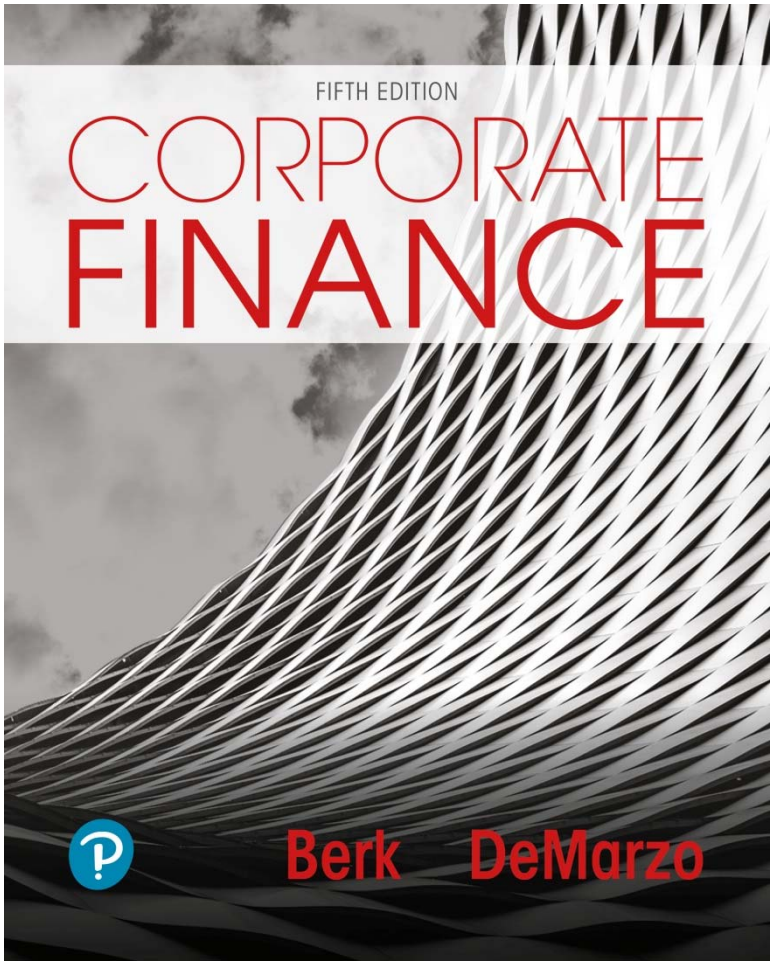
Corporate Finance

Fifth Edition



Chapter 9

Valuing Stocks

Chapter Outline

Siemens AG Dividends

SIEMENS AG Dividend Payment

Type	Div. Rate	Tax	XD Date	Pay Date
YR	E 3.80 +3 %	(G)	31.01.2019	**04.02.2019**
YR	E 3.70 +3 %	(G)	01.02.2018	**05.02.2018**
YR	E 3.60 +3 %	(G)	02.02.2017	**06.02.2017**
YR	E 3.50 +6 %	(G)	27.01.2016	27.01.2016
YR	E 3.30 +10%	(G)	28.01.2015	28.01.2015
YR	E 3.00 +0 %	(G)	29.01.2014	29.01.2014
YR	E 3.00 +0 %	(G)	24.01.2013	24.01.2013
YR	E 3.00 +11%	(G)	25.01.2012	25.01.2012
YR	E 2.70 +69%	(G)	26.01.2011	26.01.2011
YR	E 1.60 +0 %	(G)	27.01.2010	27.01.2010
YR	E 1.60 +0 %	(G)	28.01.2009	28.01.2009
YR	E 1.60 +10%	(G)	25.01.2008	25.01.2008
YR	E 1.45 +7%	(G)	26.01.2007	26.01.2007
YR	E 1.35 +8%	(G)	27.01.2006	27.01.2006
YR	E 1.25 +14%	(G)	28.01.2005	28.01.2005
YR	E 1.10 +10%	(G)	23.01.2004	23.01.2004
YR	E 1.00	(G)	24.01.2003	24.01.2003
YR	E 1.00	(G)	18.01.2002	18.01.2002
SPL	E 1.00	(G)	23.02.2001	23.02.2001
YR	E 1.40	(G)	23.02.2001	23.02.2001
YR	E 1.00	(G)	25.02.2000	25.02.2000
YR	DM1.50	(G)	19.02.1999	19.02.1999
YR	DM1.50	(G)	20.02.1998	20.02.1998
YR	DM1.50	(G)	14.02.1997	14.02.1997
YR	DM13.00	(G)	23.02.1996	23.02.1996
YR	DM13.00	(G)	24.02.1995	24.02.1995

Mc Donalds Dividends

Type	Div. Rate	Tax	XD Date	Pay Date
QTR	U$1.25 +8%	(G)	29.11.2019	16.12.2019
QTR	U$1.16	(G)	30.08.2019	17.09.2019
QTR	U$1.16	(G)	31.05.2019	17.06.2019
QTR	U$1.16	(G)	28.02.2019	15.03.2019
QTR	U$1.16	(G)	30.11.2018	17.12.2018

Type	Div. Rate	Tax	XD Date	Pay Date
QTR	U$1.16 +15%	(G)	30.11.2018	17.12.2018
QTR	U$1.01	(G)	31.08.2018	18.09.2018
QTR	U$1.01	(G)	01.06.2018	18.06.2018
QTR	U$1.01	(G)	28.02.2018	15.03.2018
QTR	U$1.01 +7 %	(G)	30.11.2017	15.12.2017
QTR	U$0.94	(G)	30.08.2017	18.09.2017
QTR	U$0.94	(G)	01.06.2017	19.06.2017
QTR	U$0.94	(G)	27.02.2017	15.03.2017
QTR	U$0.94 +6 %	(G)	29.11.2016	15.12.2016
QTR	U$0.89	(G)	30.08.2016	16.09.2016
QTR	U$0.89	(G)	02.06.2016	20.06.2016
QTR	U$0.89	(G)	26.02.2016	15.03.2016
QTR	U$0.89 +5 %	(G)	27.11.2015	15.12.2015
QTR	U$0.85	(G)	28.08.2015	16.09.2015
QTR	U$0.85	(G)	28.05.2015	15.06.2015
QTR	U$0.85	(G)	26.02.2015	16.03.2015
QTR	U$0.85 +5 %	(G)	26.11.2014	15.12.2014
QTR	U$0.81	(G)	28.08.2014	16.09.2014
QTR	U$0.81	(G)	29.05.2014	16.06.2014
QTR	U$0.81	(G)	27.02.2014	17.03.2014
QTR	U$0.81 +5 %	(G)	27.11.2013	16.12.2013
QTR	U$0.77	(G)	29.08.2013	17.09.2013
QTR	U$0.77	(G)	30.05.2013	17.06.2013
QTR	U$0.77	(G)	27.02.2013	15.03.2013
QTR	U$0.77 +10 %	(G)	29.11.2012	17.12.2012
QTR	U$0.70	(G)	30.08.2012	18.09.2012
QTR	U$0.70	(G)	31.05.2012	15.06.2012
QTR	U$0.70	(G)	28.02.2012	15.03.2012
QTR	U$0.70 +15 %	(G)	29.11.2011	15.12.2011

Learning Objectives (1 of 4)

- Describe, in words, the Law of One Price value for a common stock, including the discount rate that should be used.
- Calculate the total return of a stock, given the dividend payment, the current price, and the previous price.
- Use the dividend-discount model to compute the value of a dividend-paying company's stock, whether the dividends grow at a constant rate starting now or at some time in the future.

Mc Donalds Dividends

Type	Div. Rate	Tax	XD Date	Pay Date
QTR	U$0.61	(G)	30.08.2011	16.09.2011
QTR	U$0.61	(G)	27.05.2011	15.06.2011
QTR	U$0.61	(G)	25.02.2011	15.03.2011
QTR	U$0.61 +11 %	(G)	29.11.2010	15.12.2010
QTR	U$0.55	(G)	30.08.2010	16.09.2010
QTR	U$0.55	(G)	27.05.2010	15.06.2010
QTR	U$0.55	(G)	25.02.2010	15.03.2010
QTR	U$0.55 +10 %	(G)	27.11.2009	15.12.2009
QTR	U$0.50	(G)	28.08.2009	15.09.2009
QTR	U$0.50	(G)	04.06.2009	22.06.2009
QTR	U$0.50	(G)	26.02.2009	16.03.2009
QTR	U$0.50	(G)	26.11.2008	15.12.2008
QTR	U$0.375	(G)	28.08.2008	16.09.2008
QTR	U$0.375	(G)	05.06.2008	23.06.2008
QTR	U$0.375	(G)	28.02.2008	17.03.2008
YR	U$1.50	(G)	13.11.2007	03.12.2007
YR	U$1.00	(G)	13.11.2006	01.12.2006
YR	U$0.67	(G)	10.11.2005	01.12.2005
YR	U$0.55	(G)	10.11.2004	01.12.2004
YR	U$0.40	(G)	12.11.2003	01.12.2003
YR	U$0.235	(G)	13.11.2002	02.12.2002
YR	U$0.225	(G)	13.11.2001	03.12.2001
YR	U$0.215	(G)	13.11.2000	01.12.2000
QTR	U$0.04875	(G)	29.11.1999	15.12.1999
QTR	U$0.04875	(G)	30.08.1999	15.09.1999
QTR	U$0.04875	(G)	27.05.1999	15.06.1999
QTR	U$0.0488	(G)	11.03.1999	31.03.1999
QTR	U$0.09	(G)	25.11.1998	11.12.1998
QTR	U$0.09	(G)		

Learning Objectives (2 of 4)

- Discuss the determinants of future dividends and growth rate in dividends, and the sensitivity of the stock price to estimate those two factors.
- Given the retention rate and the return on new investment, calculate the growth rate in dividends, earnings, and share price.
- Describe circumstances in which cutting the firm's dividend will raise the stock price.

Learning Objectives (3 of 4)

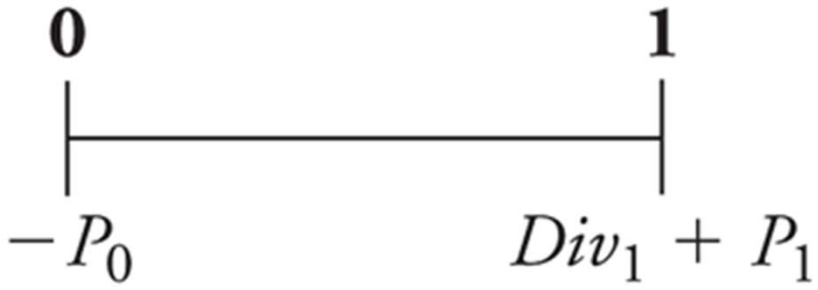
- Assuming a firm has a long-term constant growth rate after time $N + 1$, use the constant growth model to calculate the terminal value of the stock at time N.
- Compute the stock value of a firm that pays dividends as well as repurchasing shares.
- Use the discounted free cash flow model to calculate the value of stock in a company with leverage.
- Use comparable firm multiples to estimate stock value.
- Explain why several valuation models are required to value a stock.

Learning Objectives (4 of 4)

- Describe the impact of efficient markets hypothesis on positive-NPV trades by individuals with no inside information.
- Discuss why investors who identify positive-NPV trades should be skeptical about their findings, unless they have inside information or a competitive advantage. As part of that, describe the return the average investor should expect to get.
- Assess the impact of stock valuation on recommended managerial actions.

9.1 The Dividend-Discount Model (1 of 2)

- A One-Year Investor
  - Potential Cash Flows
    - Dividend
    - Sale of Stock
  - Timeline for One-Year Investor



- Since the cash flows are risky, we must discount them at the **equity cost of capital**

9.1 The Dividend-Discount Model (2 of 2)

- A One-Year Investor

$$P_0 = \left(\frac{Div_1 + P_1}{1 + r_E} \right)$$

  - If the current stock price were less than this amount, expect investors to rush in and buy it, driving up the stock's price
  - If the stock price exceeded this amount, selling it would cause the stock price to quickly fall

Dividend Yields, Capital Gains, and Total Returns

$$r_E = \frac{Div_1 + P_1}{P_0} - 1 = \underbrace{\frac{Div_1}{P_0}}_{Dividend\ Yield} + \underbrace{\frac{P_1 - P_0}{P_0}}_{Capital\ Gain\ Rate}$$

- Dividend Yield
- Capital Gain
  - Capital Gain Rate
- Total Return
  - Dividend Yield + Capital Gain Rate
    - The expected total return of the stock should equal the expected return of other investments available in the market with equivalent risk

Textbook Example 9.1 (1 of 2)

Stock Prices and Returns

Problem

Suppose you expect Walgreens Boots Alliance (a drugstore chain) to pay dividends of $1.60 per share and trade for $70 per share at the end of the year. If investments with equivalent risk to Walgreen's stock have an expected return of 8.5%, what is the most you would pay today for Walgreen's stock? What dividend yield and capital gain rate would you expect at this price?

