$40,616
Depreciation	21,978
Amortization of software & development costs	5,111
Decrease (Increase) in accounts receivables	(24,440)
Decrease (Increase) in inventories	7,921
Decrease (Increase) in other current assets	(11,808)
Increase (Decrease) in deferred income	9,602
Increase (Decrease) in accounts payable	12,800
Increase (Decrease) in income taxes payable	7,836
Increase (Decrease) in employee compensation	1,205
Increase (Decrease) in other accrued expenses	905
Increase (Decrease) in other current liabilities	(12,577)
Increase (Decrease) in deferred income taxes	1,934
Net cash provided by operating activities	$61,083
Cash Flows from Investing Activities	
Expended for capital assets	($36,619)
Goodwill amortized	8,400
Net cash used for investing activities	($28,219)
Cash Flows from Financing Activities	
Payment of long-term note	($4,138)
Payment of short-term note	(18,411)
Preferred dividends	(11,000)
Common stock dividends	(24,429)
Net cash used for financing activities	($57,978)
Net cash flows used ($25,114)	
Cash at beginning of year	$169,838
Cash at end of year	$144,724

Additional Financial Information

OSI's common stock is currently trading at $2.00 per share. A preferred dividend of $11 per share was paid in 1995, and the current price of the preferred stock is approximately at its par value. Other information pertaining to OSI's debt and stock follows:

		RATE
Short-term debt:	$8,889	8.0%
Long-term debt:		
Current portion	$18,411	10.0%
Long-term portion	$98,744	10.0%
Total long-term debt	$117,155	
Stock market risk-free rate (90-day T-bills)		5.0%
Expected return on the market		12.5%
Beta value of OSI's common stock		1.20
Growth rate of dividends		8.00%
Income tax		35.0%

Requirements

The management of OutSource, Inc., has asked you to prepare a report explaining EVA (economic value added) and MVA (market value added), how they are calculated, and how they compare with traditional measures of a firm's financial performance. OSI's management would also like to know the advantages and disadvantages of using EVA to evaluate the firm's performance on an ongoing basis as well as in assessing the performance of individual managers throughout its organization. As part of your report, calculate EVA and MVA from OutSource, Inc.'s, financial statements for 1995. Finally, OSI's management would like to know if EVA can be used as part of an incentive system for its employees and how they should proceed to implement such an incentive system at OutSource, Inc.

PURITY STEEL CORPORATION, 1995*

"I'm no expert in high finance," said Larry Hoffman, manager of the Denver branch for the Warehouse Sales Division of Purity Steel Corporation, to Harold Higgins, general manager of the division, "so it didn't occur to me that I might be better off by leasing my new warehouse instead of owning it. But I was talking to Jack Dorenbush over in Omaha the other day and he said that he's getting a lot better return on the investment in his district because he's in a leased building. I'm sure that the incentive compensation plan you put in last year is fair, but I didn't know whether it adjusted automatically for the difference between owning and leasing and I just thought I'd raise the question. There's still time to try to find someone to take over my construction contract and then lease the building to me when it's finished, if you think that's what I ought to do."

Purity Steel Corporation was an integrated steel producer with annual sales of about $4.5 billion in 1995. The Warehouse Sales Division was an autonomous unit that operated 21 field warehouses throughout the United States. Total sales of the division were approximately $225 million in 1995, of which roughly half represented steel products (rod, bar, wire, tube, sheet, and plate) purchased from Purity's Mill

*Doctoral Candidate Antonio Dávila and Professor Robert Simons prepared this updated case based on an earlier version.

Products Division. The balance of the Warehouse Sales Division volume was copper, brass, and aluminum products purchased from large producers of those metals. The Warehouse Sales Division competed with other producer-affiliated and independent steel warehousing companies and purchased its steel requirements from the Mill Products Division at the same prices paid by outside purchasers.

Harold Higgins was appointed general manager of the Warehouse Sales Division in mid-1994, after spending 12 years in the sales function with the Mill Products Division. Subject only to the approval of his annual profit plan and proposed capital expenditures by corporate headquarters, Higgins was given full authority for his division's operations, and was charged with the responsibility to "make the division grow, both in sales volume and in the rate of return on its investment." Prior to his arrival at division headquarters in St. Louis, the Warehouse Sales Division had been operated in a centralized manner; all purchase orders had been issued by division headquarters, and most other operating decisions at any particular warehouse had required prior divisional approval. Higgins decided to decentralize the management of his division by making each branch (warehouse) manager responsible for the division's activities in his or her geographic area.

