ACCOUNTING AND FINANCE

Corporate Finance FEFU 2016

BALANCE SHEET

BALANCE SHEET

Financial statement that shows the value of the firm's assets and liabilities at a particular time.

BALANCE SHEET FOR XXX, INC. (Figures in millions of dollars)

Assets	2 016	2 015	Liabilities and Shareholders' Equity	2 016	2 015
Current assets			Current liabilities		
Cash and equivalents	311	1 928	Debt due for repayment	3 921	0
Marketable securities	83	955	Accounts payable	3 870	3 617
Receivables	2 453	2 150	Other current liabilities	123	640
Inventories	1 016	732	Total current liabilities	7 914	4 257
Other current assets	499	486	Long-term debt	4 028	4 946
Total current assets	4 362	6 251	Other long-term liabilities	4 317	3 962
Fixed assets			Total liabilities	16 259	13 165
Property, plant, and equipment	13 110	11 294	Shareholders' equity		
Less accumulated depreciation	5 792	5 033	Common stock and other paid-in capital	1 195	1 343
Net fixed assets	7 318	6 261	Retained earnings	5 206	5 593
Intangible assets	8 996	5 855	Total shareholders' equity	6 401	6 936
Other assets	1 984	1 734	Total liabilities and shareholders' equity	22 660	20 101
Total assets	22 660	20 101			

THE MAIN BALANCE SHEET ITEMS

Current assets		Current liabilities
Cash & securities		Payables
Receivables		Short-term debt
Inventories		
+	=	+
Fixed assets		Long-term liabilities
Tangible assets		+
Intangible assets		Shareholders' equity

BOOK VALUES AND MARKET VALUES

Throughout this material we will frequently make a distinction between the book values of the assets shown in the balance sheet and their market values.

Items in the balance sheet are valued according to **generally accepted accounting principles,** commonly called **GAAP.** These state that assets must be shown in the balance sheet at their *historical cost* adjusted for depreciation. These **book values** are therefore "backward-looking" measures of value. They are based on the past cost of the asset, not its current market price or value to the firm. For example, suppose that a printing press cost McGraw-Hill $1 million 2 years ago, but that in today's market such presses sell for $1.3 million. The book value of the press would be less than its market value and the balance sheet would understate the value of McGraw-Hill's assets.

Or consider a specialized plant that Intel develops for producing special-purpose computer chips at a cost of $100 million. The book value of the plant is $100 million less depreciation. But suppose that shortly after the plant is constructed, a new chip makes the existing one obsolete. The market value of Intel's new plant could fall by 50 percent. In this case market value would be less than book value.

The difference between book value and market value is greater for some assets than for others. It is zero in the case of cash but potentially very large for fixed assets where the accountant starts with the initial cost of the fixed assets and then depreciates that figure according to a prespecified schedule. The purpose of depreciation is to allocate the original cost of the asset over its life, and the rules governing the depreciation of asset values do not reflect actual loss of market value. As a result, the book value of fixed assets often is much higher than the market value, but often it is less.

The same goes for the right-hand side of the balance sheet. In the case of liabilities the accountant simply records the amount of money that you have promised to pay. For short-term liabilities this figure is generally close to the market value of that promise. For example, if you owe the bank $1 million tomorrow, the accounts show a book liability of $1 million. As long as you are not bankrupt, that $1 million is also roughly the value to the bank of your promise. But now suppose that $1 million is not due to be repaid for several years. The accounts still show a liability of $1 million, but how much your debt is worth depends on what happens to interest rates. If interest rates rise after you have issued the debt, lenders may not be prepared to pay as much as $1 million for your debt; if interest rates fall, they may be prepared to pay more than $1 million.[2] Thus the market value of a long-term liability may be higher or lower than the book value.

To summarize, the market values of neither assets nor liabilities will generally equal their book values. Book values are based on historical or *original* values. Market values measure *current* values of assets and liabilities.

The difference between book value and market value is likely to be greatest for shareholders' equity. The book value of equity measures the cash that shareholders have contributed in the past plus the cash that the company has retained and reinvested in the business on their behalf. But this often bears little resemblance to the total market value that investors place on the shares.

We will often find it useful to think about the firm in terms of a *market-value balance sheet.* Like a conventional balance sheet, a market-value balance sheet lists the firm's assets, but it records each asset at its current market value rather than at historical cost less depreciation. Similarly, each liability is shown at its market value.

