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Lecture 6

Valuing stocks

Textbook chapter 7

FIN104 Lecturer Xun Lei

Key concepts and skills

1. Understand the stock trading reports on the Internet or in the financial pages of the newspaper.
2. Understand Market to book ratios and P/E ratios.
3. Calculate the present value of stocks.
4. Understand what professionals mean when they say that there are no free lunches on Wall Street.



1. Stocks and the Stock Market



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1.1. Common stock

- Ownership shares in a publicly held corporation.

1.2. Initial public offering (IPO) or primary offering

- First offering of stock to the general public.

1.3. Primary market

- Market for the sale of new securities by corporations.

1.4. Secondary market

- Market in which previously issued securities are traded among investors. US: NYSE and NASDAQ



1. Stocks and the Stock Market



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1.5. Reading stock market listings

FIGURE 7.1 A portion of the limit order book for FedEx on the BATS Exchange, March 22, 2018

FedEx Corporation (FDX) - NYSE

Top of Order Book, 1:04 PM EST

Bid		Ask	
Price	Size	Price	Size
239.81	100	240.06	100
239.80	400	240.16	100
239.70	100	241.02	100
239.33	100	241.14	100
230.03	100	241.23	500



1. Stocks and the Stock Market



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1.5. Reading stock market listings

FIGURE 7.2 Trading
information for FedEx

FedEx Corporation (FDX)

☆ [Add to watchlist](#)

NYSE - Nasdaq Real Time Price. Currency in USD

239.98 **-9.04 (-3.63%)**

As of 1:02PM EDT. Market open.

Summary	Chart	Conversations	Statistics	Profile	Final
Prev Close:	249.02	Market Cap:	64.318B		
Open:	246.00	Beta:	1.57		
Bid:	239.98 × 100	PE Ratio (TTM):	22.11		
Ask:	240.10 × 100	EPS (TTM):	10.86		
Day's Range:	236.00–246.00	Earnings Date:	Mar 19, 2018–Mar 23, 2018		
52wk Range:	182.89–274.66	Forward Dividend & Yield:	2.00 (0.80%)		
Volume:	2,359,358	Ex-Dividend Date:	N/A		
Avg. Volume:	1,866,076	1y Target Est:	284.69		



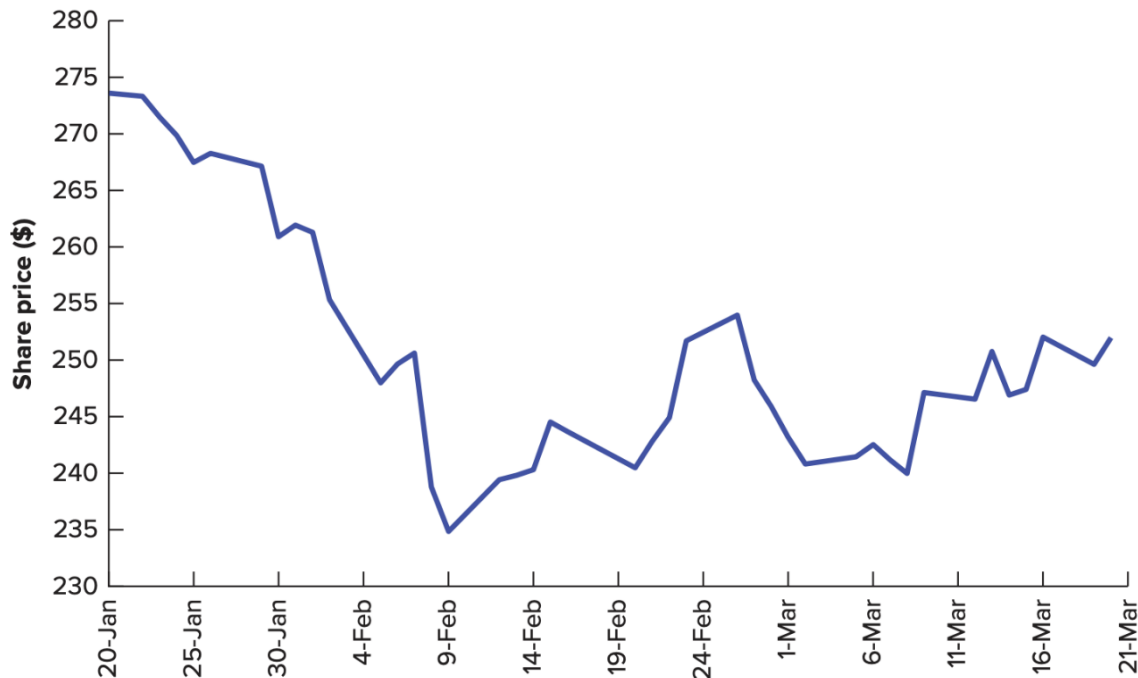
1. Stocks and the Stock Market



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1.5. Reading stock market listings