In Higgins's opinion, one of the key features of his decentralization policy was an incentive compensation plan announced in late 1994 to become effective January 1, 1995. The description of the plan, as presented to the branch managers, is reproduced in Exhibits 1, 2, and 3. Monthly operating statements had been prepared for each warehouse for many years; implementing the new plan required only the preparation of balance sheets for each warehouse. Two major asset categories, inventories and fixed assets (buildings and equipment), were easy to attribute to specific locations. Accounts receivable were collected directly at Purity's central accounting department, but an investment in receivables equal to 35 days' sales (the average for the Warehouse Sales Division) was charged to each warehouse. Finally, a small cash fund deposited in a local bank was recorded as an asset of each branch. No current or long-term liabilities were recognized in the balance sheets at the division or branch level.

At the meeting in December 1994, when the new incentive compensation plan was presented to the branch managers, Higgins had said:

> Howard Percy [division sales manager] and I have spent a lot of time during the last few months working out the details of this plan. Our objective was to devise a fair way to compensate those branch managers who do a superior job of improving the performance in their areas. First, we reviewed our salary structure and made a few adjustments so that branch managers do not have to apologize to their families for the regular pay check they bring home. Next, we worked out a simple growth incentive to recognize that one part of our job is simply to sell steel, although we didn't restrict it to steel alone. But more importantly, we've got to improve the profit performance of this division. We established 5% as the return-on-investment floor representing minimum performance eligible for a bonus. As you know, we don't even do that well for 1994, but our budget for next year anticipates 5% before taxes. Thus, in 1995 we expect about a third of the branches to be below 5%—and earn no ROI bonus—while the other two-thirds will be the ones who really carry the weight. This plan will pay a bonus to all managers who help the division increase its average rate of return. We also decided on a sliding scale arrangement for those above 5%, trying to recognize that the manager who makes a 5% return on a $10 million investment is doing as good a job as one who makes a 10% return on only a half million dollars. Finally, we put a $50,000 limit on the ROI bonus because we felt that the bonus shouldn't exceed 50% of salary, but we can always make salary adjustments in those cases where the bonus plan doesn't seem to adequately compensate a branch manager for his or her performance.

EXHIBIT 1 Branch Managers' Compensation Plan, Warehouse Sales Division

I. Objectives

The Warehouse Sales Division has three major objectives:

A. To operate the Division and its branches at a profit.

B. To utilize efficiently the assets of the Division.

C. To grow.

This compensation plan is a combination of base salary and incentive earnings. Incentive earnings will be paid to those managers who contribute to the achievement of these objectives and in proportion to their individual performance.

II. Compensation Plan Components

There are three components to this plan:

A. Base Salary

Base salary ranges are determined for the most part on dollar sales volume of the district(s) in the prior year. The higher the sales volume, the higher the range to which the manager becomes eligible. The profitability of dollar sales or increases in dollar sales is an important consideration. Actual salaries will be established by the General Manager, Warehouse Sales Division, and the salary ranges will be reviewed periodically in order to keep this Division competitive with companies similar to ours.

B. Growth Incentive

If the district earns a net profit before federal income tax for the calendar year, the manager will earn $1,750 for every $500,000 of increased sales over the prior year. Proportionate amounts will be paid for greater or lesser growth.

C. Return-on-Investment Incentive

In this feature of the plan, incentive will be paid in relation to the size of investment and the return-on-investment. The manager will be paid in direct proportion to his effective use of assets placed at his disposal.

The main emphasis of this portion of the plan is on increasing the return at any level of investment, high or low.

III. Limitations on Return-on-Investment Incentive

A. No incentive will be paid to a manager whose branch earns less than 5% return on investment before federal taxes.

B. No increase in incentive payment will be made for performance in excess of 20% return on investment before federal taxes.

C. No payment will be made in excess of $50,000 regardless of performance.

IV. Calculations on Return-on-Investment Incentive

Exhibit 2 is a graphic presentation of this portion of the incentive. Since all possible levels of investment and return on investment cannot be detailed on the chart, exact incentive figures cannot be determined. However, a rough estimate can be made by:

A. Finding the approximate level of investment on the horizontal scale.

B. Drawing a line vertically from that point to the approximate return-on-investment percent.

C. Drawing a line horizontally from that point to the vertical scale which indicates the approximate incentive payment.

The exact amount of incentive can be determined from Exhibit 3 by the following procedure and example.

Example:

Investment:	$8,263,750
ROI:	7.3%

Step 1. Subtract 500,000 from the last six digits of investment figures if they are above 500,000.
EXAMPLE: 263,750 is below 500,000; nothing is subtracted.

Step 2. Divide the number from Step 1 by 500,000. The result is a percentage.
EXAMPLE: 263,750/500,000 = 0.5275

continued

Step 3. In the 1% column in Exhibit 3, take the difference between the next highest investment and next lowest investment.