The difference between the market values of assets and liabilities is the market value of the shareholders' equity claim. The stock price is simply the market value of shareholders' equity divided by the number of outstanding shares.

Market- versus Book-Value Balance Sheets

Jupiter has developed a revolutionary auto production process that enables it to produce cars 20 percent more efficiently than any rival. It has invested $10 billion in producing its new plant. To finance the investment, Jupiter borrowed $4 billion and raised the remaining funds by selling new shares of stock in the firm. There are currently 100 million shares of stock outstanding. Investors are very excited about Jupiter's prospects. They believe that the flow of profits from the new plant justifies a stock price of $75.

If these are Jupiter's only assets, the book-value balance sheet immediately after it has made the investment is as follows:

BOOK-VALUE BALANCE SHEET FOR JUPITER MOTORS
(Figures in billions of dollars)

Assets		Liabilities and Shareholders' Equity	
Auto plant	$10	Debt	$4
		Shareholders' equity	6

Investors are placing a *market value* on Jupiter's equity of $7.5 billion ($75 per share times 100 million shares). We assume that the debt outstanding is worth $4 billion.[3] Therefore, if you owned all Jupiter's shares and all its debt, the value of your investment would be 7.5 + 4 = $11.5 billion. In this case you would own the company lock, stock, and barrel and would be entitled to all its cash flows. Because you can buy the entire company for $11.5 billion, the total value of Jupiter's assets must also be $11.5 billion. In other words, the market value of the assets must be equal to the market value of the liabilities plus the market value of the shareholders' equity.

We can now draw up the market-value balance sheet as follows:

MARKET-VALUE BALANCE SHEET FOR JUPITER MOTORS
(Figures in billions of dollars)

Assets		Liabilities and Shareholders' Equity	
Auto plant	$11.5	Debt	$4
		Shareholders' equity	7.5

[3] Jupiter has borrowed $4 billion to finance its investment, but if the interest rate has changed in the meantime, the debt could be worth more or less than $4 billion.

Notice that the market value of Jupiter's plant is $1.5 billion more than the plant cost to build. The difference is due to the superior profits that investors expect the plant to earn. Thus in contrast to the balance sheet shown in the company's books, the market-value balance sheet is forward-looking. It depends on the benefits that investors expect the assets to provide.

Is it surprising that market value exceeds book value? It shouldn't be. Firms find it attractive to raise money to invest in various projects because they believe the projects will be worth more than they cost. Otherwise, why bother? You will usually find that shares of stock sell for more than the value shown in the company's books.

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a. What would be Jupiter's price per share if the auto plant had a market value of $14 billion?
b. How would you reassess the value of the auto plant if the value of outstanding stock were $8 billion?

INCOME STATEMENT

Financial statement that shows the revenues, expenses, and net income of a firm over a period of time.

Income Statement

(Figures in millions of dollars)	
Net sales	$22,348
Cost of goods sold	9,330
Other expenses	291
Selling, general, and administrative expenses	8,912
Depreciation	1,234
Earnings before interest and taxes (EBIT)	2,581
Net interest expense	321
Taxable income	2,260
Taxes	270
Net income	1,990
Allocation of net income	
Addition to retained earnings	1,233
Dividends	757

$$\begin{aligned} \text{EBIT} &= \text{total revenues} - \text{costs} - \text{depreciation} \\ &= 22{,}348 - 18{,}533 - 1{,}234 \\ &= \$2{,}581 \text{ million} \end{aligned}$$

To calculate the cash produced by the business it is necessary to *add back* the depreciation charge (which is not a cash payment) and to *subtract* the expenditure on new capital equipment (which is a cash payment).

