

## Final overview (and review)

### Final exam

- ❑ Not cumulative
  - I won't be targeting first-half material.
  - But the course is cumulative; the second-half builds on the first half.
  - To explain how a stop-loss order is handled, you need to know basic procedures of a limit order market.
- ❑ Questions a mix of
  - Computational and institutional
  - Multiple choice and short answer (paragraph)

# Organization

		Topics				
		Public information	Private information	Hedging	Algorithms	Pricing and regulation
Approaches	Economics					
	Market procedures and rules					
	Law					
	Games					

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		Topics				
		Public information	Private information	Hedging	Algorithms	Pricing and regulation
Approaches	Economics	Informational efficiency	Informational efficiency; Models of spread and price impact	Static, Dynamic	Random walk, alpha, order impact, order splitting	Maker/taker; Taker maker, Pmt for order flow
	Market procedures and rules	Trading halts			Complex order types	Reg NMS
	Law	10b-5; securities class actions	Insider trading			
	Games	F1 (reacting to information)	PDO (price discovery)	H1, H3 (trading to manage risk)		

## Chapter 9. Public information and trading halts

### Readings (links on web page)

Fischel, Daniel R. (1982). Use of modern finance theory in securities fraud cases involving actively traded securities. *Business Lawyer*, 38(1), 1-20.

### Partial list of concepts and terms

Market efficiency (weak-, semi-strong-, strong-); limit-up/limit-down; circuit breakers; timing of public announcements; trading halts; re-openings; forecasting the forecasts of others (the Keynesian "beauty contest"); Reg FD

Rule 10b-5 (not exact wording, but the content); material fact/materiality; reliance; causation; damages under the "traditional" view; material ... damages under the market-efficiency view; fraud on the market; of materiality and reliance; corrective disclosure; the single-index stock return model and its use in damage calculation; identification of injured buyers and sellers. Most of these concepts were identified and/or analyzed in the Roka, Sanofi, and "ChunkyChocolates" cases.

The next two questions refer to the following situation.

- APX first reported its 2013 IV (fourth quarter) earnings on January 29, 2014.
- On Monday, March 3, 2014, APX closed down 2% from the previous Friday. After the market close, APX discloses that previously reported 2013 IV results can't be relied upon and are likely to be revised.
- On Tuesday, March 4, APX closes down 18% from the previous day. Also on Tuesday, after the market close, APX discloses that 2013 IV earnings were overstated by \$0.30 per share.
- On Wednesday, March 5, APX closes down 8% from the March 4 close.

- 9.5. Randolph and Mortimer Duke immediately file a law suit alleging that the accounting fraud cost them 28% of their investment in APX (the sum of the Monday, Tuesday and Wednesday declines). APX hires an expert. Using market data prior to June, 2014, the single-index model is specified for daily returns as  $r_{APX} = \alpha_{APX} + \beta_{APX} r_M + e$  where the expert's estimated parameters are  $\alpha_{APX} = 0$ ;  $\beta_{APX} = 1.3$ . The daily returns on APX and the market ("M") during the week are:

$$e = r_{APX} - (\alpha_{APX} + \beta_{APX} r_M)$$

$$e = r_{APX} - 1.3 \times r_M$$

Date	$r_{APX}$	$r_M$
Monday, March 3	-2.0%	-4.0%
Tuesday, March 4	-18.0%	-5.0%
Wednesday, March 5	-8.0%	-1.0%
Thursday, March 6	+3.0%	-1.0%
Friday, March 7	6.0%	5.0%

$$\begin{array}{r} -11.5 \\ -6.7 \\ \hline -18.2\% \end{array}$$

$$\begin{array}{l} -18 - (1.3 \times -5) = -11.5 \\ -8 - (1.3 \times -1) = -6.7 \end{array}$$

What case could the expert make to refute the Duke claim? What number might she suggest as an alternative to the 28% loss?