EXAMPLE:	Investment	1%	Difference
	$8,000,000	$2,100	
			$50
	$8,500,000	$2,150	

Step 4. Multiply the result of Step 3 by the result of Step 2 and add to the 1% column figure for the next lowest investment.
EXAMPLE: $50 × 0.5275 = $26.37 + $2,100 = $2,126.37

Step 5. Multiply the result of Step 4 by the actual ROI%.
EXAMPLE: $2,126.37 × 7.3 = $15,522.54 Incentive Payment

After the telephone call from Larry Hoffman in May 1996, quoted in the opening paragraph, Harold Higgins called Howard Percy into his office and told him the question that Hoffman had raised. "We knew that we probably had some bugs to iron out of this system," Percy responded. "Let me review the Denver situation and we'll discuss it this afternoon."

At a meeting later that day, Percy summarized the problem for Higgins:

> As you know, Larry Hoffman is planning a big expansion at Denver. He's been limping along in an old multistory building with an inadequate variety of inventory, and his sales actually declined last year. About a year ago he worked up an RFE [request for expenditure]

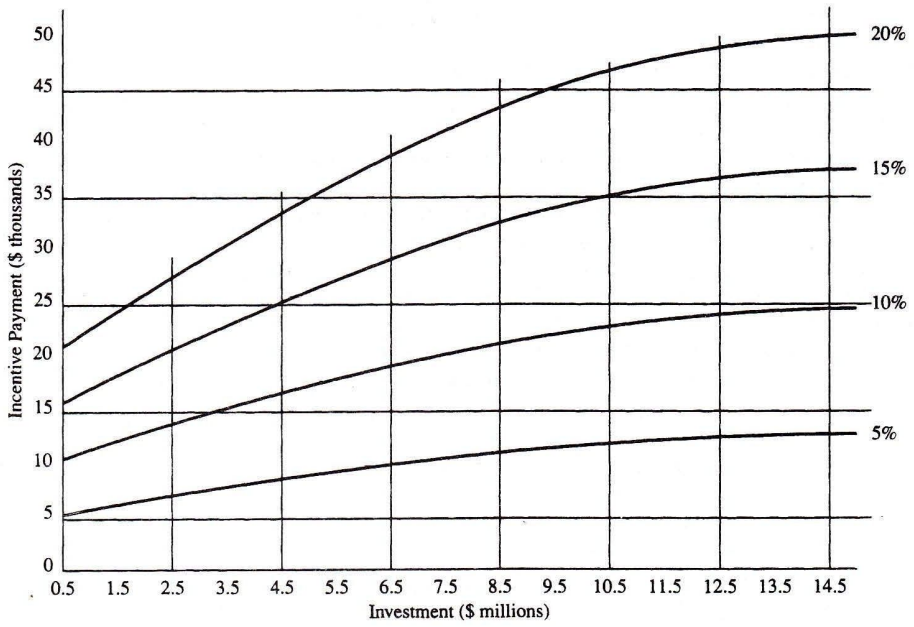

EXHIBIT 2 Incentive Payments at Various ROI Percentages

EXHIBIT 3 Incentive Payments at Various Investments and ROI Percentages

	ROI PERCENTAGE				
INVESTMENT	1%*	5%	10%	15%	20%
$ 500,000	1,045	5,225	10,450	15,675	20,900
1,000,000	1,125	5,625	11,250	16,875	22,500
1,500,000	1,205	6,025	12,050	18,075	24,100
2,000,000	1,285	6,425	12,850	19,275	25,700
2,500,000	1,365	6,825	13,650	20,475	27,300
3,000,000	1,445	7,225	14,450	21,675	28,900
3,500,000	1,525	7,625	15,250	22,875	30,500
4,000,000	1,605	8,025	16,050	24,075	32,100
4,500,000	1,685	8,425	16,850	25,275	33,700
5,000,000	1,750	8,750	17,500	26,250	35,000
5,500,000	1,810	9,050	18,100	27,150	36,200
6,000,000	1,875	9,375	18,750	28,125	37,500
6,500,000	1,935	9,675	19,350	29,025	38,700
7,000,000	2,000	10,000	20,000	30,000	40,000
7,500,000	2,050	10,250	20,500	30,750	41,000
8,000,000	2,100	10,500	21,000	31,500	42,000
8,500,000	2,150	10,750	21,500	32,250	43,000
9,000,000	2,200	11,000	22,000	33,000	44,000
9,500,000	2,250	11,250	22,500	33,750	45,000
10,000,000	2,300	11,500	23,000	34,500	46,000
10,500,000	2,325	11,625	23,250	34,875	46,500
11,000,000	2,350	11,750	23,500	35,250	47,000
11,500,000	2,375	11,875	23,750	35,625	47,500
12,000,000	2,400	12,000	24,000	36,000	48,000
12,500,000	2,425	12,125	24,250	36,375	48,500
13,000,000	2,450	12,250	24,500	36,750	49,000
13,500,000	2,475	12,375	24,750	37,125	49,500
14,000,000	2,500	12,500	25,000	37,500	50,000
14,500,000	2,500	12,500	25,000	37,500	50,000
15,000,000	2,500	12,500	25,000	37,500	50,000

**This column is for calculation purposes only. No incentive will be paid for less than 5% ROI.*

for a new warehouse which we approved here and sent forward. It was approved at corporate headquarters last fall, the contract was let, and it's to be completed by the end of this year. I pulled out one page of the RFE which summarizes the financial story [Exhibit 4]. Larry forecasts nearly a triple in his sales volume over the next eight years, and the project will pay out in about seven and a half years.