The cash that the company *receives* is equal to the sales shown in the income statement less the increase in unpaid bills:

Period:	2	3
Sales	100	0
– Change in receivables	100	(100)
= Cash received	0	+100

The cash *outflow* is equal to the cost of goods sold, which is shown in the income statement, plus the change in inventories:

	Period:	1	2
	Costs of goods sold	0	60
+	Change in inventories	60	(60)
=	Cash paid out	+ 60	0

STATEMENT OF CASH FLOWS Financial statement that shows the firm's cash receipts and cash payments over a period of time.

cash flow account

(Figures in millions of dollars)	
Cash provided by operations	
Net income	$1,990
Noncash expenses	
Depreciation expense	1,234
Other noncash expenses	382
Changes in working capital	
Decrease (increase) in inventories	(284)
Decrease (increase) in accounts receivable	(303)
Increase (decrease) in accounts payable	253
Other	(60)
Cash provided by operations	3,212
Cash provided (used) by investments	
Additions to property, plant, and equipment	(1,271)
Acquisitions of subsidiaries	(4,520)
Other investments, net	772
Cash provided (used) by investments	(5,019)
Cash provided (used) by financing activities	
Additions to (reductions in) debt	2,762
Net issues of stock	(1,815)
Dividends	(757)
Cash provided (used) by financing activities	190
Net increase in cash and marketable securities	(1,617)

		In millions
	Cash flow from operations	$3,212
–	Cash flow for new investment	– 5,019
+	Cash raised by new financing	+ 190
=	Change in cash balance	– 1,617

Financial Ratios Pepsi Example

(figures in millions of dollars)	
Net sales	$22,348
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Earnings before interest and taxes (EBIT)	2,581
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Net income	1,990
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We will describe and calculate four types of financial ratios:

- *Leverage ratios* show how heavily the company is in debt.
- *Liquidity ratios* measure how easily the firm can lay its hands on cash.
- *Efficiency* or *turnover ratios* measure how productively the firm is using its assets.
- *Profitability ratios* are used to measure the firm's return on its investments.

Debt Ratio. Financial leverage is usually measured by the ratio of long-term debt to total long-term capital. Here "long-term debt" should include not just bonds or other borrowing, but also the value of long-term leases.[3] Total long-term capital, sometimes called *total capitalization,* is the sum of long-term debt and shareholders' equity. Thus for Pepsi

$$\text{Long-term debt ratio} = \frac{\text{long-term debt}}{\text{long-term debt + equity}}$$

$$= \frac{4{,}028}{4{,}028 + 6{,}401} = .39$$

This means that 39 cents of every dollar of long-term capital is in the form of long-term debt. Another way to express leverage is in terms of the company's debt-equity ratio:

$$\text{Debt-equity ratio} = \frac{\text{long-term debt}}{\text{equity}} = \frac{4{,}028}{6{,}401} = .63$$

Times Interest Earned Ratio. Another measure of financial leverage is the extent to which interest is covered by earnings. Banks prefer to lend to firms whose earnings are far in excess of interest payments. Therefore, analysts often calculate the ratio of earnings before interest and taxes (EBIT) to interest payments. For Pepsi,

$$\text{Times interest earned} = \frac{\text{EBIT}}{\text{interest payments}} = \frac{2{,}581}{321} = 8.0$$

Cash Coverage Ratio. We have pointed out that depreciation is deducted when calculating the firm's earnings, even though no cash goes out the door. Thus, rather than asking whether *earnings* are sufficient to cover interest payments, it might be more interesting to calculate the extent to which interest is covered by the cash flow from operations. This is measured by the cash coverage ratio. For Pepsi,

$$\text{Cash coverage ratio} = \frac{\text{EBIT + depreciation}}{\text{interest payments}} = \frac{2{,}581 + 1{,}234}{321} = 11.9$$

A firm repays $10 million par value of outstanding debt and issues $10 million of new debt with a lower rate of interest. What happens to its long-term debt ratio? What happens to its times interest earned and cash coverage ratios?

LIQUIDITY Ability of an asset to be converted to cash quickly at low cost.

Net Working Capital to Total Assets Ratio. We have seen that current assets are those that the company expects to meet in the near future. The difference between the current assets and current liabilities is known as *net working capital.* It roughly measures the company's potential reservoir of cash. Net working capital is usually positive. However, Pepsi has some large short-term debt that needs to be repaid in the coming year, so its net working capital is negative:

$$\text{Net working capital} = 4{,}362 - 7{,}914 = -3{,}552$$

Managers often express net working capital as a proportion of total assets. For Pepsi,

$$\frac{\text{Net working capital}}{\text{Total assets}} = \frac{-3{,}552}{22{,}660} = -.16$$

Current Ratio. Another measure that serves a similar purpose is the current ratio:

$$\text{Current ratio} = \frac{\text{current assets}}{\text{current liabilities}} = \frac{4{,}362}{7{,}914} = .55$$

So Pepsi has 55 cents in current assets for every $1 in current liabilities.