FIGURE 7.3 Share price
history for FedEx





2. Market Values, Book Values, and Liquidation Values



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2.1. Book value of equity

- Value shown in the firm's balance sheet

TABLE 7.1 Simplified balance sheet for FedEx, May 30, 2017 (figures in \$ millions)

Assets		Liabilities and shareholders' equity	
Current assets	12,628	Current liabilities	7,918
Plant, equipment, and other long-term assets	35,924	Debt and other long-term liabilities	24,561
		Shareholders' equity	16,073
Total assets	48,552	Total liabilities and equity	48,552

Note: Shares of stock outstanding = 252.4 million. Book value of equity (per share) : $\$16,073/252.4 = \63.68 .

- Book value per share = book value of equity/ number of shares outstanding



2. Market Values, Book Values, and Liquidation Values



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2.2.Liquidation value

- Net proceeds that could be realized by selling the firm's assets and paying off its creditors.
- A successful company ought to be worth more than liquidation value.



2. Market Values, Book Values, and Liquidation Values



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2.3. Market value or market capitalization

- Different from book value or liquidation value of the firm because this measure treats the firm as an on-going concern
 - Extra earning power
 - Intangible assets
 - Value of future investments

- $\text{Share price} = \text{market value} / \text{number of shares outstanding}$



2. Market Values, Book Values, and Liquidation Values



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TABLE 7.2 Market values
versus book values, March 2018

	Ticker	Stock Price	Book Value per Share	Market-to-Book- Value Ratio
FedEx	FDX	240.00	63.68	3.8
Johnson & Johnson	JNJ	138.83	22.41	6.2
Campbell Soup	CPB	47.76	6.47	7.4
PepsiCo	PEP	119.93	7.78	15.4
Walmart	WMT	98.75	25.67	3.8
Microsoft	MSFT	85.14	10.17	8.4
Amazon	AMZN	1,169.47	57.24	20.4
DowDuPont	DWDP	67.43	43.22	1.6
American Electric Power	AEP	72.86	37.29	2.0
US Steel	X	40.24	18.91	2.1



3. Valuing common stocks



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3.1. Valuation by comparables

- Examining how much investors are willing to pay for each dollar of assets or earnings among a group of similar firms.
- Market to book ratio = market value of equity / book value of equity
- P/E ratio = stock price per share / earnings per share

3. Valuing common stocks

3.1. Valuation by comparables

TABLE 7.3 Market-to-book-value ratios and price-earnings ratios for selected companies and their principal competitors, March 2018

	Market-to-Book Value Ratio		Price-Earnings Ratio	
	Company	Industry	Company*	Industry
FedEx	3.8	7.3	14.4	22.6
Johnson & Johnson	6.2	4.9	14.9	23.9
Campbell Soup	7.4	2.9	13.4	27.0
PepsiCo	15.4	10.0	17.6	27.3
Walmart	3.8	4.0	16.9	19.6
Microsoft	8.4	6.6	23.7	60.8
Amazon	20.4	9.4	97.2	46.6
DowDuPont	1.6	3.5	13.7	13.5
American Electric Power	2.0	1.9	15.9	21.0
US Steel	2.1	2.3	8.2	27.8

* Price divided by forecasted earnings in the coming year.