Here [Exhibit 5] is a summary of the incentive compensation calculations for Denver that I worked up after I talked to you this morning. Larry had a very high ROI last year, and received one of the biggest bonuses we paid. Against that background, I next worked up a projection of what his bonus will be in 1997 assuming that he moves into his new facility at the end of the year. As you can see, his ROI will drop from 17.3% to only 7.2%, and even on the bigger investment his bonus in 1997 will go down substantially.

Finally, I dug out the file on New Orleans where we're leasing the new warehouse that was completed a few months ago. Our lease there is a so-called operating lease, which

EXHIBIT 4 Warehouse Sales Division—Denver Branch: Forecast Additional Sales, Expenses, and After-Tax Profits Due to New Facility (Dollars in Thousands)

	ESTIMATED TO 12/31/95	1ST YEAR	2ND YEAR	3RD YEAR	4TH YEAR	5TH YEAR	6TH YEAR	7TH YEAR	8TH YEAR
Sales dollars	$ 12,300	1,565	2,620	5,125	7,870	11,020	15,250	18,635	22,670
Gross profit dollars	2,385	245	400	801	1,259	1,732	2,346	2,851	3,489
Service income	255	(125)	(120)	(110)	(100)	(90)	(80)	(80)	(80)
Total income	2,640	120	280	691	1,159	1,642	2,266	2,771	3,409
Less expenses excluding depreciation	(1,645)	(305)	(585)	(785)	(1,000)	(1,175)	(1,455)	(1,610)	(1,655)
Pretax net profit excluding depreciation	995	(185)	(305)	(94)	159	467	811	1,161	1,754
Additional mill profit		65	120	290	495	625	785	920	1,165
		(120)	(185)	196	654	1,092	1,596	2,081	2,919
Less relocation		(100)							
		(220)	(185)	196	654	1,092	1,596	2,081	2,919
Less depreciation		(53)	(53)	(53)	(53)	(53)	(53)	(53)	(53)
		(273)	(238)	143	601	1,039	1,543	2,028	2,866
Less 35% tax		96	83	(50)	(210)	(364)	(540)	(710)	(1,003)
Net income		(177)	(155)	93	391	675	1,003	1,318	1,863
Add back depreciation and relocation		153	53	53	53	53	53	53	53
Annual return of funds		(24)	(102)	146	444	728	1,056	1,371	1,916
Total return over 8 years (in dollars)		$5,534,549							
Capital expenditures required (in dollars):									
Land	$ 300,000								
Building	2,612,500								
Equipment	1,059,650								
Relocation expense	100,000								
Total		$4,072,150							
Payback period		7.3 years							

EXHIBIT 5 Return-on-Investment and Incentive Compensation (in Dollars)

	TOTAL WAREHOUSE SALES DIVISION 1995 ACTUAL	DENVER BRANCH		
		1995 ACTUAL	1997 PROJECTED OWNED BUILDING	1997 PROJECTED LEASED BUILDING
Investment at Year-end				
Land	$ 5,144,500	$ 124,500	$ 300,000	$ —
Buildings (net of depreciation)	13,950,500	324,500	2,568,960	—
Equipment (net of depreciation)	2,722,000	32,000	1,010,425	$1,010,425
Subtotal	21,817,000	481,000	3,879,385	1,010,425
Cash fund	1,382,500	50,000	50,000	50,000
Accounts receivable	22,517,500	1,241,500	1,386,500	1,386,500
Inventories	55,295,500	3,132,000	3,466,250	3,466,250
Total year-end investment	101,012,500	4,904,500	8,782,135	5,913,175
Investment at start of year	99,795,500	5,263,500	8,395,650	5,483,150
Average investment during year	100,404,000	5,084,000	8,588,895	5,698,150
Profit before depreciation & taxes	4,147,310	917,870	710,000	710,000
Less: depreciation	(648,705)	(40,000)	(92,765)	(49,225)
Less: lease payments	(420,565)	—	—	$ (243,200)
Net pretax profit	$ 3,078,040	$ 877,870	$ 617,235	$ 417,575
Return on investment	3.07%	17.27%	7.19%	7.33%
Incentive Compensation				
Sales volume increase (decrease)		$ (870,000)	$1,565,000	$1,565,000
Bonus @ $1,750 per $500,000	—	—	5,478	5,478
ROI bonus:				
Base investment		5,000,000	8,500,000	5,500,000
Value for 1% column, Exhibit 3		1,750	2,150	1,810
Difference to next base		60	50	65
Interpolated portion		10.08	8.89	25.76
Total value per percentage point		1,760	2,159	1,836
ROI bonus		30,392	15,515	13,453
Total incentive compensation		$ 30,392	$ 20,993	$ 18,931