- 9.6. The Dukes also present the following records of their purchases and sales:

Date	Shares bought (sold)	Net holdings
September 1, 2013	10,000	10,000
December 29, 2013	(9,000)	1,000
January 5, 2014	5,000	6,000
February 1, 2014	2,000	8,000
March 7, 2014	(8,000)	0

On the basis of these records, they claim that their 28% loss applies to the 17,000 shares they purchased before or during the period affected by the alleged fraud. What alternative number might APX's expert suggest?

## Chapter 10. Private information

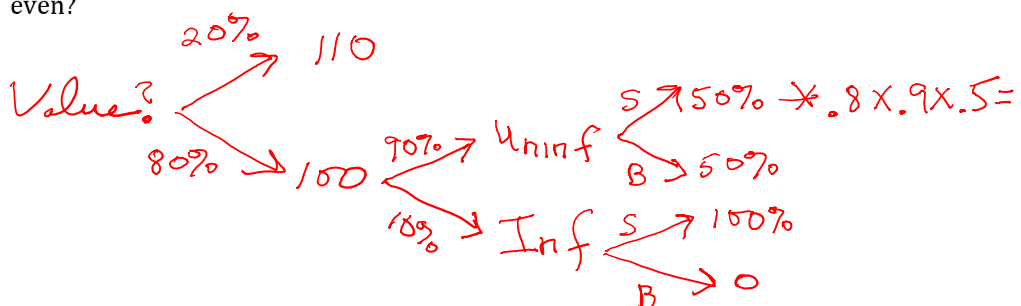
### Readings (links on web site)

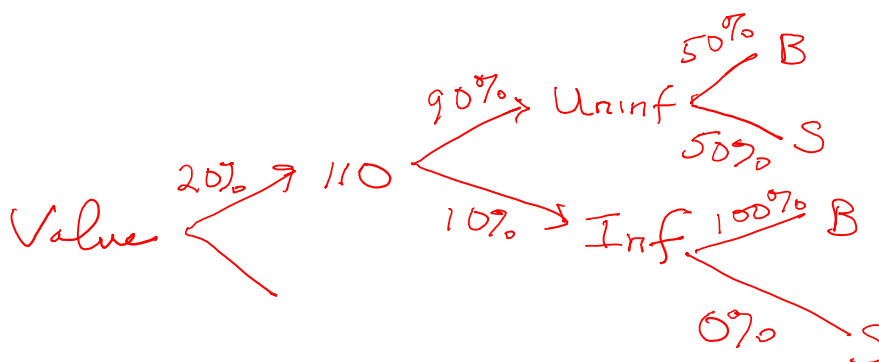
Bagehot, W., 1971. The Only Game in Town. Financial Analysts Journal 27, no. 2 (March-April), 12-22, (pseudonym for Jack Treynor).

### Partial list of concepts and terms.

Private vs. common values; symmetric and asymmetric information; Treynor/"Bagehot" analysis of the bid-ask spread. The sequential trade model of the bid-ask spread and price impact; market failure;

- 10.2. At the end of the day, SLK stock will be worth 100 (an 80% probability) or 110 (a 20% probability). A market-maker believes that 90% of her incoming traders are uninformed, and equally likely to buy or sell; the remaining 10% know SLK's end-of-day value. The market maker is trying to set his ask price. At what value of the ask does she just break even?