3. Valuing common stocks



3.2. Price and intrinsic value

- Intrinsic value is present value of future cash payoffs from a stock
- Calculation: assume we buy a share of Apple Inc. today and sell it after 1 year. The predicted stock price in 1 year is P_1 , the expected dividend per share is DIV_1 , and the discount rate is r . V_0 which is the intrinsic value, equals to:

$$V_0 = \frac{DIV_1 + P_1}{1 + r}$$

- If $P_1 = \$81$, $DIV_1 = \$3$ and $r = 12\%$,

$$V_0 = \frac{3 + 81}{1.12} = \$75$$



3. Valuing common stocks



3.2. Price and intrinsic value

➤ Discount rate or required rate of return r

Expected rate of return = expected dividend yield + expected capital gain

$$\begin{aligned} &= \frac{DIV_1}{P_0} + \frac{P_1 - P_0}{P_0} \\ &= \frac{3}{75} + \frac{81 - 75}{75} \\ &= .04 + .08 = .12, \text{ or } 12\% \end{aligned}$$

➤ When the firms' risk is the same, the firms' discount rate r is the same.

▶ 3. Valuing common stocks

7.2 Self-Test

Androscoggin Copper is increasing next year's dividend to \$5 per share. The forecast stock price next year is \$105. Equally risky stocks of other companies offer expected rates of return of 10%. What should Androscoggin common stock sell for?



3. Valuing common stocks



3.3. The dividend discount model

- Discounted cash-flow model that states that today's stock price equals the present value of all expected future dividends (without considering investment horizons).

$$\begin{aligned} P_0 &= \text{present value of } (DIV_1, DIV_2, DIV_3, \dots, DIV_t, \dots) \\ &= \frac{DIV_1}{1+r} + \frac{DIV_2}{(1+r)^2} + \frac{DIV_3}{(1+r)^3} + \dots + \frac{DIV_t}{(1+r)^t} + \dots \end{aligned}$$



3. Valuing common stocks



3.3. The dividend discount model

➤ If we consider time horizon, then

$$P_0 = \frac{DIV_1}{1+r} + \frac{DIV_2}{(1+r)^2} + \dots + \frac{DIV_H + P_H}{(1+r)^H}$$



3. Valuing common stocks



3.3.The dividend discount model

- The firm should have the same present value, even if the time horizons are different.

TABLE 7.4 Value of Blue Skies

Horizon (years)	PV (dividends)	+	PV (terminal price)	=	Value per Share
1	\$ 2.68		\$72.32		\$75
2	5.26		69.74		75
3	7.75		67.25		75
10	22.87		52.13		75
20	38.76		36.24		75
30	49.81		25.19		75
50	62.83		12.17		75
100	73.02		1.98		75



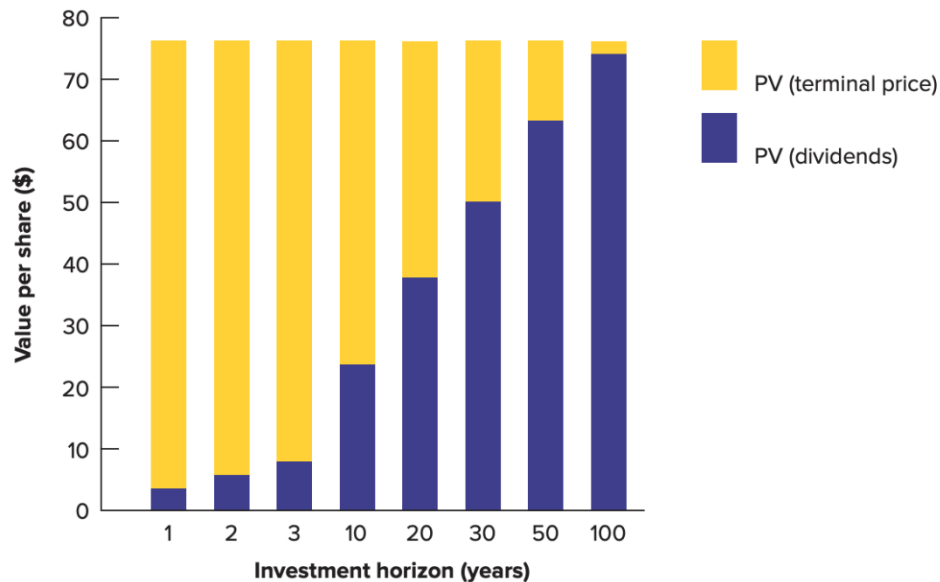
3. Valuing common stocks



3.3. The dividend discount model

- The firm should have the same present value, even if the time horizons are different.