Assumptions used for 1997 projections at Denver:

1. Old facility and equipment sold at the end of 1996, proceeds remitted to corporate headquarters.
2. Depreciation on new facilities in 1997 is $43,540 (60 years, straight line) and $49,225 on equipment (various lives, straight line).
3. Year-end investment in receivables and inventory will approximate 1995 relationship: receivables at 10% of annual sales, inventories at 25% of annual sales.
4. Average total investment assumes that new fixed assets are acquired on December 31, 1996, and that other assets at that date are the same as at the end of 1995.
5. Profit taken from RFE (Exhibit 4) as $995,000 less $185,000 first-year decline, less $100,000 relocation expense. Additional mill profit of $65,000 does not reflect on divisional books and was used only at corporate headquarters for capital expenditures evaluation purposes.

means that we pay the insurance, taxes, and maintenance just as if we owned it. The lease runs for 20 years with renewal options at reduced rates for two additional 10-year periods. Assuming that we could get a similar deal for Denver, and adjusting for the difference in the cost of the land and building at the two locations, our lease payments at Denver during the first 20 years would be just under $250,000 per year. Pushing that through the bonus formula for Denver's projected 1997 operations shows an ROI of 7.3%, but Larry's bonus would be about 15% less than if he was in an owned building.

"On balance, therefore," Percy concluded, "there's not a very big difference in the bonus payment as between owning and leasing, but in either event Larry will be taking a substantial cut in his incentive compensation."

As the discussion continued, Larry Hoffman and Howard Percy revisited the formula for ROI:

$$\text{Return-on-investment} = \frac{\text{net income}}{\text{investment in operating assets}}$$

$$= \frac{\text{net income}}{\text{sales}} \times \frac{\text{sales}}{\text{investment in operating assets}}$$

$$= (\text{return on sales}) \times (\text{asset turnover})$$

Both wondered whether the proposed bonus plan needed further revision or clarification.

Western Chemical Corporation: Divisional Performance Measurement*

The fact is that we really have not yet figured out the best way to measure and report on the performance of some of our foreign operations. Because of different ownership arrangements and the use of local financing, when we use conventional accounting principles and standards, we often get financial reports that seem to contradict what we believe to be the true results of operations. This creates problems within the company because people who are not familiar with particular operations see the reports and draw erroneous conclusions about how this one or that one is performing relative to others.

Now that you are beginning to get questions from shareholders and analysts about how some of these investments are performing, I realized that Cynthia and I had better brief you on what some of the problems are that we have with division performance measurement.

Stan Rogers, president of Western Chemical Corporation (WCC), was meeting with Samantha Chu, recently appointed director of Investor Relations, and Cynthia Sheldon, who had recently been appointed vice president and controller. Chu had that morning received an inquiry from a well-known chemical industry analyst who had some fairly specific questions about some of the company's investments in Europe and the Far East. When she questioned Sheldon, Cynthia suggested that they meet with Rogers to examine some of the issues that Rogers and Sheldon had been discussing, so that Chu could answer the analyst's requests more accurately.

The information on the financial performance of WCC's foreign operations was prepared by the same accountants who maintained the company's accounts and who prepared its quarterly and annual reports. A

*Professor William J. Bruns and Professor Roger Atherton of Northeastern University prepared this case.

single database for all accounting had been established some years earlier in the belief that it could serve all accounting needs of both managers and those external to the company. A common chart of accounts and accounting policies was used throughout the company and in all of its subsidiaries.

A variety of new alliances and ownership arrangements had been used in recent international ventures to speed entry to new international markets and to minimize investment and risk. Because of these, Rogers had become convinced that some of the reports the accountants were preparing about some of the ventures could be quite misleading. It was for that reason that he and Sheldon were already discussing alternative ways to measure divisional performance, and that Sheldon thought Chu should be brought into their discussion before trying to answer the analyst's queries.

The Company and International Ventures

In 1995, WCC was a 75-year-old, Fortune 300 chemical company. Its largest business marketed chemicals and chemical programs for water and waste treatment. Additional products and chemical services targeted manufacturing processes where the quality of a customer's product could be enhanced. The company was proud of its industry reputation for quality of its solutions to customer problems and exceptional service to customers. WCC had 4,900 employees and operated more than 35 plants in 19 countries. Financial information by geographic area is shown in Exhibit 1.

WCC manufactured in many different countries using a variety of ownership arrangements. Some plants were wholly owned manufacturing sites, and others were operated as joint ventures with local affiliates. Three of these plants were useful illustrations as background for discussing the problems the company faced in measuring the performance of its international ventures. All had been constructed and had come onstream in the 1991–1993 period.