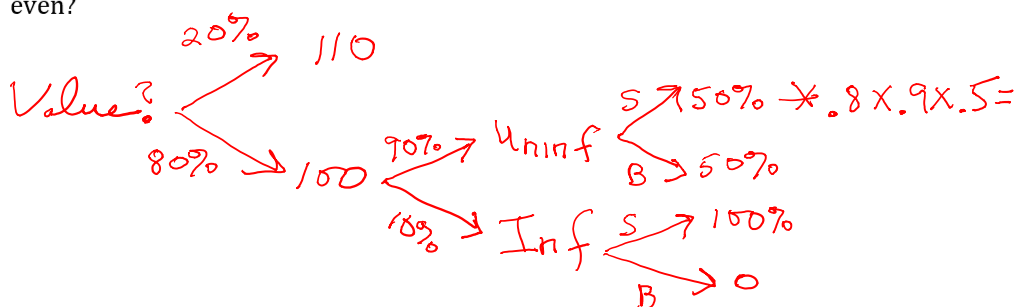




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- 10.2. At the end of the day, SLK stock will be worth 100 (an 80% probability) or 110 (a 20% probability). A market-maker believes that 90% of her incoming traders are uninformed, and equally likely to buy or sell; the remaining 10% know SLK's end-of-day value. The market maker is trying to set his ask price. At what value of the ask does she just break even?



- 10.3. Before posting her ask price, the market maker notices that the date is April 15. Uninformed traders are more likely to be selling stock to pay their taxes. She now figures that there is only a 30% probability that an uninformed trader will be buying. What is her revised ask price?

## Chapter 11. Insider trading

### Readings (links on web site)

Bainbridge, Stephen M. (2000). Insider trading: an overview.

Pages 1-(top of) p. 5. Morrison-Foerster, LLP. (2015). 2014 Insider Trading Annual Review. Morrison-Foerster, LLP.

### Partial list of concepts and terms

Disclose or abstain (Texas Gulf Sulfur); fiduciary duty of confidentiality (Chiarella); misappropriation of information (O'Hagan); tipper-tipee liability (Dirks); short-swing profits; 10b5-1 plans and the criticisms; economic arguments and counter-arguments in favor of insider trading.

11.4. Does the following situation constitute illegal insider trading?

- IceMountain (ICE) and SlipperySlope (SSL) are both publicly-traded companies that manufacture snowboards.
- ICE has done extensive tests of both firms' products; this testing clearly indicates that ICE boards are better.
- Next week, Downhill Magazine will release its annual review of snowboards.
- Mike, the president of ICE, is certain that Downhill's review will confirm the ICE tests, and the price of SSL will drop. He sees an opportunity.
- He plans to sell short, in his personal account, 10,000 shares of his competitor, SSL, just before the review is released.

Discuss whether this would constitute illegal insider trading from the perspectives of the disclose-or-abstain, fiduciary duty, and misappropriation principles.

## **Chapter 12. Conditional orders / Complex orders**

### **Partial list of concepts and terms**

Stop orders; trailing stops; pegged orders; discretionary orders; reserve/iceberg orders



- 12.6. Stock XYZ is 20.10 bid, offered at 20.18. At 10:00am I enter an order to buy, undisplayed, pegged to the midpoint, with a discretionary offset of \$0.03. In the following sequence of quotes, when does my order first execute (if at all)?

	Time	Bid	Offer	Mid	Distance to Offer
a.	10:01	20.10	20.29	20.195	0.095
b.	10:02	20.18	20.29	20.235	0.055
c.	10:03	20.19	20.29	20.240	0.050
d.	10:04	20.20	20.29	20.245	0.045
e.	10:05	20.21	20.29	20.250	0.040
f.	10:06	20.22	20.29	20.255	0.035
g.	10:07	20.23	20.29	20.260	0.030
h.	10:08	20.24	20.29	20.265	0.025
<u>i.</u>	10:09	20.25	20.29	20.270	0.020
j.	10:10	20.26	20.29	20.275	0.015
k.	None of these situations would lead to an execution.				