Quick (or Acid-Test) Ratio. Some assets are closer to cash than others. If trouble comes, inventory may not sell at anything above fire-sale prices. (Trouble typically comes *because* the firm can't sell its finished-product inventory for more than production cost.) Thus managers often exclude inventories and other less liquid components of current assets when comparing current assets to current liabilities. They focus instead on cash, marketable securities, and bills that customers have not yet paid. This results in the quick ratio:

$$\text{Quick ratio} = \frac{\text{cash + marketable securities + receivables}}{\text{current liabilities}} = \frac{311 + 83 + 2{,}453}{7{,}914} = .36$$

Cash Ratio. A company's most liquid assets are its holdings of cash and marketable securities. That is why analysts also look at the cash ratio:

$$\text{Cash ratio} = \frac{\text{cash + marketable securities}}{\text{current liabilities}} = \frac{311 + 83}{7{,}914} = .05$$

A low cash ratio may not matter if the firm can borrow on short notice. Who cares whether the firm has actually borrowed from the bank or whether it has a guaranteed line of credit that lets it borrow whenever it chooses? None of the standard liquidity measures takes the firm's "reserve borrowing power" into account.

Interval Measure. Instead of looking at a firm's liquid assets relative to its current liabilities, it may be useful to measure whether liquid assets are large relative to the firm's regular outgoings. We ask how long the firm could keep up with its bills using only its cash and other liquid assets. This is called the interval measure, which is computed by dividing liquid assets by daily expenditures:

$$\text{Interval measure} = \frac{\text{cash + marketable securities + receivables}}{\text{average daily expenditures from operations}}$$

For Pepsi the cost of goods sold amounted to $9,330 in 1998, administrative costs were $8,912, and other expenses were $291. Therefore,

$$\text{Interval measure} = \frac{311 + 83 + 2{,}453}{(9{,}330 + 8{,}912 + 291)/365} = 56.1$$

Pepsi has enough liquid assets to finance operations for 56.1 days even if it does not sell another bottle.

EFFICIENCY RATIOS

Financial analysts employ another set of ratios to judge how efficiently the firm is using its assets.

Asset Turnover Ratio. The asset turnover, or sales-to-assets, ratio shows how hard the firm's assets are being put to use. For Pepsi, each dollar of assets produced $1.05 of sales:

$$\frac{\text{Sales}}{\text{Average total assets}} = \frac{22{,}348}{(22{,}660 + 20{,}101)/2} = 1.05$$

A high ratio compared with other firms in the same industry could indicate that the firm is working close to capacity. It may prove difficult to generate further business without additional investment.

Notice that since the assets are likely to change over the year, we use the *average* of the assets at the beginning and end of the year. Averages are often used when a flow figure (in this case *annual sales*) is compared with a snapshot figure (*total assets*).

Instead of looking at the ratio of sales to *total* assets, managers sometimes look at how hard particular types of capital are being put to use. For example, they might look at the value of sales per dollar invested in fixed assets. Or they might look at the ratio of sales to net working capital.[5]

Thus for Pepsi each dollar of fixed assets generated $3.29 of sales:

$$\frac{\text{Sales}}{\text{Average fixed assets}} = \frac{22{,}348}{(7{,}318 + 6{,}261)/2} = 3.29$$

Average Collection Period. The average collection period measures the speed with which customers pay their bills. It expresses accounts receivable in terms of daily sales:

$$\text{Average collection period} = \frac{\text{average receivables}}{\text{average daily sales}} = \frac{(2{,}453 + 2{,}150)/2}{22{,}348/365} = 37.6 \text{ days}$$

On average Pepsi's customers pay their bills in about 38 days. A comparatively low figure often indicates an efficient collection department. Sometimes, however, it is the result of an unduly restrictive credit policy, so that the firm offers credit only to customers that can be relied on to pay promptly.[6]

Inventory Turnover Ratio. Managers may also monitor the rate at which the company is turning over its inventories. The financial statements show the *cost* of inventories rather than what the finished goods will eventually sell for. So we compare the cost of inventories with the cost of goods sold. In Pepsi's case,

$$\text{Inventory turnover} = \frac{\text{cost of goods sold}}{\text{average inventory}} = \frac{9{,}330}{(1{,}016 + 732)/2} = 10.7$$

Efficient firms turn over their inventory rapidly and don't tie up more capital than they need in raw materials or finished goods. But firms that are living from hand to mouth may also cut their inventories to the bone.