A chemical plant on the outskirts of Prague in the Czech Republic was operated as a joint venture with a local partner. Total investment in the plant was between $35 and $40 million, including working capital. WCC retained a controlling interest in the joint venture and operated the plant. The company had invested about $5 million in the venture, and the balance of the investment had come from the venture partner and local borrowing.

A similar plant in Poland was 100% owned, and the total capital investment of $40 to $45 million including working capital had been funded by WCC. The venture itself had no external debt.

A third plant in Malaysia was also 100% owned. The plant was built to add capacity in the Pacific region, but the plant was considered part of the company's production capacity serving the global market. WCC had invested approximately $35 million in this Malaysian plant.

Measuring the Performance of Three International Ventures

Cynthia Sheldon had prepared some exhibits using representative numbers, and she began by explaining the income statement for the venture in the Czech Republic to Samantha Chu.

> The first case is Prague. It is pretty much a classic situation. What I have put together here is a basic income statement for the facility for the first three quarters of 1995 (Exhibit 2). What this helps to show is how the difference between the ownership structures in Prague and Poland lead to apparent differences in reported income.
>
> This is a nine-month year-to-date income statement for the joint venture. Earnings before interest and taxes of $869,000 is what we

EXHIBIT 1 Financial Information by Geographic Area

Western Chemical Corporation (WCC) is engaged in the worldwide manufacture and sale of highly specialized service chemical programs. This includes production and service related to the sale and application of chemicals and technology used in water treatment, pollution control, energy conservation, and other industrial processes as well as a super-absorbent product for the disposable diaper market.

Within WCC, sales between geographic areas are made at prevailing market prices to customers minus an amount intended to compensate the sister WCC company for providing quality customer service.

Identifiable assets are those directly associated with operations of the geographic area. Corporate assets consist mainly of cash and cash equivalents; marketable securities; investments in unconsolidated partnerships, affiliates, and leveraged leases; and capital assets used for corporate purposes.

GEOGRAPHIC AREA DATA (IN MILLIONS)

	1994	1993	1992
Sales			
North America	$ 886.9	$ 915.1	$ 883.7
Europe	288.9	315.6	346.5
Latin America	72.2	66.4	60.7
Pacific	127.7	116.7	108.2
Sales between areas	(30.1)	(24.4)	(24.6)
	$1,345.6	$1,389.4	$1,374.5
Operating Earnings			
North America	$ 181.6	$ 216.9	$ 211.3
Europe	(10.2)	41.8	48.9
Latin America	9.3	11.4	10.0
Pacific	14.3	14.4	14.4
Expenses not allocated to areas	(20.3)	(21.6)	(24.3)
	$ 174.7	$ 262.9	$ 260.3
Identifiable Assets			
North America	$ 485.2	$ 566.6	$ 562.2
Europe	245.2	227.4	225.5
Latin America	66.9	45.4	42.7
Pacific	147.9	126.3	124.7
Corporate	337.0	246.7	395.5
	$1,282.2	$1,212.4	$1,350.6

Amounts for North America sales in the tabulation above include exports to the following areas:

Latin America	$21.9	$19.2	$16.0
All other	7.3	13.0	12.0

The decrease in operating earnings in 1994 was mainly attributable to the pretax provision of $68 million for consolidation expenses. Of that amount, approximately $34 million was included in European operations.

would normally report internally for a wholly owned subsidiary, and that is what would be consolidated. As you proceed down the income statement, there is a charge for interest because we have the ability to leverage these joint ventures fairly highly, anywhere from 60% to 80%. This is interest on external debt—cash going out. We account for it this way because

EXHIBIT 2 9/95 Year-to-Date Income from Czech Republic Joint Venture (in Thousands)

Revenues	$11,510
Cost of sales	(9,541)
Selling, technical expenses, and administrative expenses	(891)
Other income/other charges	(209)
Income before interest and taxes	$ 869
Interest	(1,120)
Fees	(867)
Foreign exchange	(60)
Income (loss)	$(1,178)
Minority interest	532)
Taxes	—
Net income (loss)	$ (646)

the venture has its own Board of Directors, even though we have management control and retain much of the ability to influence operations, which is not always the case. The fees of $867,000 are coming to WCC under a technical agreement that we have with the joint venture, as a percentage of revenues. In this case, we have put a minority interest line to get down to a net income for WCC. That is the actual income that we would report to the outside world.

We are reporting externally a loss of $646,000 on this business, when in truth, relative to our other businesses which are reported before interest charges and before fees, it is contributing to our corporate income. This report makes it appear that we are operating at a loss of just under $1.2 million, $532,000 of which is the share of our joint venture partner, and our share is the $646,000.