Textbook Example 9.1 (2 of 2)

Solution

Using Eq. 9.1, we have

$$P_0 = \frac{Div_1 + p_1}{1 + r_E} = \frac{1.60 + 70.00}{1.085} = \$65.99$$

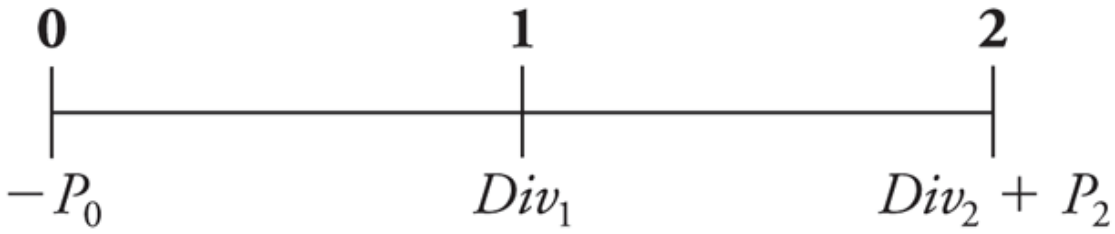
At this price, Walgreen's dividend yield is $\frac{Div_1}{P_0} = \frac{1.60}{65.99} = 2.42\%.$

The expected capital gain is \$70.00 − \$65.99 = \$4.01 per share, for a capital gain rate of $\frac{4.01}{65.99} = 6.08\%.$

Therefore, at this price, Walgreen's expected total return is 2.42% + 6.08% = 8.5%, which is equal to its equity cost of capital.

A Multi-Year Investor

- What is the price if we plan on holding the stock for two years?



$$P_0 = \frac{Div_1}{1 + r_E} + \frac{Div_2 + P_2}{(1 + r_E)^2}$$

The Dividend-Discount Model Equation
(1 of 2)

- What is the price if we plan on holding the stock for *N* years?

$$P_0 = \frac{Div_1}{1+r_E} + \frac{Div_2}{(1+r_E)^2} + \cdots + \frac{Div_N}{(1+r_E)^N} + \frac{P_N}{(1+r_E)^N}$$

  - This is known as the Dividend-Discount Model
    - Note that the above equation (9.4) holds for any horizon *N*
      - Thus all investors (with the same beliefs) will attach the same value to the stock, independent of their investment horizons

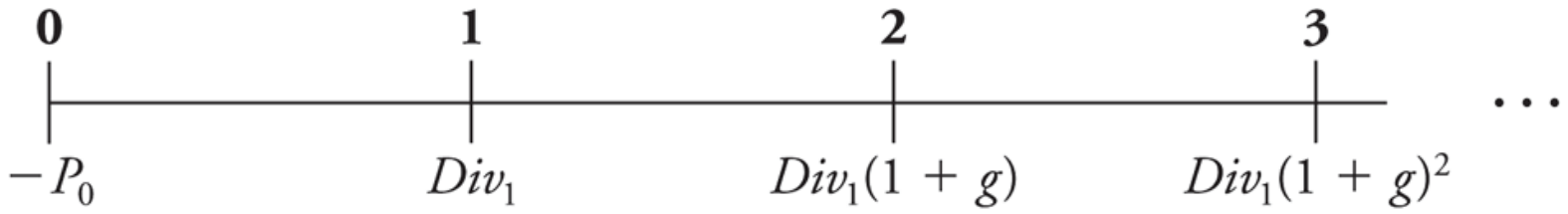
The Dividend-Discount Model Equation
(2 of 2)

$$P_0 = \frac{Div_1}{1 + r_E} + \frac{Div_2}{(1 + r_E)^2} + \frac{Div_3}{(1 + r_E)^3} + \cdots = \sum_{n=1}^{\infty} \frac{Div_n}{(1 + r_E)^n}$$

- The price of any stock is equal to the present value of the expected future dividends it will pay

9.2 Applying the Discount-Dividend Model (1 of 2)

- Constant Dividend Growth
  - The simplest forecast for the firm's future dividends states that they will grow at a constant rate, *g*, forever



9.2 Applying the Discount-Dividend Model (2 of 2)

- Constant Dividend Growth Model

$$P_0 = \frac{Div_1}{r_E - g}$$

$$r_E = \frac{Div_1}{P_0} + g$$

  - The value of the firm depends on the current dividend level, the cost of equity, and the growth rate

Textbook Example 9.2 (1 of 2)

Valuing a Firm with Constant Dividend Growth

Problem

Consolidated Edison, Inc. (Con Edison), is a regulated utility company that services the New York City area. Suppose Con Edison plans to pay $3.00 per share in dividends in the coming year. If its equity cost of capital is 6% and dividends are expected to grow by 2% per year in the future, estimate the value of Con Edison's stock.

Textbook Example 9.2 (2 of 2)

Solution

If dividends are excepted to grow perpetually at a rate of 2% per year, we can use Eq. 9.6 to calculate the price of a share of Con Edison stock:

$$P_O = \frac{Div1}{r_E - g} = \frac{\$3.00}{0.06 - 0.02} = \$75$$

Dividends Versus Investment and Growth (1 of 6)

- A Simple Model of Growth
  - Dividend Payout Ratio
    - The fraction of earnings paid as dividends each year

$$Div_t = \underbrace{\frac{\text{Earnings}_t}{\text{Shares Outstanding}_t}}_{\text{EPS}_t} \times \text{Dividend Payout Rate}_t$$

Earnings per Share

Dividends Versus Investment and Growth (2 of 6)

- A Simple Model of Growth
  - Assuming the number of shares outstanding is constant, the firm can do two things to increase its dividend:
    - Increase its earnings (net income)
    - Increase its dividend payout rate

Dividends Versus Investment and Growth (3 of 6)

- A Simple Model of Growth
  - A firm can do one of two things with its earnings:
    - It can pay them out to investors
    - It can retain and reinvest them

Dividends Versus Investment and Growth (4 of 6)

- A Simple Model of Growth

$$\text{Change in Earnings} = \text{New Investment} \times \text{Return on New Investment}$$

$$\text{New Investment} = \text{Earnings} \times \text{Retention Rate}$$

$$\text{Change in Earnings} = \text{Earnings} \times \text{Retention Rate} \times \text{Return on New Investment}$$

  - Retention Rate
    - Fraction of current earnings that the firm retains

Notice: Dividend Payout Ratio = 1 – Retention Rate

Dividends Versus Investment and Growth (5 of 6)

- A Simple Model of Growth

$$\text{Change in Earnings} = \text{Earnings} \times \text{Retention Rate} \times \text{Return on New Investment}$$

$$g = \text{Earnings Growth Rate} = \frac{\text{Change in Earnings}}{\text{Earnings}}$$

$$= \text{Earnings Growth Rate} = \frac{\text{Earnings} \times \text{Retention Rate} \times \text{Return on New Investment}}{\text{Earnings}}$$

$$= \text{Retention Rate} \times \text{Return on New Investment}$$

g = Retention Rate × Return on New Investment

  - If the firm keeps its retention rate constant, then the growth rate in dividends will equal the growth rate of earnings

Dividends Versus Investment and Growth (6 of 6)

- Profitable Growth
  - If a firm wants to increase its share price, should it cut its dividend and invest more, or should it cut investment and increase its dividend?
    - The answer will depend on the profitability of the firm's investments
      - *Cutting the firm's dividend to increase investment will raise the stock price if, and only if, the new investments have a positive NPV.*

Textbook Example 9.3 (1 of 3)

Cutting Dividends for Profitable Growth

Problem

Crane sporting goods expect to have earnings per share of $6 in the coming year. Rather than reinvest these earnings and grow, the firm plans to pay out all of its earnings as a dividend. With these expectations of no growth, Crane's current share price is $60.

Suppose crane could cut its dividend payout rate to 75% for the foreseeable future and use the retained earnings to open new stores. The return on its investment in these stores is expected to be 12%. Assuming its equity cost of capital is unchanged, what effect would this new policy have on Crane's stock price?

Textbook Example 9.3 (2 of 3)

Solution

First, let's estimate Crane's equity cost of capital. Currently, Crane plans to pay a dividend equal to its earnings of $6 per share. Given a share price of $60, Crane's dividend yield is $\frac{\$6}{\$60} = 10\%$. With no expected growth (g = 0),

we can use Eq. 9.7 to estimate r_E:

$$r_E = \frac{Div_1}{P_0} + g = 10\% + 0\% = 10\%$$

In other words, to justify Crane's stock price under its current policy, the expected return of other stocks in the market with equivalent risk must be 10%.

Next, we consider the consequences of the new policy. If Crane reduces its dividend payout rate to 75%, then from Eq. 9.8 its dividend this coming year will fall to $Div_1 = EPS1 \times 75\% = \$6 \times 75\% = \$4.50$. **At the same time, because the firm will now retain** 25% of its earnings to invest in new stores, from Eq. 9.12 its growth rate will increase to

Textbook Example 9.3 (3 of 3)

g = Retention Rate × Return on New Investment = 25% × 12% = 3%

Assuming Crane can continue to grow at this rate, we can compute its share price under the new policy using the constant dividend growth model of Eq. 9.6:

$$P_0 = \frac{Div_1}{r_E - g} = \frac{\$4.50}{0.10 - 0.03} = \$64.29$$

Thus, Crane's share price should rise from $60 to $64.29 if it cuts its dividend to invest in projects that offer a return (12%) greater than their cost of capital (which we assume remains 10%). These projects are positive NPV, and so by taking them Crane has created value for its shareholders.

Textbook Example 9.4 (1 of 2)

Unprofitable Growth

Problem

Suppose Crane Sporting Goods decides to cut its dividend payout rate to 75% to invest in new stores, as in Example 9.3 but now suppose that the return on these new investments is 8%, rather than 12%. Given its excepted earnings per share this year of $6 and its equity cost of capital of 10%, what will happen to Crane's current share price in this case?

Textbook Example 9.4 (2 of 2)

Solution

Just as in Example 9.3, Crane's dividend will fall to \$6 × 75% = \$4.50. Its growth rate under the new policy, given the lower return on new investment, will now be g = 25% × 8% = 2%. The new share price is there fore

$$P_0 = \frac{Div_1}{r_E - g} = \frac{\$4.50}{0.10 - 0.02} = \$56.25$$

Thus, even though Crane will grow under the new policy, the new investments have negative NPV. Crane's share price will fall if it cuts its dividend to make new investments with a return of only 8% when its investors can earn 10% on other investments with comparable risk.

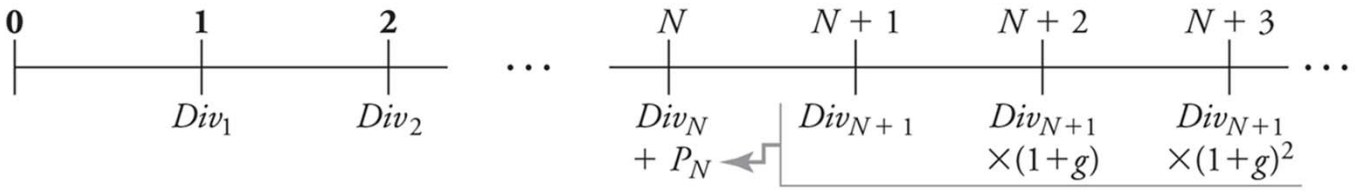
Changing Growth Rates (1 of 3)

- We cannot use the constant dividend growth model to value a stock if the growth rate is not constant
  - For example, young firms often have very high initial earnings growth rates
  - During this period of high growth, these firms often retain 100% of their earnings to exploit profitable investment opportunities
  - As they mature, their growth slows
  - At some point, their earnings exceed their investment needs, and they begin to pay dividends

Changing Growth Rates (2 of 3)

- Although we cannot use the constant dividend growth model directly when growth is not constant, we can use the general form of the model to value a firm by applying the constant growth model to calculate the future share price of the stock once the expected growth rate stabilizes

Changing Growth Rates (3 of 3)



$$P_N = \frac{Div_{N+1}}{r_E - g}$$

- Dividend-Discount Model with Constant Long-Term Growth

$$P_0 = \frac{Div_1}{1+r_E} + \frac{Div_2}{(1+r_E)^2} + L + \frac{Div_N}{(1+r_E)^N} + \frac{1}{(1+r_E)^N}\left(\frac{Div_{N+1}}{r_E - g}\right)$$

Textbook Example 9.5 (1 of 3)

Valuing a Firm with Two Different Growth Rates

- **Problem**
  - Small Fry, Inc., has just invented a potato chip that looks and tastes like a french fry. Given the phenomenal market response to this product, Small Fry is reinvesting all of its earnings to expand its operations. Earnings were $2 per share this past year and are expected to grow at a rate of 20% per year until the end of year 4. At that point, other companies are likely to bring out competing products. Analysts project that at the end of year 4, Small Fry will cut investment and begin paying 60% of its earnings as dividends and its growth will slow to a long-run rate of 4%. If Small Fry's equity cost of capital is 8%, what is the value of a share today?

Textbook Example 9.5 (2 of 3)

Solution

We can use Small Fry's projected earnings growth rate and payout rate to forecast its future earnings and dividends as shown in the following spreadsheet:

	Year	0	1	2	3	4	5	6
Earnings								
1	EPS Growth Rate (versus prior year)		20%	20%	20%	20%	4%	4%
2	EPS	$2.00	$2.40	$2.88	$3.46	$4.15	$4.31	$4.49
Dividends								
3	Dividend Payout Rate		0%	0%	0%	60%	60%	60%
4	Dividend		$ —	$ —	$ —	$2.49	$2.59	$2.69

Starting from $2.00 in year 0, EPS grows by 20% per year until year 4, after which growth slows to 4%. Small Fry's dividend payout rate is zero until year 4, when competition reduces its investment opportunities and its payout rate rises to 60%. Multiplying EPS by the dividend payout ratio, we project Small Fry's future dividends in line 4.