FIGURE 7.4 Value of Blue Skies for different horizons





3. Valuing common stocks



3.4. Simplifying the dividend discount model

- Case 1: the dividend discount model with no growth
- No-growth shares should sell for the present value of a constant, perpetual stream of dividends.

$$\text{Value of a no-growth stock} = P_0 = \frac{\text{DIV}_1}{r}$$

- No-growth firms pays out all its earnings as dividends

$$\text{Value of a no-growth stock} = P_0 = \frac{\text{EPS}_1}{r}$$



3. Valuing common stocks



3.4. Simplifying the dividend discount model

$$\text{Value of a no-growth stock} = P_0 = \frac{\text{DIV}_1}{r}$$

$$\text{Value of a no-growth stock} = P_0 = \frac{\text{EPS}_1}{r}$$

7.4 Self-Test

Moonshine Industries has produced a barrel per week for the past 20 years but cannot grow because of certain legal hazards. It earns \$25 per share per year and pays it all out to stockholders. The stockholders have alternative, equivalent-risk ventures yielding 20% per year on average. How much is one share of Moonshine worth? Assume the company can keep going indefinitely.



3. Valuing common stocks



3.4. Simplifying the dividend discount model

- Case 2: the dividend discount model with constant growth
- We assume the dividend grows at a rate of g every year, then

$$P_0 = \frac{DIV_1}{1+r} + \frac{DIV_1(1+g)}{(1+r)^2} + \frac{DIV_1(1+g)^2}{(1+r)^3} + \frac{DIV_1(1+g)^3}{(1+r)^4} + \dots$$

- Rearranging the formulas above, we obtain:

$$P_0 = \frac{DIV_1}{r-g} = \frac{DIV_0 \times (1+g)}{r-g}$$

- It is constant-growth dividend discount model or Gordon growth model

▶ 3. Valuing common stocks



$$P_0 = \frac{DIV_1}{r - g} = \frac{DIV_0 \times (1 + g)}{r - g}$$

7.5 Self-Test

Androscoggin Copper can grow at 5% per year for the indefinite future. It's selling at \$100, and next year's dividend is \$5. What is the expected rate of return from investing in Carrabasset Mining common stock? Carrabasset and Androscoggin shares are equally risky.



3. Valuing common stocks



3.4. Simplifying the dividend discount model

- How to calculate constant or sustainable growth rate g here?
- Payout ratio is earnings paid out as dividends/total earnings.
- Plowback ratio is earnings retained in the firm/ total earnings.
- Plowback ratio = $1 - \text{payout ratio}$



3. Valuing common stocks



3.4. Simplifying the dividend discount model

➤ g is the rate at which the firm can grow by reinvesting earnings.

$$\begin{aligned}\text{➤ } g = \text{Growth rate} &= \frac{\text{plowed-back earnings}}{\text{initial equity}} = \frac{\text{plowed-back earnings}}{\text{total earnings}} \times \frac{\text{total earnings}}{\text{initial equity}} \\ &= \text{plowback ratio} \times \text{ROE}\end{aligned}$$

➤ Since g is constant or unchanged, plowback ratio and ROE should be constant or unchanged.



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3.4. Simplifying the dividend discount model

- *Exercise: if Aqua America's ROE is 12.5% and payout ratio is 62%, what is its sustainable growth rate?*



3. Valuing common stocks

3.4. Simplifying the dividend discount model

- Plowing earnings back will result in growth in earnings and dividends.
- But plowing earnings back will only add value or add to present stock price, when $ROE > \text{required rate of return } r$.



3. Valuing common stocks



3.4. Simplifying the dividend discount model

- Example: Aqua America's $DIV_1 = .86$, plowback ratio = 0.38 and $g = 0.0475$. If investors require a return of 7.0% ($r = .070$), then the price of Aqua America should be

$$P_0 = \frac{DIV_1}{r - g} = \frac{\$.86}{.070 - .0475} = \$38.22$$

- If Aqua America pays out all earnings as dividend, then $g=0$ and

$$P_0 = \frac{EPS_1}{r} = \frac{\$1.3875}{.070} = \$19.82$$

- If Aqua America's $ROE = r = 7\%$, then $g = 0.38 * 0.07 = 0.0266$

$$P_0 = \frac{DIV_1}{r - g} = \frac{.86}{.070 - .0266} = \$19.82$$



3. Valuing common stocks



3.4. Simplifying the dividend discount model

- Present value of growth opportunities
= Net present value of a firm's future investments