Stan Rogers described the investment:

In this business WCC has invested, in addition to its technical knowledge and technology, $5 million of its money. In addition, we do not guarantee the debt, which is off balance sheet so far as WCC is concerned. One other way that we can look at these businesses is to look at cash flows to WCC, and cash return on investment to WCC. When we do that, because of the $867,000 in fees which are paid to WCC, there is some return. Although the return is small, it is reasonable at this stage of development of a new business. This business, because of the fees, has been in a loss position, but because of the fees it has shown a positive cash return on investment to WCC.

Sheldon continued:

Our actual return consists of the fees paid to WCC, or $867,000, and our share of the reported operating losses, for a net income of $221,000. That is the return on our approximately $5 million investment. If the subsidiary were wholly owned with a total investment of approximately $40 million, we would be looking at the $869,000 income before interest and taxes, to which we might decide to apply a tax, on the investment of $40 million. That is how we measure the performance of wholly owned divisions.

One of the reasons that this report appears as it does was that, a few years ago, then current management decided to work from a single data base and to have one group prepare both the external financial reports and the management reports for internal use. It was a fine decision, except for the fact that the external reporters did not have the interest or ability to report what was actually going on in the affiliates.

Now, let's look at the report for our subsidiary in Poland (Exhibit 3). This plant is 100%

EXHIBIT 3 9/95 Year-to-Date Income from Poland Plan (in Thousands)

Revenues	$32,536
Cost of sales	(28,458)
Selling, technical expenses, and administrative expenses	(2,529)
Other income/other charges	(121)
Income before interest and taxes	$ 1,428
Interest	—
Fees	—
Foreign exchange	34
Income	$ 1,462
Minority interest	—
Taxes	—
Net income	$ 1,462

owned, so we do not report any interest or fees. The total capital investment was funded by the company and totaled about $40 or $45 million including working capital. There is no external debt or minority interest and no fees. The other charges include the amortization of interest that was capitalized during the construction of the plant. The cost of sales includes some profit from materials that are purchased from other plants, but the prices paid are reasonable if you compare them with competitors' prices. This is another interesting problem that we struggle with, since we are probably reporting $2 or $3 million in profits elsewhere because of these plant purchases. But consider how this would look if we were deducting interest on $30 million of debt, and fees of 8% of revenues as we do in the case of the Prague affiliate. We would then be showing a loss from the business of about $3 million. The accountants do not consider this, and their report makes it appear that the business was doing just fine.

Samantha Chu spoke up:

Your explanation implies that there must be some other measures of performance that tell you how these plants are performing. What are those?

Sheldon:

We use budgets and the original business plans. We look at the performance against those expectations.

Rogers:

Also, although we do not monitor cash flows to the degree that we ought to, we have in our head the cash contribution compared to the amounts that we have invested. In the Czech Republic we can look ahead and see that in the future we will have a 35% to 45% cash on cash return. Poland is draining cash out of us at a remarkable rate, and we have not yet figured out a way to stop it. There are still a lot of unresolved business problems. Compared to the original business plan we have not been able to generate the revenues that were forecasted and the costs have been higher. We do not present cash flow reports to our managers, so these analyses all have to be done in our heads. The information we would need to bring this about formally is all available, but we just have not asked anyone to do it.

What we have are three new plants built at about the same time, each having very complex and different financial reporting issues that lead you to have completely different views of the business. Cynthia, show Samantha the report on the plant in Malaysia and what happens when we introduce an economic value added (EVA) approach. . . .

Sheldon:

The third plant was built to supply a high margin part of our business. That part of our business is truly a global business in that we can actually ship our product from any of several plants to anywhere in the world. When the decision to build a plant in Malaysia was made we were running out of capacity. We made a strategic decision that we wanted to be located in Malaysia, but this was to be part of our production facilities to serve the global market. We do not usually build a separate plant to supply only the high margin products. The volumes sold and shipped tend to be small, and adding the technostructure of technical service and laboratories to a plant makes the economics somewhat unfavorable unless there are several other units in the same plant producing higher volume products to help carry the costs of these necessary add-ons.

Looking at the column labeled "Region of Manufacture," you can see the sales and profitability of the manufacturing facility in Malaysia [Exhibit 4]. It sells $12 million worth of product, and you can see that with the costs being what they are, the plant is losing a lot of money. The capital charge that we show is an attempt to get a measure of the economic value added by the plant. As was the case with Poland, this report does not include any interest on the total investment of almost $35 million, or any fees.