Textbook Example 9.5 (3 of 3)

From year 4 onward, Small Fry's dividends will grow at the expected long-run rate of 4% per year. Thus, we can use the constant dividend growth model to project Small Fry's share price at the end of year 3. Given its equity cost of capital of 8%,

$$P_3 = \frac{Div_1}{r_E - g} = \frac{\$2.49}{0.08 - 0.04} = \$62.25$$

We then apply the dividend-discount model (Eq. 9.4) with this terminal value:

$$P_0 = \frac{Div_4}{1+r_E} + \frac{Div_2}{(1+r_E)^2} + \frac{Div_3}{(1+r_E)^3} + \frac{P_3}{(1+r_E)^3} = \frac{\$62.25}{(1.08)^3} = \$49.42$$

As this example illustrates, the dividend-discount model is flexible enough to handle any forecasted pattern of dividends.

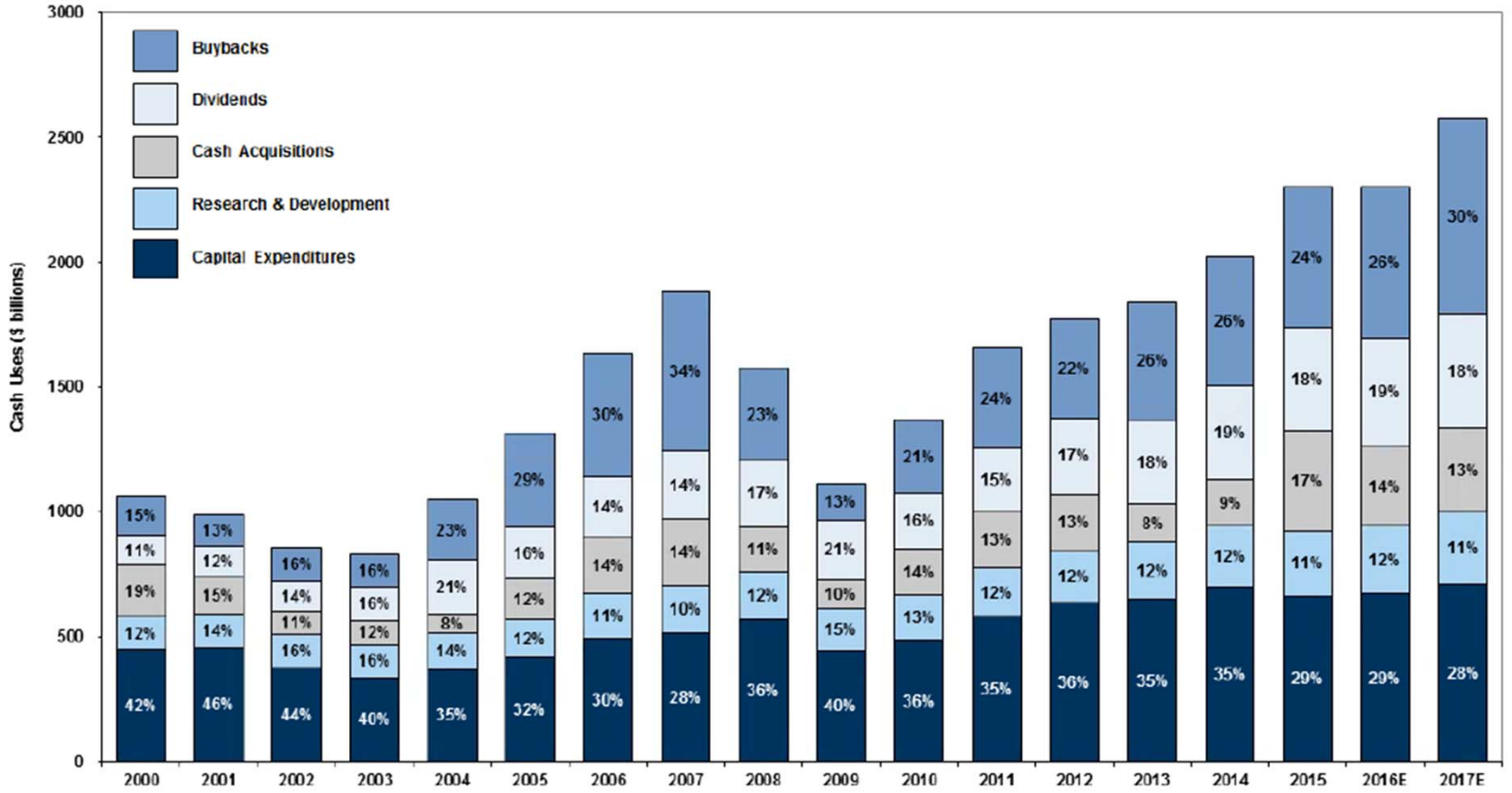
Limitations of the Dividend-Discount Model

- There is a **tremendous** amount of uncertainty associated with forecasting a firm's dividend growth rate and future dividends
- Small changes in the assumed dividend growth rate can lead to large changes in the estimated stock price

9.3 Total Payout and Free Cash Flow Valuation Models (1 of 3)

- Share Repurchases and the Total Payout Model
  - Share Repurchase
    - When the firm uses excess cash to buy back its own stock
  - Implications for the Dividend-Discount Model
    - The more cash the firm uses to repurchase shares, the less it has available to pay dividends
    - By repurchasing, the firm decreases the number of shares outstanding, which increases its earnings and dividends per share

Exhibit 1: S&P 500 use of cash, 2000-2017E
as of November 17, 2016



Use of cash:	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016E	2017E
Invest for Growth (capex + R&D + M&A)	74%	75%	70%	68%	57%	56%	55%	52%	60%	65%	62%	60%	60%	56%	56%	58%	55%	52%
Return to Investors (buybacks + dividends)	26%	25%	30%	32%	43%	44%	45%	48%	40%	35%	38%	40%	40%	44%	44%	42%	45%	48%

Source: Compustat, Goldman Sachs Global Investment Research

9.3 Total Payout and Free Cash Flow Valuation Models (2 of 3)

- Share Repurchases and the Total Payout Model

$$PV_0 = PV(\text{Future Dividends per Share})$$

9.3 Total Payout and Free Cash Flow Valuation Models (3 of 3)

- Share Repurchases and the Total Payout Model
  - Total Payout Model

$$PV_0 = \frac{PV(\text{Future Total Dividends and Repurchases})}{\text{Shares Outstanding}_0}$$

    - Values all of the firm's equity, rather than a single share. You discount total dividends and share repurchases and use the growth rate of earnings (rather than earnings per share) when forecasting the growth of the firm's total payouts.

Textbook Example 9.6 (1 of 3)

Valuation with Share Repurchases

Problem

- Titan industries has 217 million shares outstanding and expects earnings at the end of this year of $860 million. Titan plans to pay out 50% of its earnings in total, paying 30% as a dividend and using 20% to repurchase shares. If Titan's earnings are excepted to grow by 7.5% per year and these payout rates remain constant, determine Titan's share price assuming an equity cost of capital of 10%.

Textbook Example 9.6 (2 of 3)

Solution

Titan will have total payouts this year of 50% × $860 million = $430 million. Based on the equity cost of capital of 10% and an expected earnings growth rate of 7.5%, the present value of Titan's future payouts can be computed as a constant growth perpetuity:

$$Pv\,(\text{Future Total Dividends and Repurchases}) = \frac{\$430\text{ million}}{0.10 - 0.075} = \$17.2\text{ billion}$$

This present value represents the total value of Titan's equity (i.e., its market capitalization). To compute the share price, we divide by the current number of shares outstanding:

$$P_0 = \frac{\$17.2\text{ billion}}{217\text{ million shares}} = \$79.26\text{ per share}$$

Textbook Example 9.6 (3 of 3)

Using the total payout method, we did not need to know the firm's split between dividends and share repurchases. To compare this method with the dividend-discount model, note that Titan will pay a dividend of

$$\frac{30\% \times \$860 \text{ million}}{(217 \text{ million shares})} = \$1.19 \text{ per share},$$

for a dividend yield of $\frac{1.19}{79.26} = 1.50\%$. From Eq. 9.7, Titan's expected EPS, dividend, and share price growth rate is $g = r_E - \frac{Div_1}{P_0} = 8.50\%$.

These "per share" growth rates exceed the 7.5% growth rate of total earnings because Titan's share count will decline over time due to share repurchases.

The Discounted Free Cash Flow Model (1 of 5)

- Discounted Free Cash Flow Model
  - Determines the value of the firm to all investors, including both equity and debt holders *(= Enterprise Value = V_0)*

$$\text{Enterprise Value} = \text{Market Value of Equity} + \text{Debt} - \text{Cash}$$

  - The enterprise value can be interpreted as the net cost of acquiring the firm's equity, taking its cash, paying off all debt, and owning the unlevered business

Assets	Liabilities + Equity
Cash	Debt
V_0	Equity

$$\text{Market Value of Equity}_0 = V_0 + \text{Cash}_0 - \text{Debt}_0$$

The Discounted Free Cash Flow Model (2 of 5)

- Valuing the Enterprise

$$\text{Free Cash Flow} = \overbrace{EBIT \times (1 - \tau_c)}^{\text{Unlevered Net Income}} + \text{Depreciation} - \text{Capital Expenditures} - \text{Increases in Net Working Capital}$$

  - Free Cash Flow
    - Cash flow available to pay both debt holders and equity holders
  - Discounted Free Cash Flow Model

$$V_0 = PV(\text{Future Free Cash Flow of Firm})$$

$$P_0 = \frac{V_0 + \text{Cash}_0 - \text{Debt}_0}{\text{Shares Outstanding}_0}$$

The Discounted Free Cash Flow Model (3 of 5)

- Implementing the Model
  - Since we are discounting cash flows to both equity holders and debt holders, the free cash flows should be discounted at the firm's weighted average cost of capital, r_{wacc}. If the firm has no debt, $r_{wacc} = r_E$
  - Notice:
    $r_{WACC} = E/(E + D) \cdot r_E + D/(E + D) \cdot r_D \cdot (1 - \tau_c)$

Assets	Liabilities + Equity
	Net Debt -> $r_D \cdot (1 - \tau_c)$
V_0 -> r_{WACC}	Equity -> r_E

Net Debt = Debt – Cash

The Discounted Free Cash Flow Model (4 of 5)

- Implementing the Model

$$V_0 = \frac{FCF_1}{1+r_{wacc}} + \frac{FCF_2}{(1+r_{wacc})^2} + \cdots + \frac{FCF_N}{(1+r_{wacc})^N} + \frac{V_N}{(1+r_{wacc})^N}$$

  - Often, the terminal value is estimated by assuming a constant long-run growth rate g_{FCF} for free cash flows beyond year N, so that

$$V_N = \frac{FCF_{N+1}}{r_{wacc} - g_{FCF}} = \left(\frac{1+g_{FCF}}{(r_{wacc} - g_{FCF})} \right) \times FCF_N$$

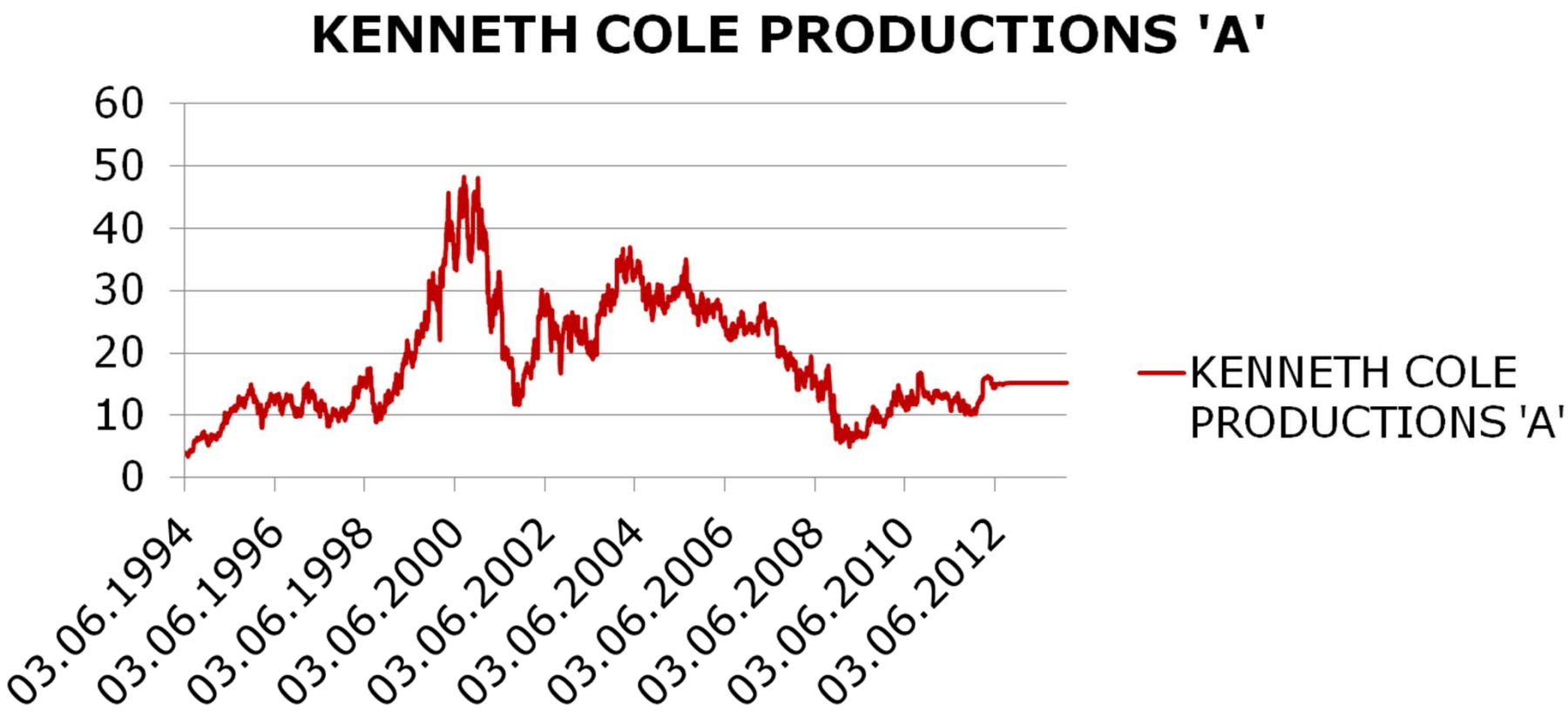
Textbook Example 9.7 (1 of 3)

Valuing Kenneth Cole Using Free Cash Flow

Problem

- Kenneth Cole (KCP) had sales of $518 million in 2005. Suppose you expect its sales to grow at a 9% rate in 2006, but that this growth rate will slow by 1% per year to a long –run growth rate for the apparel industry of 4% by 2011. Based on KCP's past profitability and investment needs, you expect EBIT to be 9% of sales, increases in net working capital requirements to be 10% of any increase in sales, and net investment (capital expenditures in excess of depreciation) to be 8% of any increase in sales. If KCP has $100 million in cash, $3 million in debt, 21 million shares outstanding, a tax rate of 37%, and a weighted average cost of capital of 11%, what is your estimate of the value of KCP's stock in early 2006?