Value of assets in place	\$19.82
+ Present value of growth opportunities (PVGO)	<u>18.40</u>
= Total value of Aqua America's stock	\$38.22



3. Valuing common stocks



3.4. Simplifying the dividend discount model

7.6 Self-Test

Suppose that instead of plowing money back into lucrative ventures, Aqua America's management is investing at an expected return on equity of 5%, which is *below* the return of 7% that investors could expect to get from comparable securities.

- Find the sustainable growth rate of dividends and earnings in these circumstances. Continue to assume a 38% plowback ratio.
- Find the new value of its investment opportunities. Explain why this value is negative despite the positive growth rate of earnings and dividends.



3. Valuing common stocks



3.4. Simplifying the dividend discount model

➤ Limitation of this constant growth dividend discount model

$$P_0 = \frac{\text{DIV}_1}{r - g}$$

- g is not always constant in the practical world.
- r should be larger than g , otherwise P_0 here becomes negative.



3. Valuing common stocks



3.4. Simplifying the dividend discount model

➤ Case 3: the dividend discount model with no constant growth

The formula is

$$P_0 = \underbrace{\frac{DIV_1}{1+r} + \frac{DIV_2}{(1+r)^2} + \dots + \frac{DIV_H}{(1+r)^H}}_{\text{PV of dividends from year 1 to horizon}} + \underbrace{\frac{P_H}{(1+r)^H}}_{\text{PV of stock price at horizon}}$$



3. Valuing common stocks



3.4. Simplifying the dividend discount model

- Example: Walmart's earnings does not grow constantly in the following 5 years but the payout ratio remains 43%. Since year 6, Walmart's earnings begins to constantly grow at 3%. What is the price now, if r is 5.6%?

Year	1	2	3	4	5
Earnings	5.14	5.48	5.83	6.21	6.61
Dividends (43% of earnings)	2.21	2.36	2.51	2.67	2.85

$$\begin{aligned}\text{PV of dividends years 1-5} &= \frac{\$2.21}{1.056} + \frac{\$2.36}{(1.056)^2} + \frac{\$2.51}{(1.056)^3} + \frac{\$2.67}{(1.056)^4} + \frac{\$2.85}{(1.056)^5} \\ &= \$10.66\end{aligned}$$



3. Valuing common stocks



3.4. Simplifying the dividend discount model

- Example: Walmart's earnings does not grow constantly in the following 5 years but the payout ratio remains 43%. Since year 6, Walmart's earnings begins to constantly grow at 3%. What is the price now, if r is 5.6%?

$$\text{DIV}_6 = 1.03 \times \text{DIV}_5 = 1.03 \times \$2.85 = \$2.94$$

$$P_5 = \frac{\text{DIV}_6}{r - g} = \frac{\$2.94}{.056 - .03} = \$113.08$$

$$P_0 = \text{PV}(\text{dividends years 1-5}) + \text{PV}(\text{price in year 5})$$