The EVA approach uses a 12% capital charge based on the assets employed such as working capital, including accounts payable, and fixed capital. Depreciation is included in cost of sales. I think the way we use EVA is very simple, exactly the way it is employed by other folks, but some get much more sophisticated about allocations, capitalized

EXHIBIT 4 9/95 Year-to-Date Income from Malaysia and Southeast Asia (in Thousands)

	REGION OF MANUFACTURE	REGION OF SALE
Revenues	$ 12,020	$ 36,052
Cost of sales	(12,392)	(26,648)
Selling, technical expenses, and administrative expenses	(3,775)	(4,845)
Other income/other charges	(685)	(285)
Income before interest and taxes	$ (4,832)	$ 4,274
Taxes (40%)	—	(1,710)
Net income	$ (4,832)	$ 2,564
Capital charges	(3,600)*	(6,686)†
Economic value added	$ (8,432)	$ (4,122)

\$30,000 @ 12% = \$3,600.
†(\$110,000 @ 12%) × [(36,052 − 12,020)/102,800] + (30,000 @ 12%) = \$6,686.

research and development, and the like. We do not do that.

In addition we have recently started to look not just at "region of manufacture" but also at "region of sale," primarily to get an understanding of whether or not a market is attractive. The second column labeled "Region of Sale" is all product being sold in Southeast Asia even if it is being manufactured outside, so it includes the cost of manufacturing product, shipping it, and delivering it to customers in the region. On that basis the earnings before interest and taxes are about \$4 million. If we wanted to get down to economic value added we would need to deduct taxes and a capital charge and the economic value added would still be negative but not so much so that we could not develop some reasonable strategies to fix it compared to the region of manufacture measure which is pretty daunting.

Stan Rogers interjected:

There is an incremental layer of complexity here in that this plant is starting to produce for the rest of the world because we are running out of capacity and are using this plant as the swing plant. Those shipments will show up in the region of manufacture numbers, but they will not show up in the region of sale numbers. We have not yet sorted this out, but my suspicion is that you cannot look at it this way and get an intriguing view—a solid view—of the business. We probably have to look at the whole system and analyze the incremental revenues and costs of the whole business.

The reason why I see this as another iteration of the same or complexity of the same problem, is that in Prague and Poland we had the different corporate structures that led to different accounting treatments of interest and fees, which gave us completely warped views on what was going on in the business. This presents the same challenge but adds the dimensions of region of manufacture and region of sale accounting and the need for total system analysis.

Samantha Chu broke the silence of the pause which followed: "Have you found a solution to the problem yet?" Rogers answered:

We understand it. We have not institutionalized a management reporting system that would lead someone who is intelligent but does not understand the background to understand what is really going on. We do not have a management reporting system in place that shows the relative performance of the three plants in a clear manner. On this basis the system does not work.

Some Possible Solutions to the Performance Measurement Problem

Cynthia Sheldon began a discussion of some possible solutions to the division performance measurement problem:

> We are scratching away at a solution, perhaps using the concept of economic value added. We probably will also separate the people who are preparing the managerial reports from those who are concerned with external reporting, even though both groups will be working from the same databases. Until now, when we report to external public relations and to the Chairman about the performance of the business, we have used external reporting standards and bases. I have concluded that to get away from that we have to have a separate group engaged with the businesses.

Stan Rogers chimed in:

> From a business standpoint we understand this, we think. When we want to do a presentation we will do a one time analysis, pulling the numbers together that we think best reflect the situation. But we do not have a disciplined, repetitive reporting system that produces an analysis of how these businesses are doing in any other way than the way the external reporting system does it. That is an issue of priorities. We just do not have the time or resources to fix the system now. It is not that we do not understand the problem, or that we could not do it. I think we understand the problem, and we understand the intellectual underpinnings of a solution.
>
> I know that does not help you in responding to the analyst's questions today, so you will just have to respond very carefully.

Cynthia Sheldon continued:

> We are really just beginning to use EVA as a tool to get people to understand the issues. There is nothing wrong with using cash flow, return on net assets, and other familiar financial measures. There are always problems with any single financial measure, but right now in order to get people to focus it is easier to have one number and EVA is the most effective single number. We know that in order to make the business viable in our Southeast Asia region we have to go down a path of expanding the business. When you expand, EVA goes down, so if you focus on only that measure you risk saying that I do not want to do that. That is not the right answer. We are already seeing that kind of problem. But at least EVA gets people to focus on the cost of the capital associated with the income that they earn, and it gets more of a sense of cash flow, but we do not rely solely on it.

Stan Rogers summed up his feelings on the division performance measurement problems, echoing some of the conclusions of Sheldon:

> You know, I would say the same thing. There is not a planning department here that thinks about EVA and all that kind of stuff. We probably could use better numbers, but driving the business off any single number probably would not work.

Required

(1) What is causing the problems in measuring division performance at Western Chemical Corporation?
(2) Are there alternative methods for measuring division performance that would avoid the problems that WCC management is having with the methods that they have been using?
(3) Evaluate the approach to using economic value added (EVA) that WCC management is discussing and using experimentally. What are the strengths and weaknesses of this approach?
(4) How should the performance of divisions of WCC be measured?
(5) What should Samantha Chu tell the analyst if he asks specifically about the investments in the Czech Republic, Poland, and Malaysia?