Kenneth Cole Stock Price



Textbook Example 9.7 (2 of 3)

Solution

Using Eq. 9.20, we can estimate KCP's future free cash flow based on the estimates above as follows:

	Year	2005	2006	2007	2008	2009	2010	2011
FCF Forecast ($ millions)								
1	Sales	518.0	564.6	609.8	652.5	691.6	726.2	755.3
2	*Growth versus Prior Year*		*9.0%*	*8.0%*	*7.0%*	*6.0%*	*5.0%*	*4.0%*
3	**EBIT** (9% of sales)		50.8	54.9	58.7	62.2	65.4	68.0
4	Less: Income Tax (37% EBIT)		(18.8)	(20.3)	(21.7)	(23.0)	(24.2)	(25.1)
5	Less: Net Investment (8% ΔSales)		(3.7)	(3.6)	(3.4)	(3.1)	(2.8)	(2.3)
6	Less: Inc. in NWC (10% ΔSales)		(4.7)	(4.5)	(4.3)	(3.9)	(3.5)	(2.9)
7	**Free Cash Flow**		23.6	26.4	29.3	32.2	35.0	37.6

Because we expect KCP's free cash flow to grow at a constant rate after 2011, we can use Eq. 9.24 to compute a terminal enterprise value:

Textbook Example 9.7 (3 of 3)

$$V_{2011} = \left(\frac{1+g_{FCF}}{r_{wacc}-g_{FCF}}\right) \times FCF_{2011} = \left(\frac{1.04}{0.11-0.04}\right) \times 37.6 = \$558.6 \text{ million}$$

From Eq. 9.23, KCP's current enterprise value is the present value of its free cash flows plus the terminal enterprise value:

$$V_0 = \frac{23.6}{1.11} + \frac{26.4}{1.11^2} + \frac{29.3}{1.11^3} + \frac{32.2}{1.11^4} + \frac{35.0}{1.11^5} + \frac{37.6+558.6}{1.11^6} = \$424.8 \text{ million}$$

We can now estimate the value of a share of KCP's stock using Eq. 9.22:

$$P_0 = \frac{424.8+100-3}{21} = \$24.85$$

The Discounted Free Cash Flow Model (5 of 5)

- Connection to Capital Budgeting
  - The firm's free cash flow is equal to the sum of the free cash flows from the firm's current and future investments, so we can interpret the firm's enterprise value as the total NPV that the firm will earn from continuing its existing projects and initiating new ones.
    - The NPV of any individual project represents its contribution to the firm's enterprise value. To maximize the firm's share price, we should accept projects that have a positive NPV.

Textbook Example 9.8 (1 of 3)

Sensitivity Analysis for Stock Valuation

Problem

In example 9.7, KCP's revenue growth rate was assumed to be 9% in 2006, slowing to a long term growth rate of 4%. How would your estimate of the stock's value change if you expected revenue growth of 4% from 2006 on? How would it change if in addition you expected EBIT to be 7% of sales, rather than 9%?

t_0	t_1	T_2	…	∞
V_0 = ?	FCF_{06}	$FCF_{06} \cdot (1 + g)$	…	$FCF_{06} \cdot (1 + g)^{(\infty - 1)}$

Textbook Example 9.8 (2 of 3)

Solution

With 4% revenue growth and a 9% EBIT margin, KCP will have 2006 revenues of 518 × 1.04 = $538.7 million, and EBIT of 9%(538.7) = $48.5 million. Given the increase in sales of 538.7 − 518.0 = $20.7 million, we expect net investment of 8%(20.7) = $1.7 million and additional net working capital of 10%(20.7) = $2.1 million. Thus, KCP's expected FCF in 2006 is

$$FCF_{06} = 48.5(1-0.37) - 1.7 - 2.1 = \$26.8\,\text{million}$$

Because growth is expected to remain constant at 4%, we can estimate KCP's enterprise value as a growing perpetuity:

$$V_0 = \frac{\$26.8}{(0.11-0.04)} = \$383\,\text{million}$$

Textbook Example 9.8 (3 of 3)

for an initial share value of $P_0 = \frac{(383 + 100 - 3)}{21} = \$22.86.$

Thus, comparing this result with that of Example 9.7, we see that a higher initial revenue growth of 9% versus 4% contributes about $2 to the value of KCP's stock.

If, in addition, we expect KCP's EBIT margin to be only 7%, our FCF estimate would decline to

$$FCF_{06} = (.07 \times 538.7)(1 - .37) - 1.7 - 2.1 = \$20.0 \text{ million}$$

for an enterprise value of $V_0 = \frac{\$20}{(0.11 - 0.04)} = \$286 \text{ million}$ and a share value of $P_0 = \frac{(286 + 100 - 3)}{21} = \$18.24.$

Thus, we can see that maintaining an EBIT margin of 9%versus 7% contributes more than $4.50 to KCP's stock value in this scenario.

Figure 9.1 A Comparison of Discounted Cash Flow Models of Stock Valuation

Present value of…	At the …	Determines the..
Dividend Payments	Equity cost of capital	Stock Price
Total Payouts (All dividends and repurchases)	Equity cost of capital	Equity Value
Free Cash Flow (Cash available to pay all security holders)	Weighted average cost of capital	Enterprise Value

9.4 Valuation Based on Comparable Firms

- Method of Comparables (Comps)
  - Estimate the value of the firm based on the value of other, comparable firms or investments that we expect will generate very similar cash flows in the future

Valuation Multiples (1 of 5)

- Valuation Multiple
  - A ratio of firm's value to some measure of the firm's scale or cash flow
- The Price-Earnings Ratio
  - *P*/*E* Ratio
    - Share price divided by earnings per share

Valuation Multiples (2 of 5)

- Trailing Earnings
  - Earnings over the last 12 months
- Trailing *P*/*E*
- Forward Earnings
  - Expected earnings over the next 12 months
- Forward *P*/*E*

Valuation Multiples (3 of 5)

$$\text{Forward } P/E = \frac{P_0}{EPS_1} = \frac{Div_1 \,/\, EPS_1}{r_E - g} = \frac{\text{Dividend Payout Rate}}{r_E - g}$$

$$\text{Note}: P_0 = \frac{Div_1}{r_E - g}$$

- If two stocks have the same payout and EPS growth rates, as well as equivalent risk (r_E), then they should have the same P/E.
- Firms with high growth rates, and which generate cash well in excess of their investment needs so that they can maintain high payout rates, should have high *P*/*E* multiples

Textbook Example 9.9 (1 of 2)

Valuation Using the Price-Earnings Ratio

Problem

Suppose furniture manufacturer Herman Miller, Inc., has earnings per share of $1.99. If the average P/E of comparable furniture stocks is 24.6, estimate a value for Herman Miller using the P/E as a valuation multiple. What are the assumptions underlying this estimate?

Textbook Example 9.9 (2 of 2)

Solution

We estimate a share price for Herman Miller by multiplying its EPS by the *P*/*E* of comparable firms. Thus, P_0 = \$1.99 × 24.6 = \$48.95. This estimate assumes that Herman Miller will have similar future risk, payout rates, and growth rates to comparable firms in the industry.

Valuation Multiples (4 of 5)

- Enterprise Value Multiples

$$\frac{V_0}{EBITDA_1} = \frac{FCF_1}{r_{wacc} - g_{FCF}} \cdot \frac{1}{EBITDA_1} = \frac{FCF_1 / EBITDA_1}{r_{wacc} - g_{FCF}}$$

  - This valuation multiple is higher for firms with high growth rates and low capital requirements (so that free cash flow is high in proportion to EBITDA)

Textbook Example 9.10 (1 of 2)

Valuation Using an Enterprise Value Multiple

Problem

Suppose Rocky Shoes and Boots (RCKY) has earnings per share of $2.30 and EBITDA of $30.7 million. RCKY also has 5.4 million shares outstanding and debt of $125 million (net of cash). You believe Deckers Outdoor Corporation is comparable to RCKY in terms of its underlying business, but Deckers has little debt. If Deckers has a P/E of 13.3 and an enterprise value to EBITDA multiple of 7.4, estimate the value of RCKY's shares using both multiples. Which estimate is likely to be more accurate?

Textbook Example 9.10 (2 of 2)

Solution

Using Decker's P/E, we would estimate a share price for RCKY of P_0 = \$2.30 × 13.3 = \$30.59. Using the enterprise value to EBITDA multiple, we would estimate RCKY's enterprise value to be V_0 = \$30.7 million × 7.4 = \$227.2 million. We then subtract debt and divide by the number of shares to estimate RCKY's share price:

$$P_0 = \frac{(227.2 - 125)}{5.4} = \$18.93.$$

Because of the large difference in leverage between the firms, we would expect the second estimate, which is based on enterprise value, to be more reliable.

Valuation Multiples (5 of 5)

- Other Multiples
  - Multiple of sales
  - Price to book value of equity per share
  - Enterprise value per subscriber
    - Used in cable TV industry

Limitations of Multiples

- When valuing a firm using multiples, there is no clear guidance about how to adjust for differences in expected future growth rates, risk, or differences in accounting policies
- Comparables only provide information regarding the value of a firm relative to other firms in the comparison set
  - Using multiples will not help us determine if an entire industry is overvalued

Comparison with Discounted Cash Flow Methods

- Discounted cash flows methods have the advantage that they can incorporate specific information about the firm's cost of capital or future growth
  - The discounted cash flow methods have the potential to be more accurate than the use of a valuation multiple

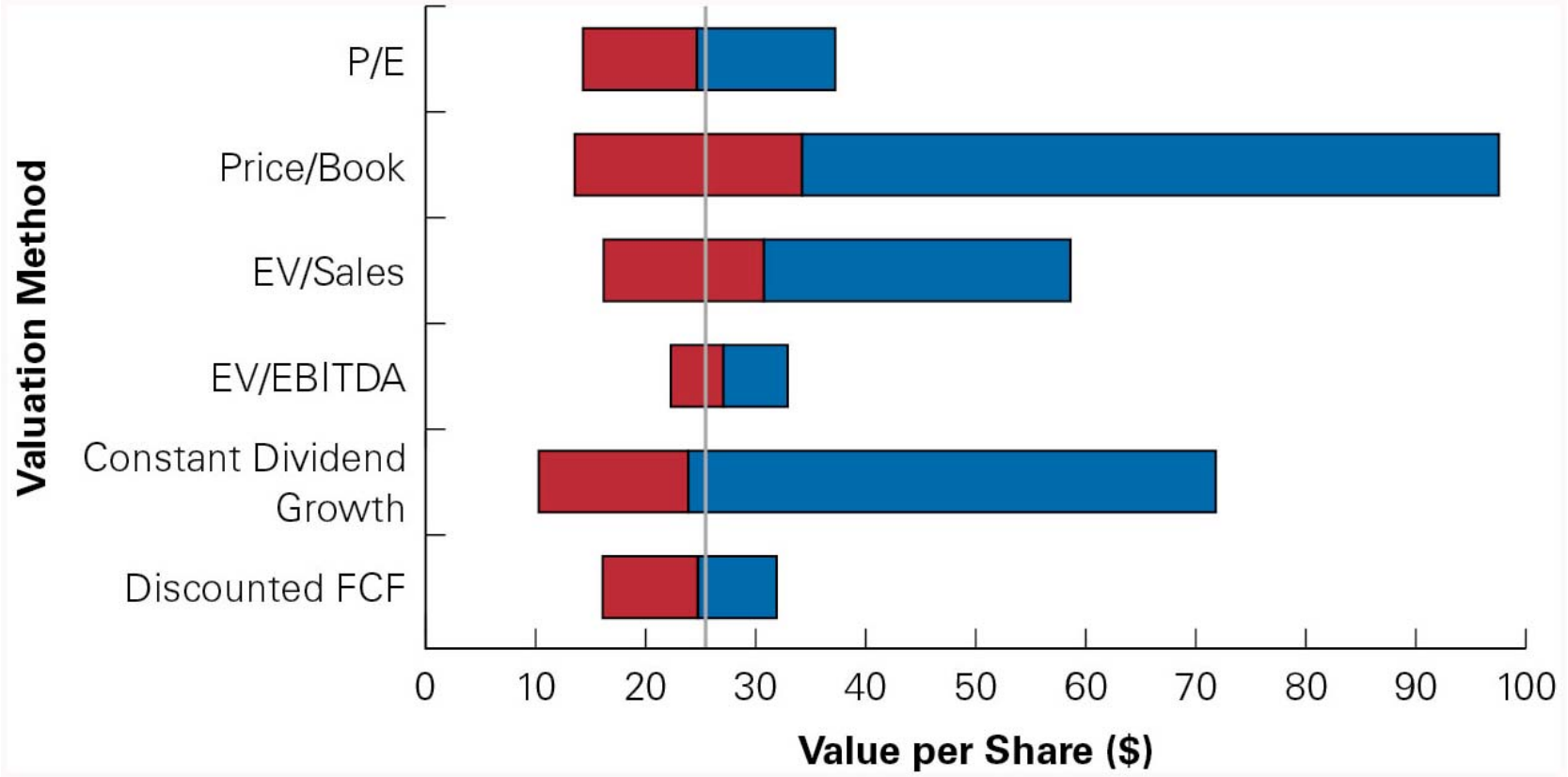
Table 9.1 Stock Prices and Multiples for the Footwear Industry, January 2006