$$= \$10.66 + \frac{\$113.08}{1.056^5} = \$96.77 \blacksquare$$



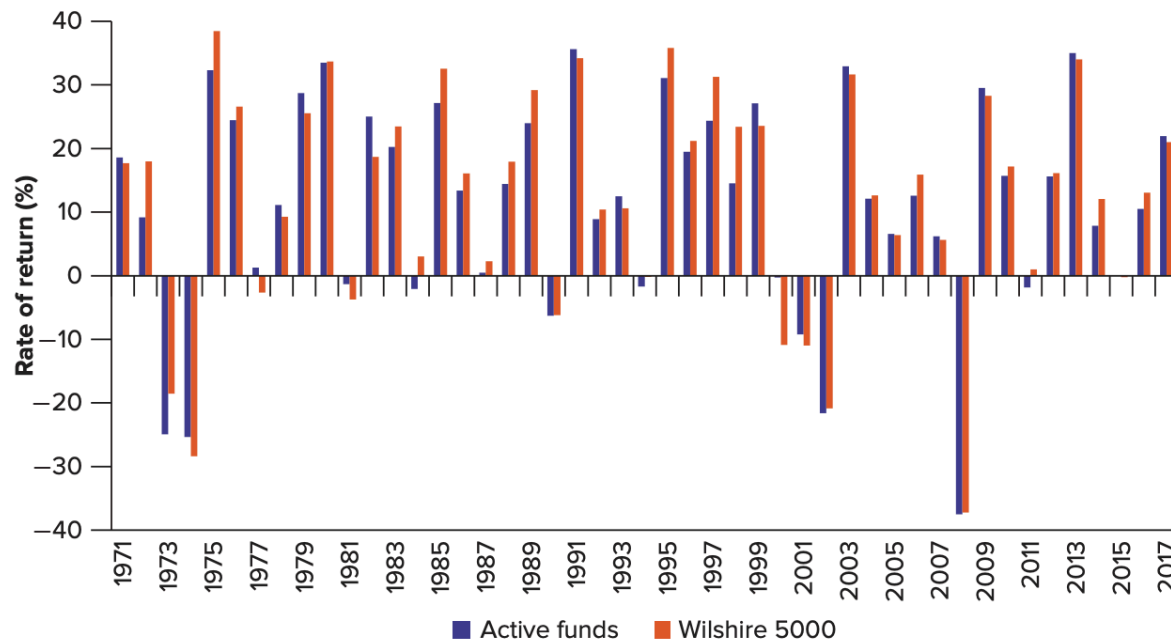
4. No free lunches on wall street



4.1. Individual investors cannot beat the market

4.2. Institutional investors cannot always beat the market

FIGURE 7.6 Annual returns on the Wilshire 5000 Market Index and equity mutual funds, 1971–2017. The market index provided a higher return than the average mutual fund in 28 of the 47 years.





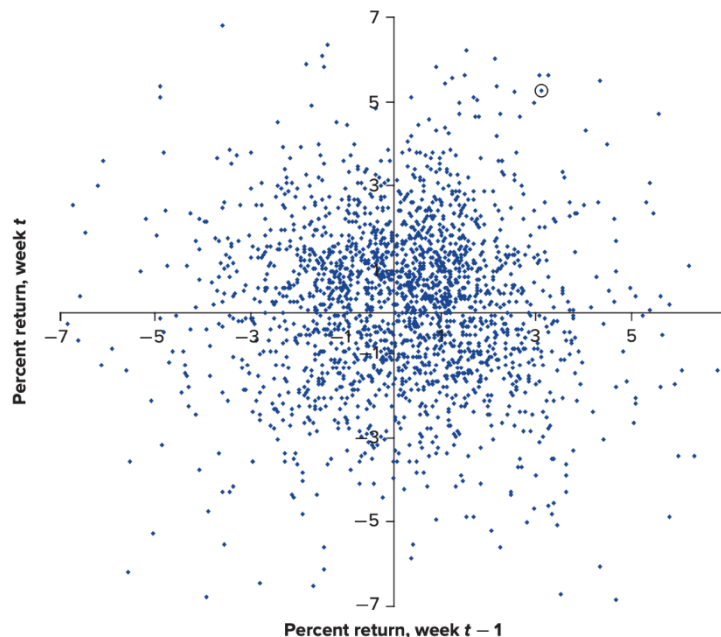
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4.3. Random walks

- New information is necessarily unanticipated. So, the change in the stock price must be a surprise and cannot be predicted from earlier changes in the stock price.

FIGURE 7.7a Each dot shows the returns on the New York Composite Index on two successive weeks over a 40-year period. The circled dot shows a weekly return of +3.1%, followed by +5.2% in the next week. The scatter diagram shows no significant relationship between returns on successive weeks.





4. No free lunches on wall street



4.4. Efficient market hypothesis

- Market in which prices reflect all available information
- Weak-form efficient market: history price information is contained in the current prices.
- Semi-form efficient market: all public information is contained in the current prices, including history price, annual reports, new papers and investment magazines.
- Strong-form efficient market: all public and private information is contained in the current prices.



4. No free lunches on wall street



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4.5. Behavior finance

- People are not 100% rational and psychology could impact stock prices.
- Attitudes toward risk
- Beliefs about probability
- Sentiment



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That is all for today!
Thanks for listening.