Managers sometimes also look at how many days' sales are represented by inventories. This is equal to the average inventory divided by the daily cost of goods sold:

$$\text{Days' sales in inventories} = \frac{\text{average inventory}}{\text{cost of goods sold}/365} = \frac{(1{,}016 + 732)/2}{9{,}330/365} = 34.2 \text{ days}$$

You could say that on average Pepsi has sufficient inventories to maintain sales for 34 days.[7]

PROFITABILITY RATIOS

Profitability ratios focus on the firm's earnings.

Net Profit Margin. If you want to know the proportion of revenue that finds its way into profits, you look at the profit margin. This is commonly defined as

$$\text{Net profit margin} = \frac{\text{net income}}{\text{sales}} = \frac{1{,}990}{22{,}348} = .089, \text{ or } 8.9\%$$

When companies are partly financed by debt, the profits are divided between the debtholders and the shareholders. We would not want to say that such a firm is less profitable simply because it employs debt finance and pays out part of its profits as interest. Therefore, when calculating the profit margin, it seems appropriate to add back the debt interest to net income. This would give

$$\text{Net profit margin} = \frac{\text{net income} + \text{interest}}{\text{sales}} = \frac{1{,}990 + 321}{22{,}348} = .103, \text{ or } 10.3\%$$

This is the definition we will use.

Holding everything constant, a firm would naturally prefer a high profit margin. But all else cannot be held constant. A high-price and high-margin strategy typically will result in lower sales. So while Bloomingdales might have a higher margin than J. C. Penney, it will not necessarily enjoy higher profits. A low-margin but high-volume strategy can be quite successful. We return to this issue later.

Return on Assets (ROA). Managers often measure the performance of a firm by the ratio of net income to total assets. However, because net income measures profits net of interest expense, this practice makes the apparent profitability of the firm a function of its capital structure. It is better to use net income plus interest because we are measuring the return on *all* the firm's assets, not just the equity investment:[8]

$$\text{Return on assets} = \frac{\text{net income + interest}}{\text{average total assets}} = \frac{1{,}990 + 321}{(22{,}660 + 20{,}101)/2} = .108, \text{ or } 10.8\%$$

[8] This definition of ROA is also misleading if it is used to compare firms with different capital structures. The reason is that firms that pay more interest pay less in taxes. Thus this ratio reflects differences in financial leverage as well as in operating performance. If you want a measure of operating performance alone, we suggest adjusting for leverage by subtracting that part of total income generated by interest tax shields (interest payments × marginal tax rate). This gives the income the firm would earn if it were all-equity financed. Thus, using a tax rate of 35 percent for Pepsi,

$$\text{Adjusted return on assets} = \frac{\text{net income + interest – interest tax shields}}{\text{average total assets}}$$

$$= \frac{1{,}990 + 321 - (.35 \times 321)}{(22{,}660 + 20{,}101)/2} = .103, \text{ or } 10.3\%$$

Return on Equity (ROE). Another measure of profitability focuses on the return on the shareholders' equity:

$$\text{Return on equity} = \frac{\text{net income}}{\text{average equity}}$$

$$= \frac{1{,}990}{(6{,}401 + 6{,}936)/2} = .298, \text{ or } 29.8\%$$

Payout Ratio. The payout ratio measures the proportion of earnings that is paid out as dividends. Thus:

$$\text{Payout ratio} = \frac{\text{dividends}}{\text{earnings}} = \frac{757}{1{,}990} = .38$$

Managers don't like to cut dividends because of a shortfall in earnings. Therefore, if a company's earnings are particularly variable, management is likely to play it safe by setting a low average payout ratio.

When earnings fall unexpectedly, the payout ratio is likely to rise temporarily. Likewise, if earnings are expected to rise next year, management may feel that it can pay somewhat more generous dividends than it would otherwise have done.