Ticker	Name	Stock Price ($)	Market Capitalization ($ millions)	Enterprise Value ($ millions)	P/E	Price/ Book	Enterprise Value/ Sales	Enterprise Value/ EBITDA
KCP	Kenneth Cole Productions	26.75	562	465	16.21	2.22	0.90	8.36
NKE	NIKE, Inc.	84.20	21,830	20,518	16.64	3.59	1.43	8.75
PMMAY	Puma AG	312.05	5,088	4,593	14.99	5.02	2.19	9.02
RBK	Reebok International	58.72	3,514	3,451	14.91	2.41	0.90	8.58
WWW	Wolverine World Wide	22.10	1,257	1,253	17.42	2.71	1.20	9.53
BWS	Brown Shoe Company	43.36	800	1,019	22.62	1.91	0.47	9.09
SKX	Skechers U.S.A.	17.09	683	614	17.63	2.02	0.62	6.88
SRR	Stride Rite Corp.	13.70	497	524	20.72	1.87	0.89	9.28
DECK	Deckers Outdoor Corp.	30.05	373	367	13.32	2.29	1.48	7.44
WEYS	Weyco Group	19.90	230	226	11.97	1.75	1.06	6.66
RCKY	Rocky Shoes & Boots	19.96	106	232	8.66	1.12	0.92	7.55
DFZ	R.G. Barry Corp.	6.83	68	92	9.20	8.11	0.87	10.75
BOOT	LaCrosse Footwear	10.40	62	75	12.09	1.28	0.76	8.30
				Average (excl. KCP)	**15.01**	**2.84**	**1.06**	**8.49**
				Max (relative to Avg.)	+51%	+186%	+106%	+27%
				Min (relative to Avg.)	−42%	−61%	−56%	−22%

Stock Valuation Techniques: The Final Word

- No single technique provides a final answer regarding a stock's true value
- All approaches require assumptions or forecasts that are too uncertain to provide a definitive assessment of the firm's value
  - Most real-world practitioners use a combination of these approaches and gain confidence if the results are consistent across a variety of methods

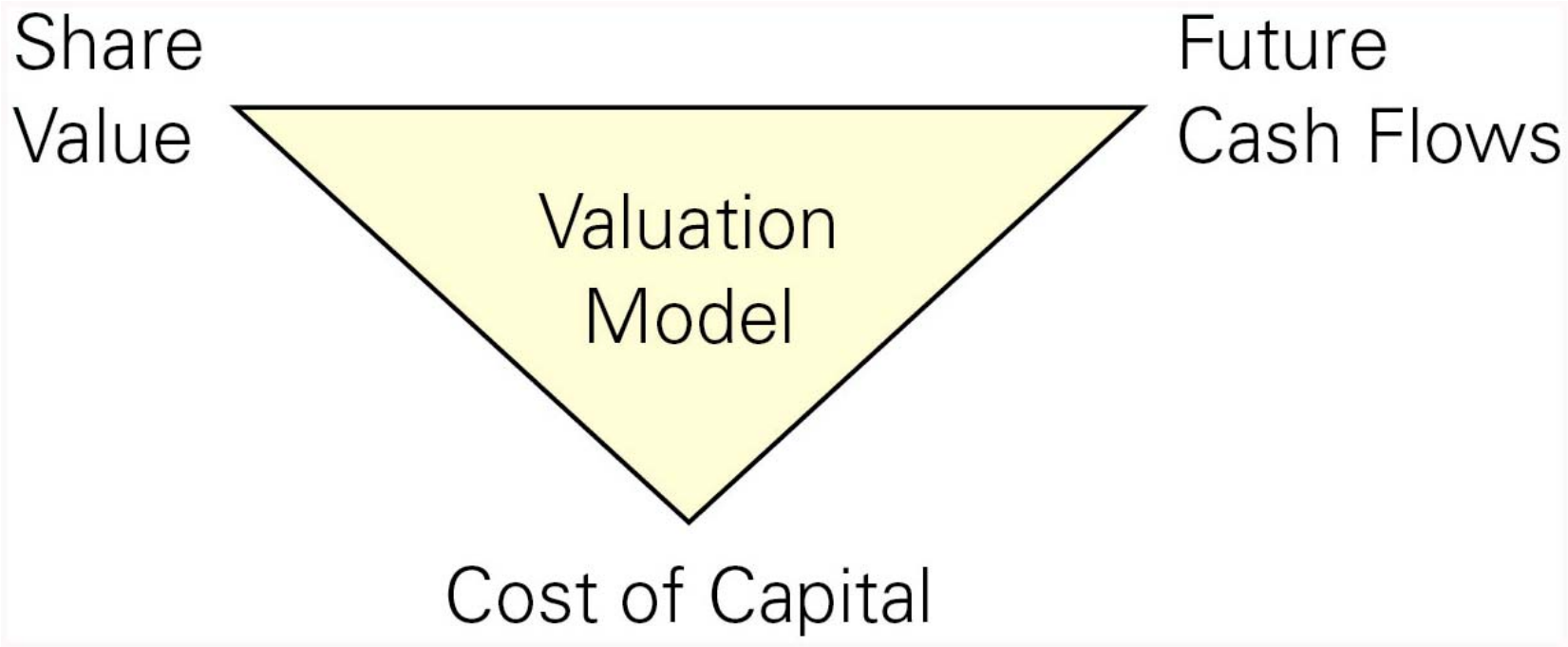
Figure 9.2 Range of Valuations for KCP Stock Using Alternative Valuation Methods



9.5 Information, Competition, and Stock Prices (1 of 2)

- Information in Stock Prices
  - Our valuation model links the firm's future cash flows, its cost of capital, and its share price
  - Given accurate information about any two of these variables, a valuation model allows us to make inferences about the third variable

Figure 9.3 The Valuation Triad



9.5 Information, Competition, and Stock Prices (2 of 2)

- Information in Stock Prices
  - For a publicly traded firm, its current stock price should already provide very accurate information, aggregated from a multitude of investors, regarding the true value of its shares
    - Based on its current stock price, a valuation model will tell us something about the firm's future cash flows or cost of capital

Textbook Example 9.11 (1 of 2)

Using the Information in Market Prices

Problem

Suppose Tecnor Industries will pay a dividend this year of $5 per share. Its equity cost of capital is 10%, and you except its dividends to grow at a rate of about 4% per year, though you are somewhat unsure of the precise growth rate. If Tecnor's stock is currently tradings for $76.92 per share, how would you update your beliefs about its dividend growth rate?

Textbook Example 9.11 (2 of 2)

Solution

If we apply the constant dividend growth model based on a 4% growth rate, we would estimate a stock price of

$$P_0 = \frac{5}{(0.10 - 0.04)} = \$83.33 \text{ per share.}$$

The market price of $76.92, however, implies that most investors except dividends to grow at a somewhat slower rate. If we continue to assume a constant growth rate, we can solve for the growth rate consistent with the current market price using Eq. 9.7:

$$g = r_E - \frac{Div_1}{P_0} = 10\% - \frac{5}{76.92} = 3.5\%$$

Thus, given this market price for the stock, we should lower our expectations for the dividend growth rate unless we have very strong reasons to trust our own estimate.

Competition and Efficient Markets (1of 4)

- Efficient Markets Hypothesis
  - Implies that securities will be fairly priced, based on their future cash flows, given all information that is available to investors.

Competition and Efficient Markets (2 of 4)

- Public, Easily Interpretable Information
  - If the impact of information that is available to all investors (news reports, financials statements, etc.) on the firm's future cash flows can be readily ascertained, then all investors can determine the effect of this information on the firm's value
    - In this situation, we expect the stock price to react nearly instantaneously to such news

Textbook Example 9.12 (1 of 2)

Stock Price Reactions to Public Information

Problem

Myox labs announces that due to potential side effects, it is pulling one of its leading drugs from the market. As a result, its future excepted free cash flow will decline by $85 million per year for the next 10 years. Myox has 50 million shares outstanding, no debt, and equity cost of capital of 8%. If this news came as a complete surprise to investors, what should happen to myox's stock price upon the announcement?

Textbook Example 9.12 (2 of 2)

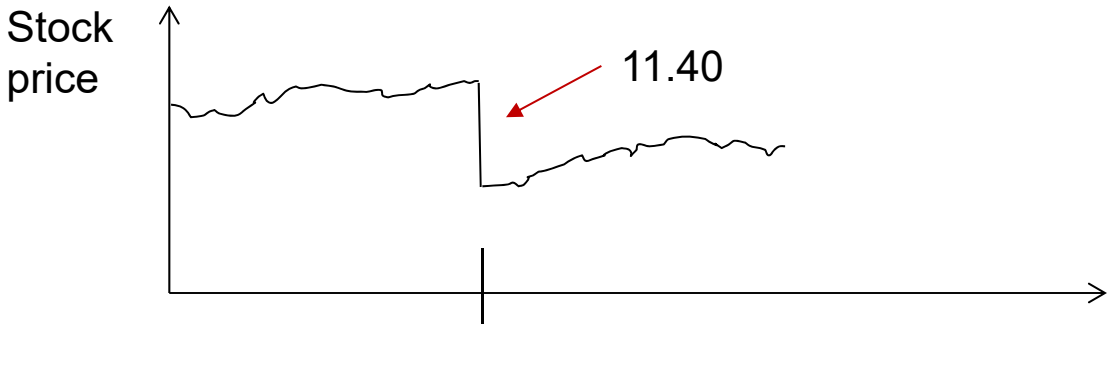
Solution

In this case, we can use the discounted free cash flow method. With no debt, $r_{wacc} = r_E = 8\%$.Using the annuity formula, the decline in expected free cash flow will reduce Myox's enterprise value by

$$\$85 \text{ million} \times \frac{1}{0.08}\left(1 - \frac{1}{1.08^{10}}\right) = \$570 \text{ million}$$

Thus, the share price should fall by $\frac{\$570}{50} = \$11.40 \text{ per share.}$

Because this news is public and its effect on the firm's expected free cash flow is clear, we would expect the stock price to drop by this amount nearly instantaneously.



Competition and Efficient Markets (3 of 4)

- Private or Difficult-to-Interpret Information
  - Private information will be held by a relatively small number of investors
  - These investors may be able to profit by trading on their information
    - In this case, the efficient markets hypothesis will not hold in the strict sense
    - However, as these informed traders begin to trade, they will tend to move prices, so over time prices will begin to reflect their information as well

Competition and Efficient Markets (4 of 4)

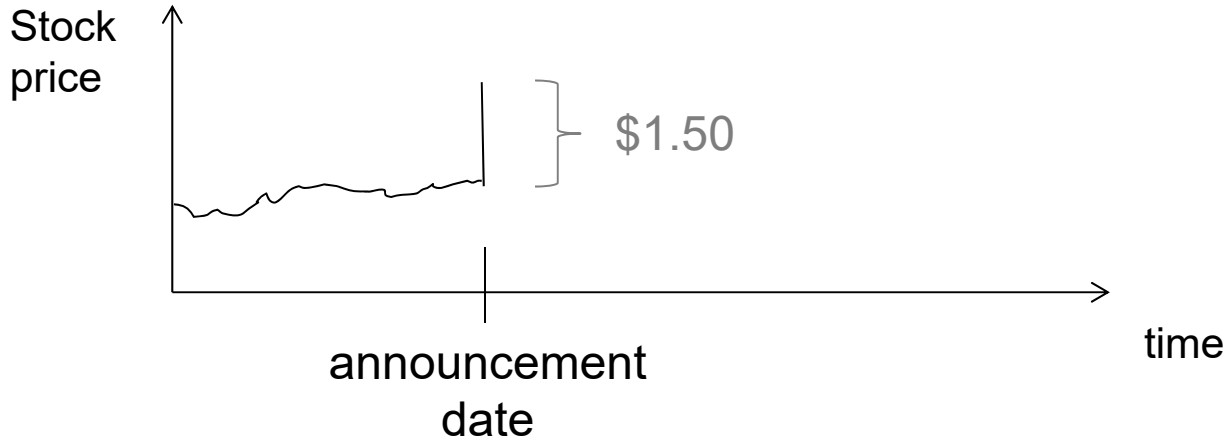
- Private or Difficult-to-Interpret Information
  - If the profit opportunities from having private information are large, others will devote the resources needed to acquire it
    - In the long run, we should expect that the degree of "inefficiency" in the market will be limited by the costs of obtaining the private information

Textbook Example 9.13 (1 of 2)

Stock Price Reactions to Private Information

Problem

Phenyx Pharmaceuticals has just announced the development of a new drug for which the company is seeking approval from the Food and Drug Administration (FDA). If approved, the future profits from the new drug will increase Phenyx's market value by $750 million, or $15 per share given its 50 million shares outstanding. If the development of this drug was a surprise to investors, and if the average likelihood of FDA approval is 10%, what do you expect will happen to Phenyx's stock price when this news is announced? What may happen to the stock price over time?

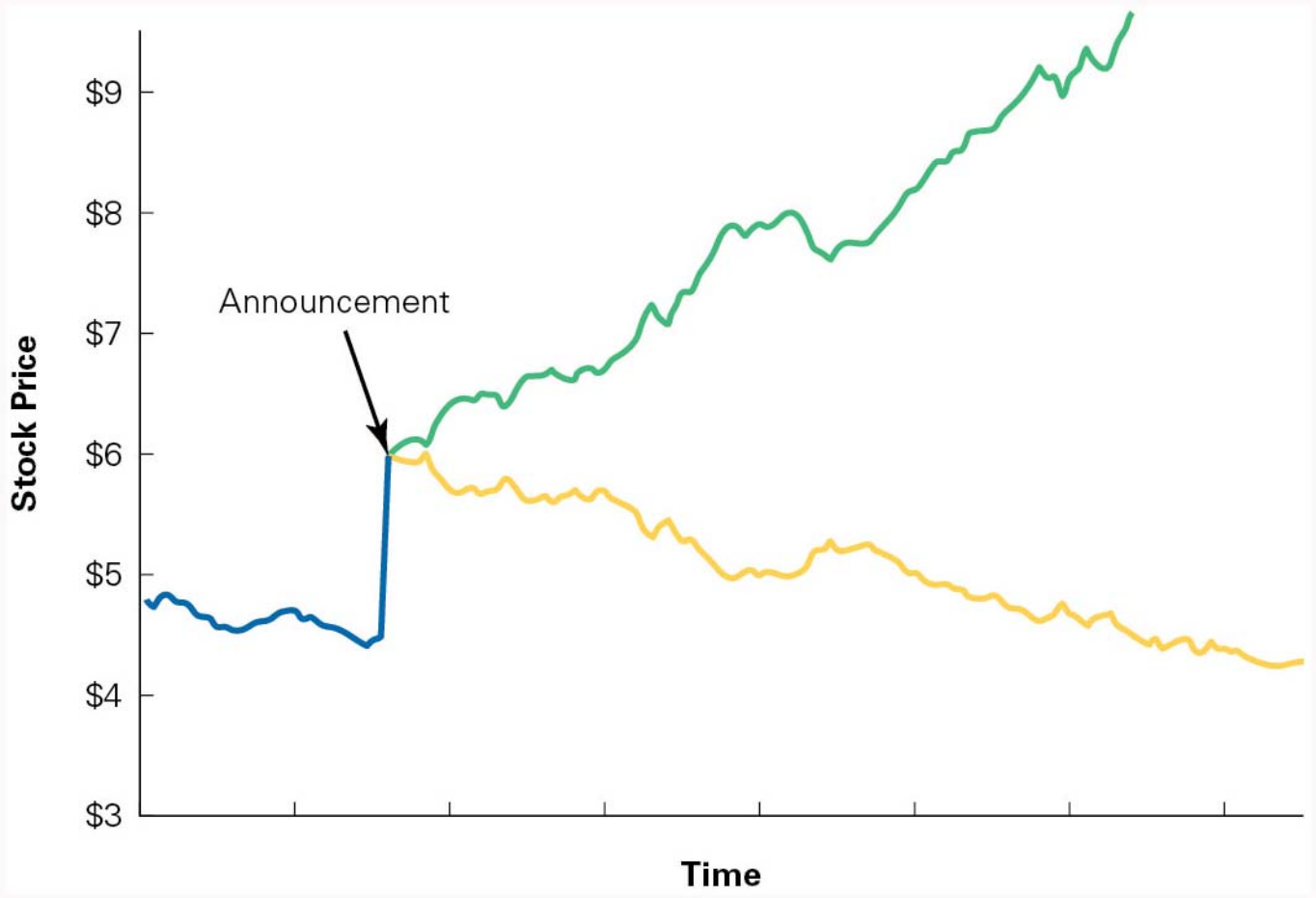


Textbook Example 9.13 (2 of 2)

Solution

Because many investors are likely to know that the chance of FDA approval is 10%, competition should lead to an immediate jump in the stock price of 10% × $15 = $1.50 per share. Over time, however, analysts and experts in the field are likely to do their own assessments of the probable efficacy of the drug. If they conclude that the drug looks more promising than average, they will begin to trade on their private information and buy the stock, and the price will tend to drift higher over time. If the experts conclude that the drug looks less promising than average, they will tend to sell the stock, and its price will drift lower over time. Examples of possible price paths are shown in Figure 9.4. While these experts may be able to trade on their superior information and earn a profit, for uninformed investors who do not know which outcome will occur, the stock may rise or fall and so appears fairly priced at the announcement.

Figure 9.4 Possible Stock Price Paths for Example 9.13



Lessons for Investors and Corporate Managers (1 of 2)

- Consequences for Investors
  - If stocks are fairly priced, then investors who buy stocks can expect to receive future cash flows that fairly compensate them for the risk of their investment
    - In such cases, the average investor can invest with confidence, even if he is not fully informed

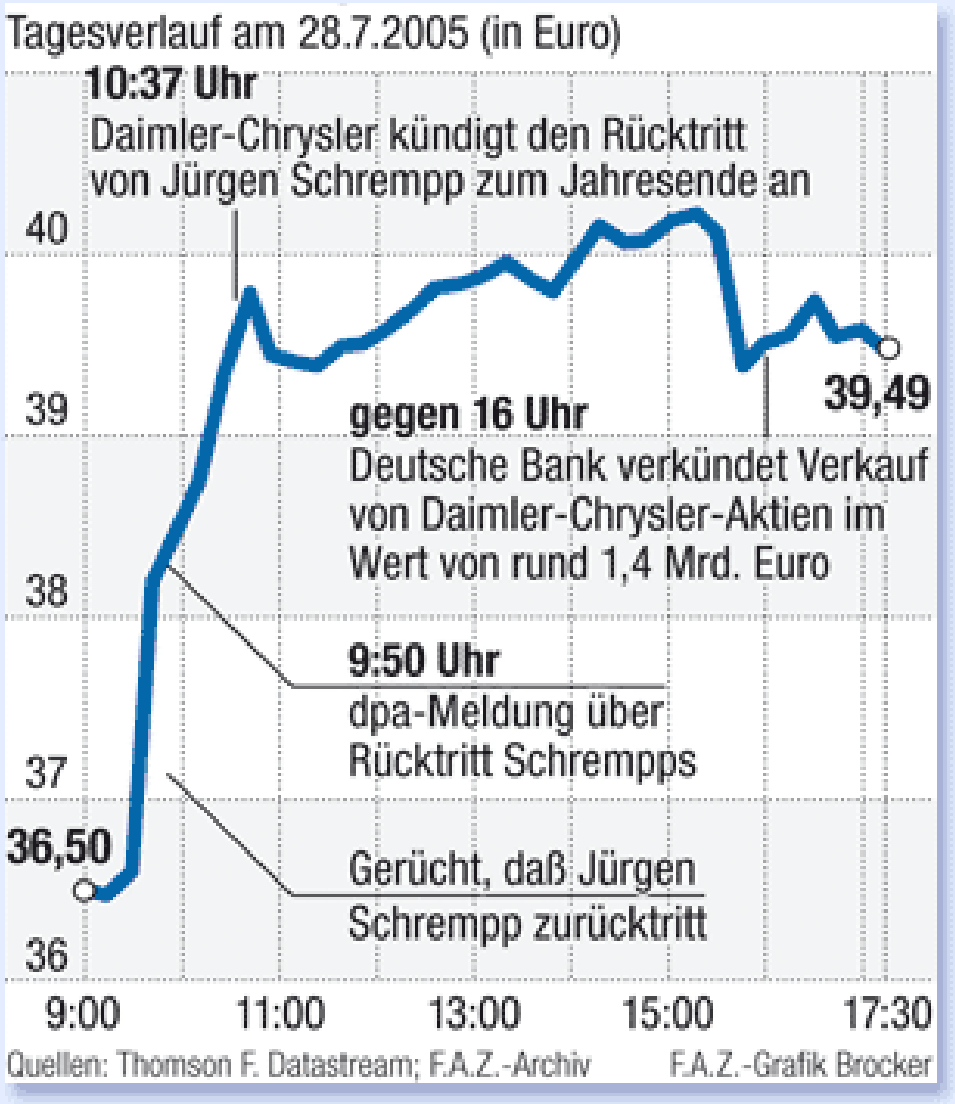
Lessons for Investors and Corporate Managers (2 of 2)

- Implications for Corporate Managers
  - Focus on NPV and free cash flow
  - Avoid accounting illusions
  - Use financial transactions to support investment

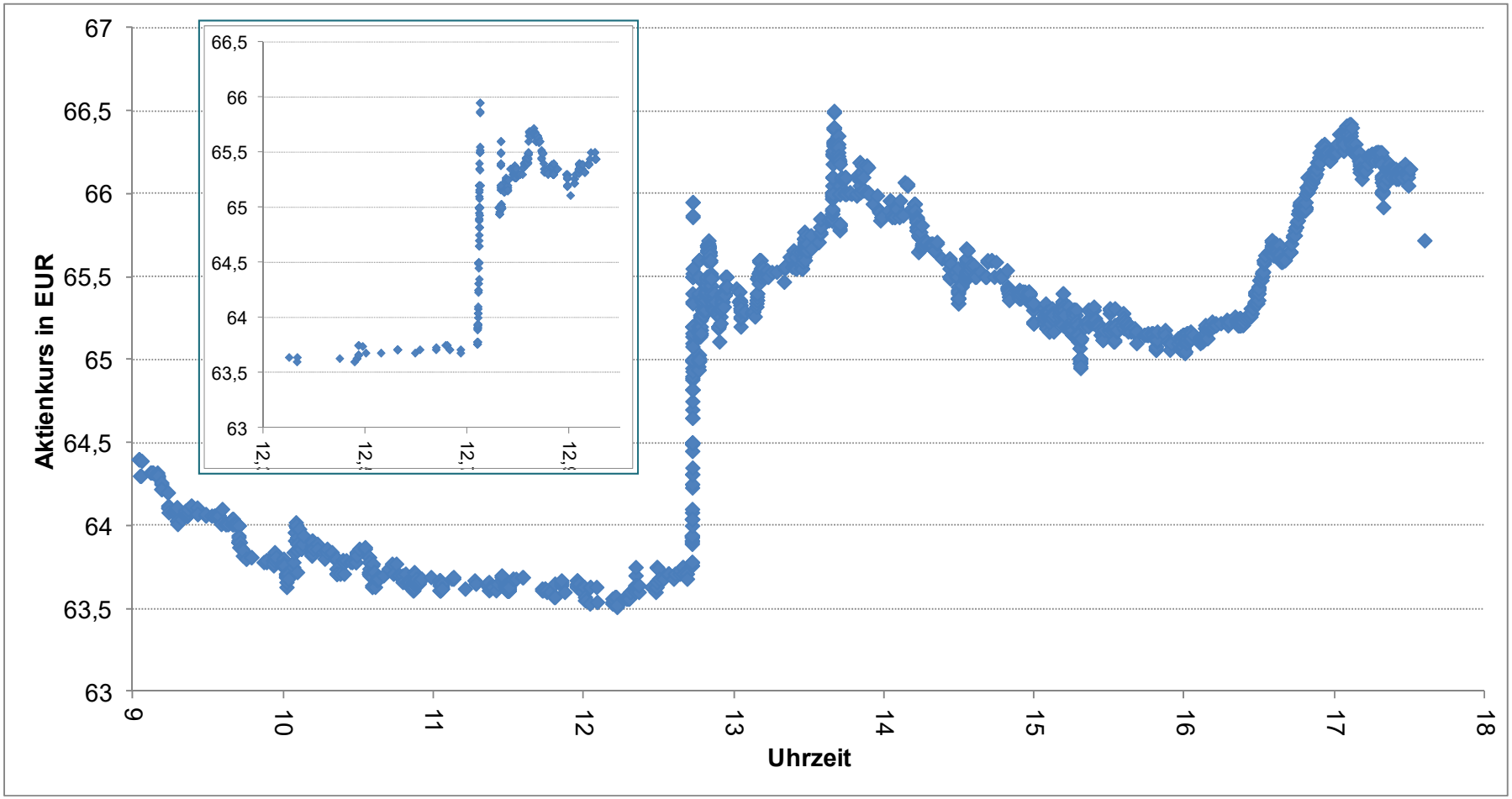
The Efficient Markets Hypothesis Versus No Arbitrage

- The efficient markets hypothesis states that securities with **equivalent risk** should have the **same expected return**
- An arbitrage opportunity is a situation in which two securities with **identical cash flows** have **different prices**