Earnings not paid out as dividends are retained, or plowed back into the business. The proportion of earnings reinvested in the firm is called the *plowback ratio:*

$$\text{Plowback ratio} = 1 - \text{payout ratio} = \frac{\text{earnings} - \text{dividends}}{\text{earnings}}$$

The Du Pont System

Some profitability or efficiency measures can be linked in useful ways. These relationships are often referred to as the **Du Pont system,** in recognition of the chemical company that popularized them.

The first relationship links the return on assets (ROA) with the firm's turnover ratio and its profit margin:

$$\text{ROA} = \frac{\text{net income + interest}}{\text{assets}} = \frac{\text{sales}}{\text{assets}} \times \frac{\text{net income + interest}}{\text{sales}}$$

$\frac{\text{sales}}{\text{assets}}$: ↑ **asset turnover**

$\frac{\text{net income + interest}}{\text{sales}}$: ↑ **profit margin**

We can also break down financial ratios to show how the return on equity (ROE) depends on the return on assets and leverage:

$$\text{ROE} = \frac{\text{earnings available for common stock}}{\text{equity}} = \frac{\text{net income}}{\text{equity}}$$

Therefore,

$$\textbf{ROE} = \underset{\substack{\uparrow \\ \textbf{leverage ratio}}}{\frac{\textbf{assets}}{\textbf{equity}}} \times \underset{\substack{\uparrow \\ \textbf{asset turnover}}}{\frac{\textbf{sales}}{\textbf{assets}}} \times \underset{\substack{\uparrow \\ \textbf{profit margin}}}{\frac{\textbf{net income + interest}}{\textbf{sales}}} \times \underset{\substack{\uparrow \\ \textbf{“debt burden”}}}{\frac{\textbf{net income}}{\textbf{net income + interest}}}$$

Notice that the product of the two middle terms is the return on assets. This depends on the firm's production and marketing skills and is unaffected by the firm's financing mix.[10] However, the first and fourth terms do depend on the debt-equity mix. The first term, assets/equity, which we call the leverage ratio, can be expressed as (equity + liabilities)/equity, which equals 1 + total-debt-to-equity ratio. The last term, which we call the "debt burden," measures the proportion by which interest expense reduces profits.

Summary of financial ratios

Leverage ratios

$$\text{Long-term debt ratio} = \frac{\text{long-term debt}}{\text{long-term debt + equity}}$$

$$\text{Debt-equity ratio} = \frac{\text{long-term debt}}{\text{equity}}$$

$$\text{Total debt ratio} = \frac{\text{total liabilities}}{\text{total assets}}$$

$$\text{Times interest earned} = \frac{\text{EBIT}}{\text{interest payments}}$$

$$\text{Cash coverage ratio} = \frac{\text{EBIT + depreciation}}{\text{interest payments}}$$

Liquidity ratios

$$\text{NWC to assets} = \frac{\text{net working capital}}{\text{total assets}}$$

$$\text{Current ratio} = \frac{\text{current assets}}{\text{current liabilities}}$$

$$\text{Quick ratio} = \frac{\text{cash + marketable securities + receivables}}{\text{current liabilities}}$$

$$\text{Cash ratio} = \frac{\text{cash + marketable securities}}{\text{current liabilities}}$$

$$\text{Interval measure} = \frac{\text{cash + marketable securities + receivables}}{\text{average daily expenditures from operations}}$$

Efficiency ratios

$$\text{Total asset turnover} = \frac{\text{sales}}{\text{average total assets}}$$

$$\text{Average collection period} = \frac{\text{average receivables}}{\text{average daily sales}}$$

$$\text{Inventory turnover} = \frac{\text{cost of goods sold}}{\text{average inventory}}$$

$$\text{Days' sales in inventories} = \frac{\text{average inventory}}{\text{cost of goods sold}/365}$$

Profitability ratios

$$\text{Net profit margin} = \frac{\text{net income} + \text{interest}}{\text{sales}}$$

$$\text{Return on assets} = \frac{\text{net income} + \text{interest}}{\text{average total assets}}$$

$$\text{Return on equity} = \frac{\text{net income}}{\text{average equity}}$$

$$\text{Payout ratio} = \frac{\text{dividends}}{\text{earnings}}$$

$$\text{Plowback ratio} = 1 - \text{payout ratio}$$

$$\text{Growth in equity from plowback} = \text{plowback ratio} \times \text{ROE}$$