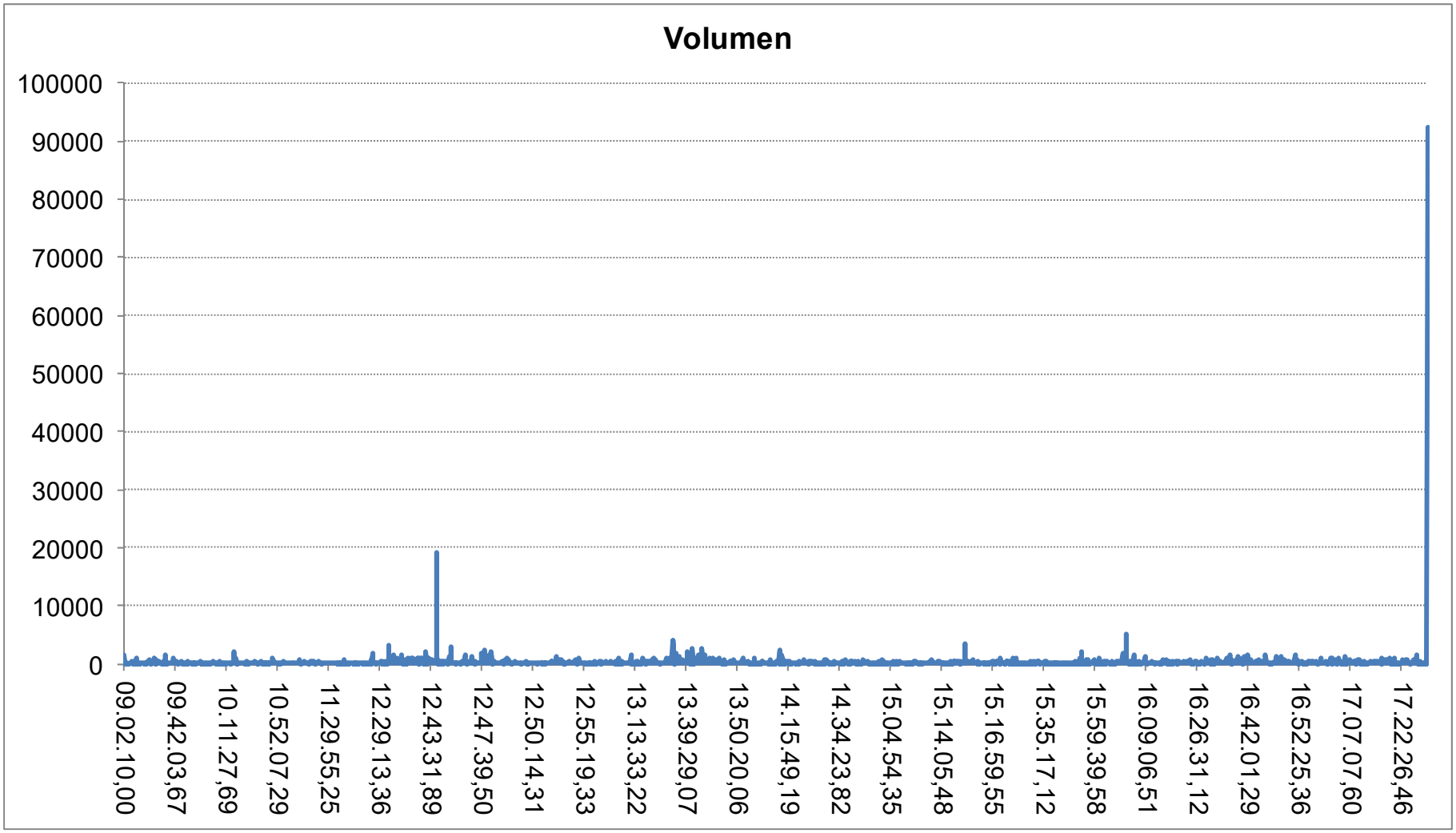
Die Daimler-Chrysler-Aktie



ACS bid for Hochtief



Hochtief Trading Volume XETRA



Stock Exchanges in Germany

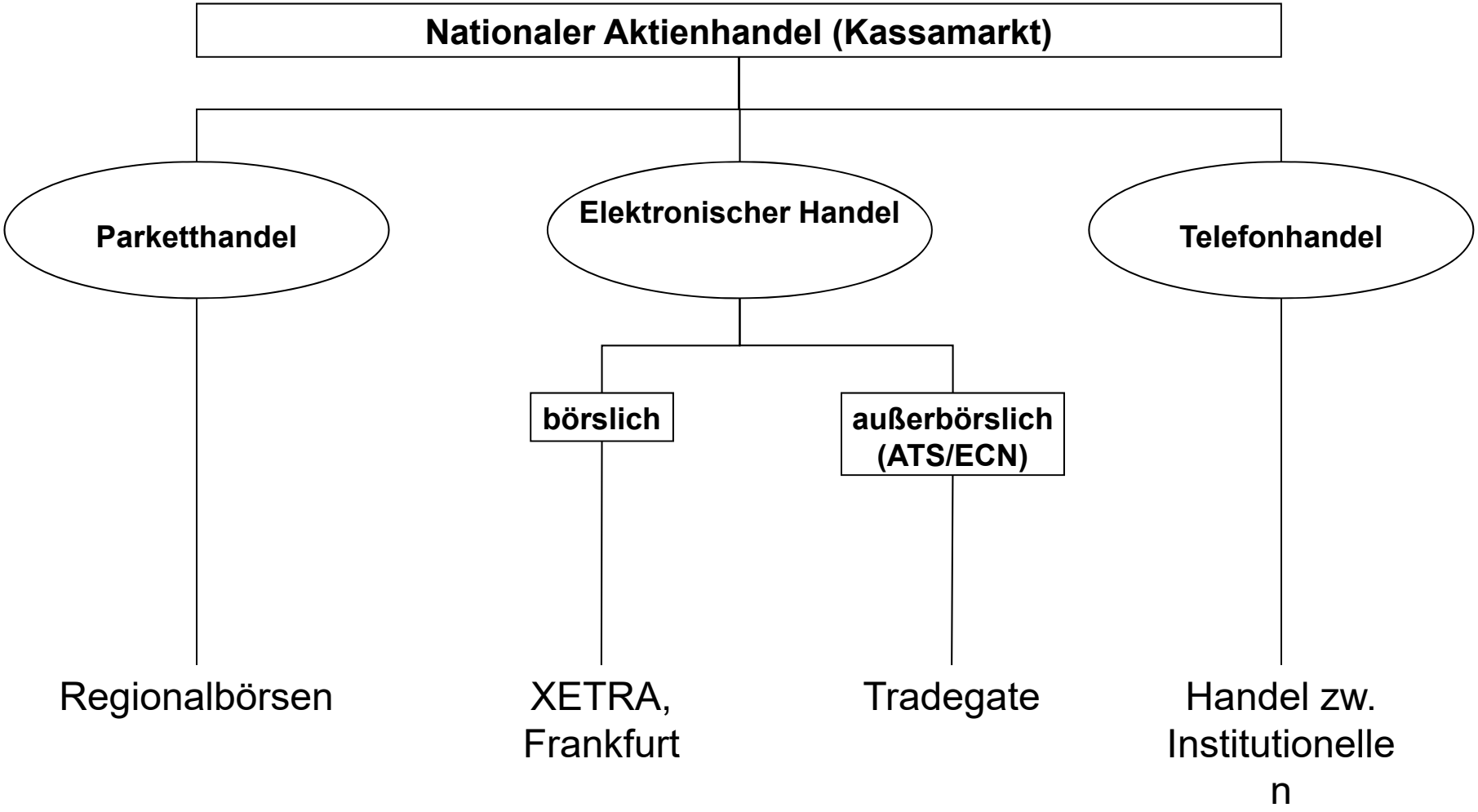
Siemens
Sep 29
2015
9:38 a.m.

Handelsplätze

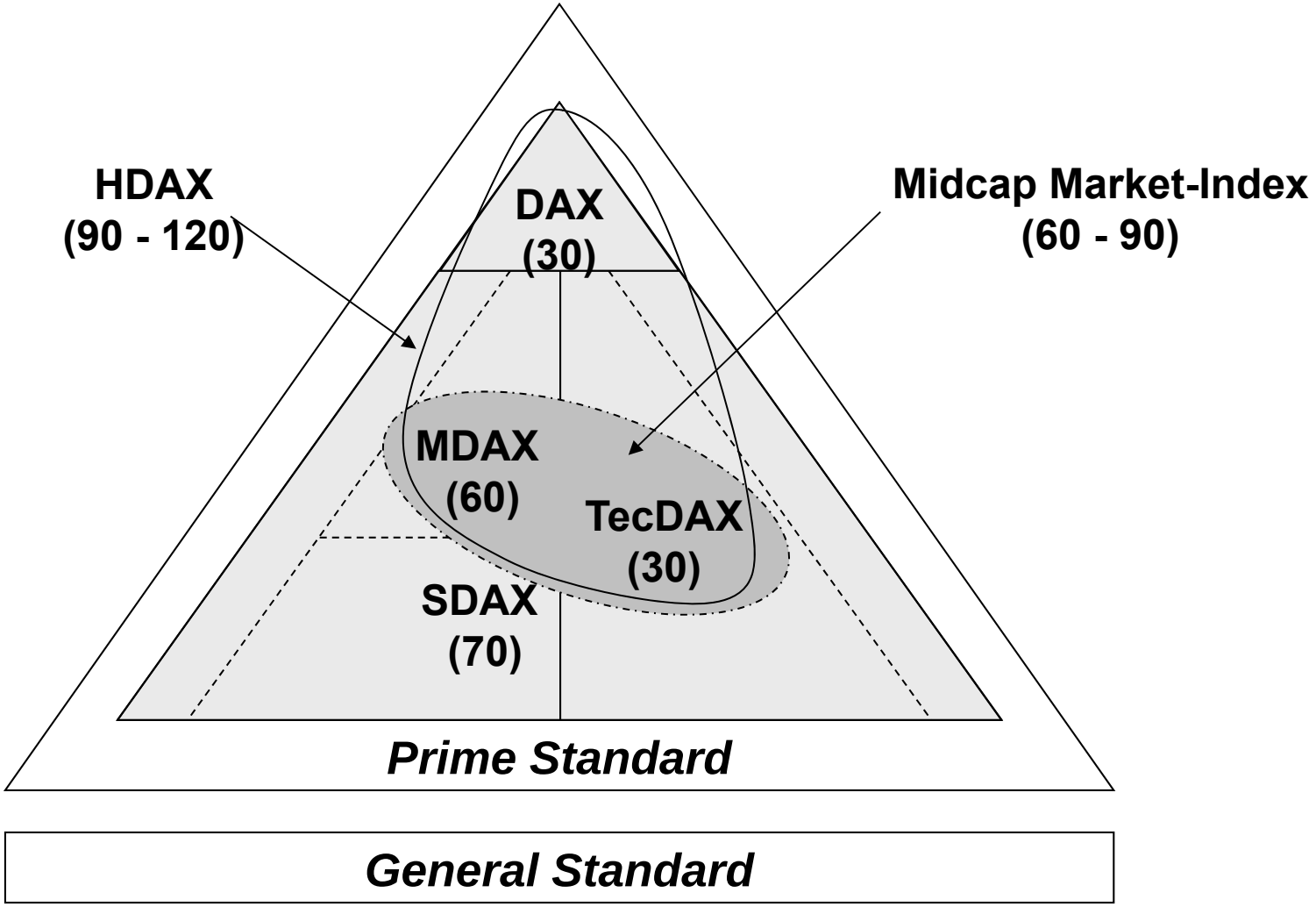
LiveTrading	Geld	Brief	Datum	Zeit	Gestellte Kurse
LT Commerzbank	78,261	78,27	29.09.15	09:37	4.329
LT Lang & Schwarz	78,253	78,277	29.09.15	09:37	3.244
LT Baader Bank	78,242	78,288	29.09.15	09:37	852

Börse	Aktuell	Datum	Zeit	Tages.-Vol.	Anzahl Kurse
Xetra	78,27	29.09.15	09:22	16,52 Mio.	789
Tradegate	78,469	29.09.15	09:34	1,75 Mio.	72
Frankfurt	78,33	29.09.15	09:15	876.068,67	16
Stuttgart	78,175	29.09.15	09:14	142.231,80	7
München	77,95	29.09.15	08:29	22.002,50	5
gettex	77,988	29.09.15	08:28	3.899,40	2
Hannover	78,00	29.09.15	08:25	1.560,00	2
Hamburg	78,00	29.09.15	08:26	4.680,00	2
Berlin	78,49	29.09.15	08:00	9.968,23	1
Düsseldorf	78,40	29.09.15	08:02	0,00	1
FINRA other OTC Issues	88,86	25.09.15	20:14	62.963,60	4
Euronext Amsterdam	78,03	29.09.15	09:03	8.977,00	4
Borsa Italiana	78,10	29.09.15	09:00	13.201,00	3
SIX Swiss Exchange	86,85	28.09.15	09:00	6.079,00	2
Mailand After Hours	96,40	21.07.15	18:00	2.892,00	1
SIX Swiss Exchange	81,81	18.09.15	17:12	8.181,00	1

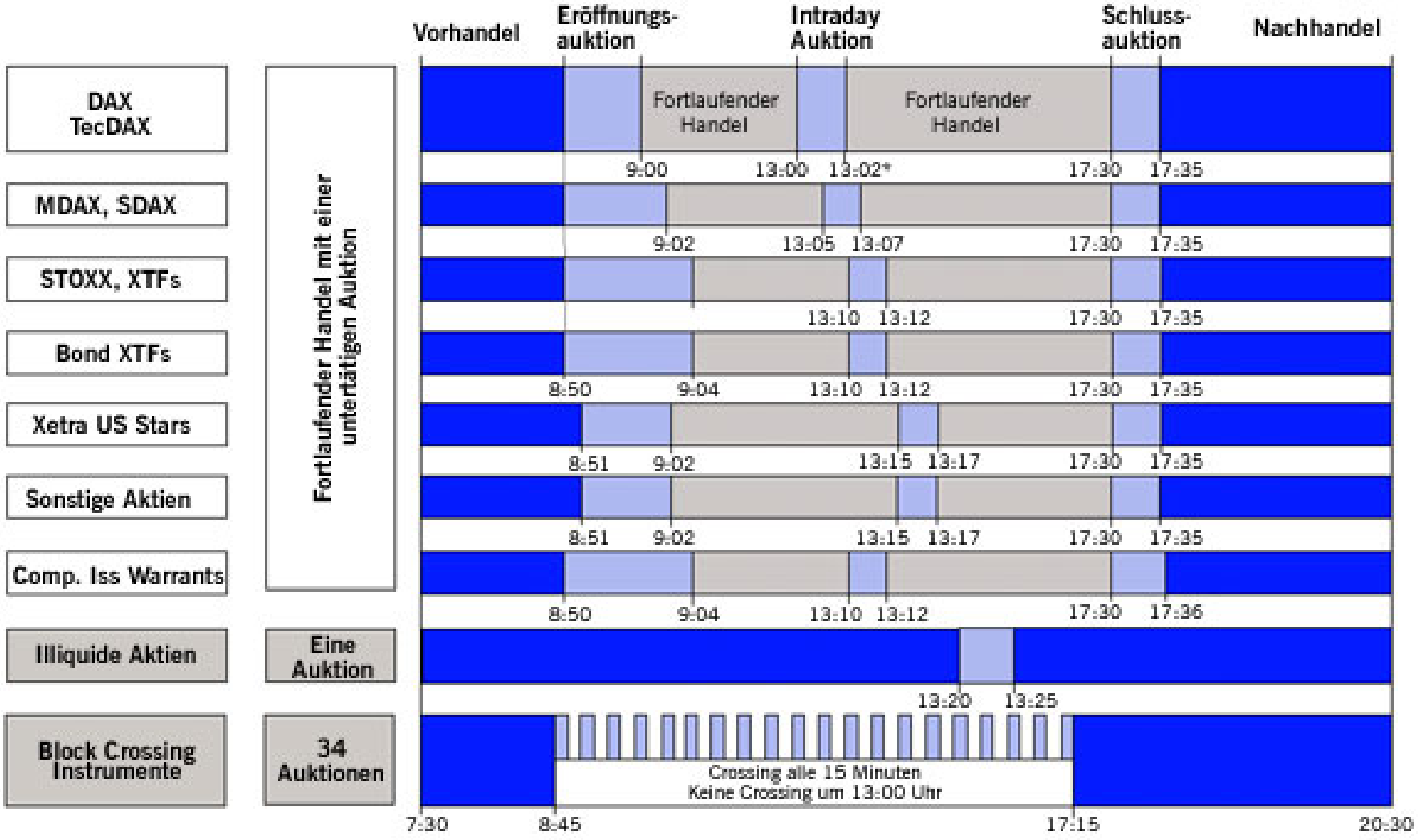
Stock Trading overview



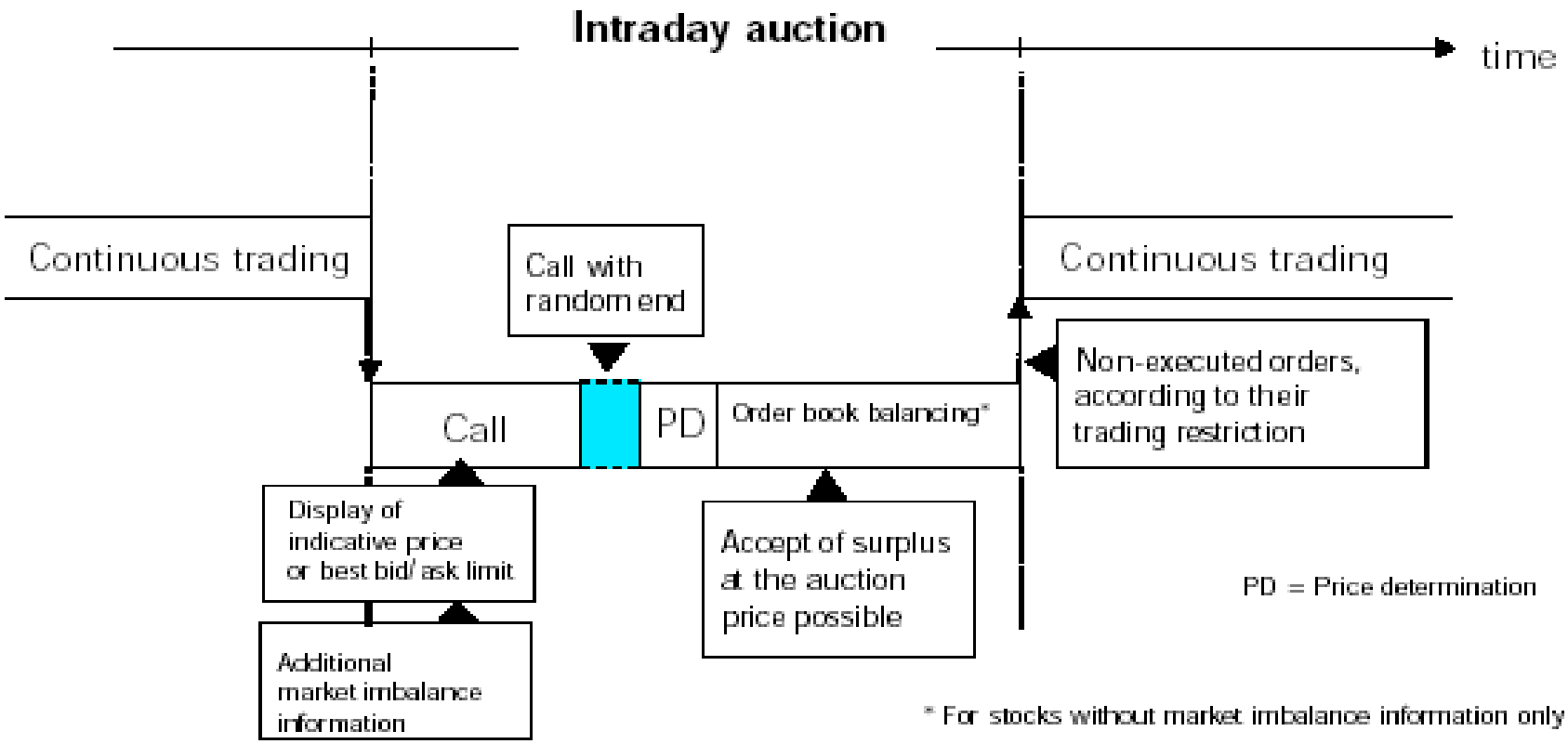
Indexes after Sep. 24 2018



Trading Time XETRA

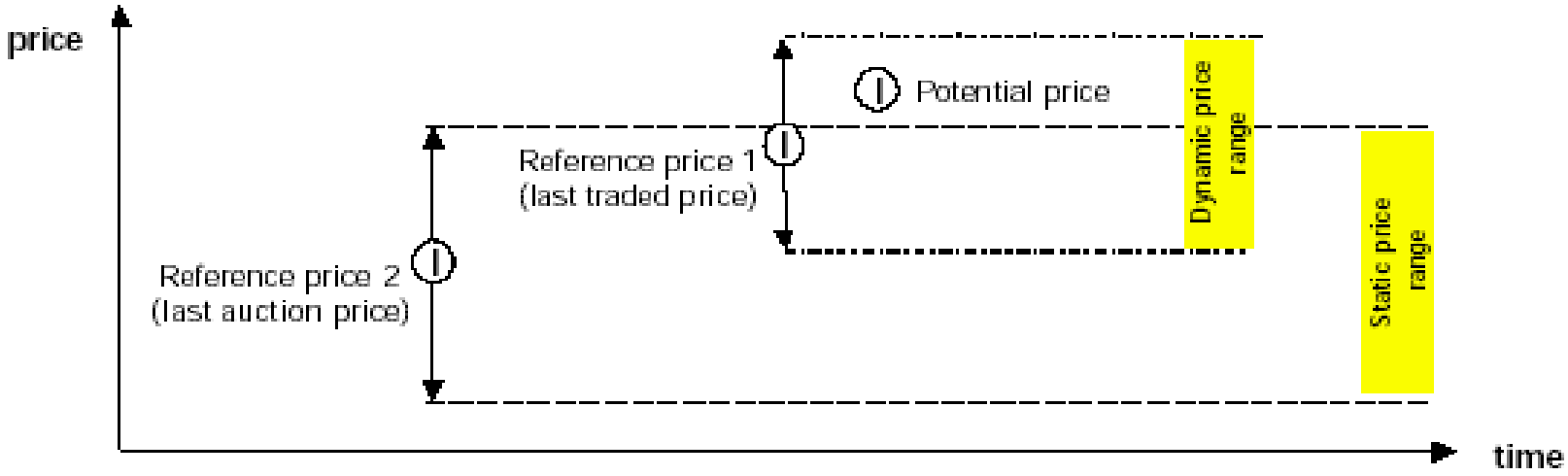


Intraday auction with partially closed order book



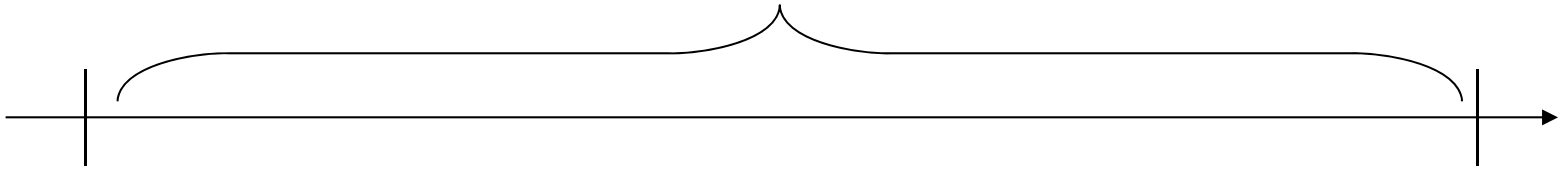
Xetra® - The electronic trading system for the cash market

Dynamic and static price range



Floor Trading

Continuous trading



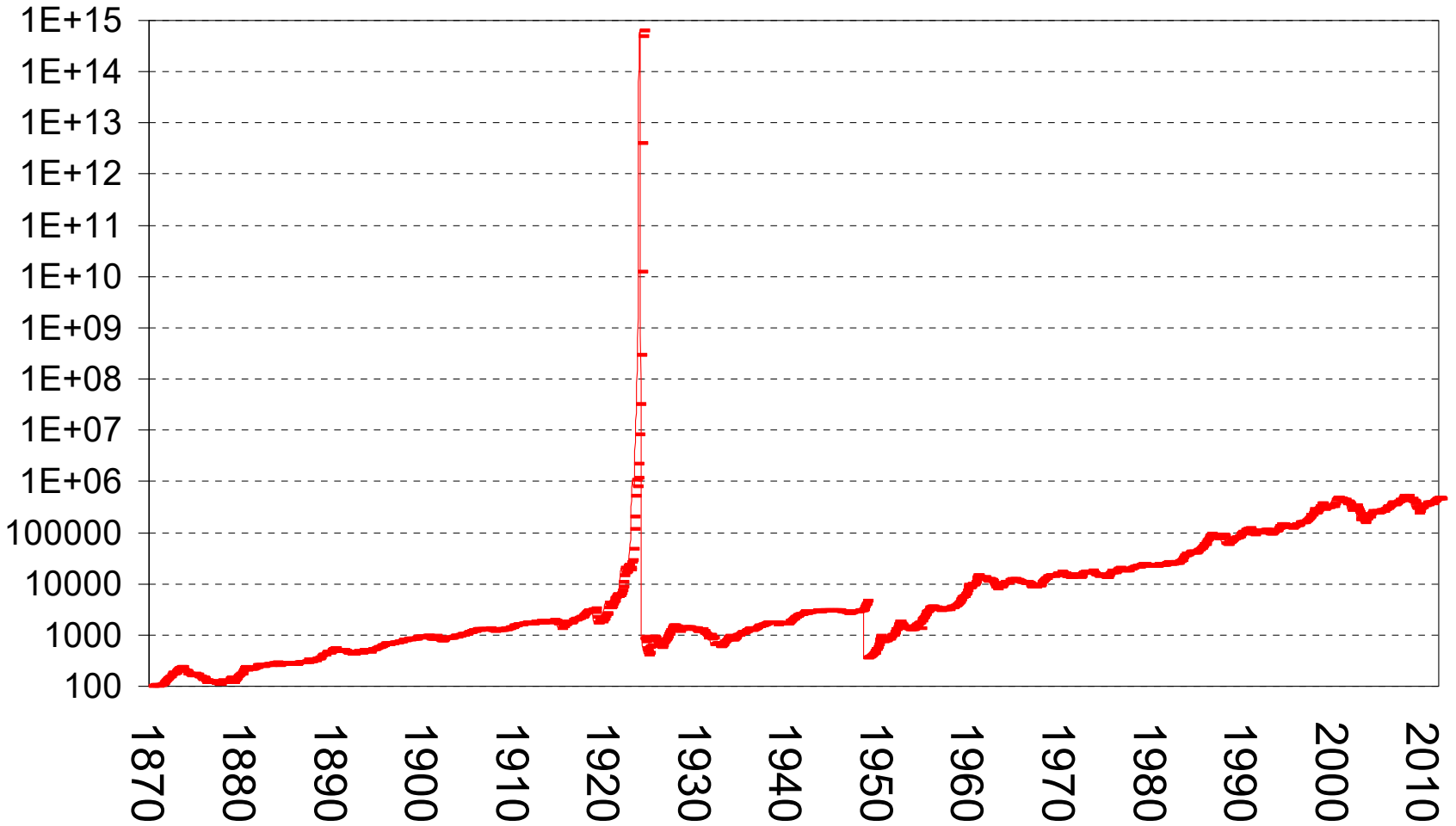
8 Uhr

Opening auction

22 Uhr

End of trading

German Stocks since 1870 nominal



German Stocks real values