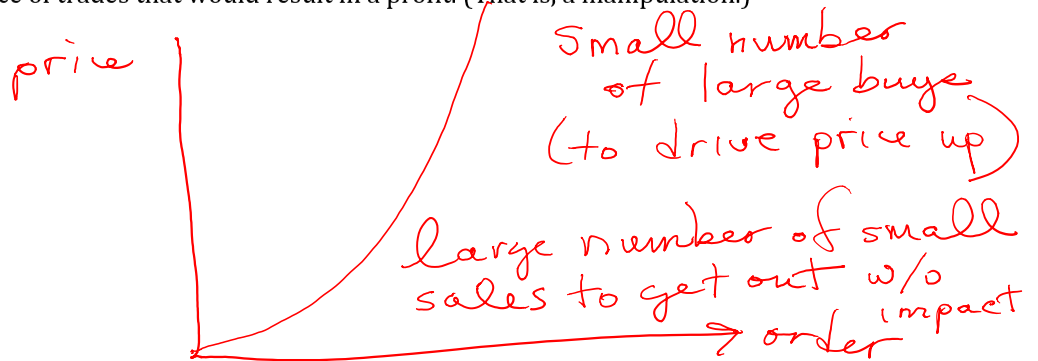
## Chapter 13. Statistical models of order-price dynamics [and]

## Chapter 14. Order splitting

### Partial list of concepts and terms

Random-walk; alpha; order impact; efficient trading frontier; manipulations

- 14.4. (Difficult) Suppose that the stock price dynamics are described by  $p_t = p_{t-1} + 0.1 \times S_t^2$  (if  $S_t$  shares are being actively bought, that is, if  $S_t > 0$ ) and  $p_t = p_{t-1} - 0.1 \times S_t^2$  (if  $S_t$  shares are being actively sold, that is, if  $S_t < 0$ ). The current price is \$10. Describe a round-trip sequence of trades that would result in a profit. (That is, a manipulation.)



## Chapter 15. Hedging

### Terms and Concepts

Static hedging; the market model; single index model; setting up a hedge to capture a return differential; setting up a hedge to remove market risk; dynamic hedging; delta of an option; implementation of delta hedges; direction of trades. You won't need to do a Black-Scholes valuation or compute a Black-Scholes delta.

- 15.1. (Static hedging) The Privet hedge fund analyst has determined that LMN stock is likely to outperform the market ("SPY") over the near horizon. The fund wants to establish a \$20 million position that will earn the return differential  $r_{LMN} - r_{SPY}$ . LMN stock is currently priced at \$28 per share; the SPY is currently priced at \$204 per share. How many shares of each security should Privet be long and/or short?

- 15.2. (Static hedging) DBQ stock is currently priced around \$12 per share. The president and founder of the firm owns two million shares. She doesn't want to sell the stock outright: the market for DBQ has little depth, and she wants to avoid any suspicion that she is pessimistic on the company's outlook. She would like to at least partially hedge her position against market risk. Her broker has estimated the following regression relation between one-month returns on DBQ and the SPY (the market):  $r_{DBQ} = 0.001 + 1.2 \times r_{SPY} + e$ . With the SPY at \$204 per share, what position (how many shares? long or short?) should she establish in SPY?

## Chapter 16. Fees, rebates and other inducements

### Partial list of concepts and terms

Taker fees (also called liquidity removal, liquidity access); rebates for adding liquidity (also called maker rebates); inverted ("taker/maker") pricing and the logic behind it; payment for order flow; [SEC] Rule 606 information.

## Chapter 17. Regulation of US equity markets

### Readings (links on the web page)

Discussion of "spoofing" in the Complaint for US v. Navinder Singh Sarao. (This was discussed in the class session on Pricing.)

Introduction to Reg NMS (from the final version of the rule). ←

### Partial list of concepts and terms

Market competition; order competition; alternative trading system (ATS); electronic communications network (ECN); order handling rule; Reg NMS; order protection rule; access rule; subpenny pricing rule; protected quotes; intermarket sweep orders (ISOs); tick size; The Common Cents Pricing Act of 1997; Small Cap Liquidity Reform Act of 2014; Tick size pilot program. Trade-at rule. *Some of the material on protected quotes and intermarket sweep orders is discussed in Chapter 4.*

- 17.2. ISOs. Protected quotes. The bid sides of the books at three market centers are as follows. There are no hidden orders.

<i>Price</i>	<i>Exchange A shares</i>	<i>Exchange B shares</i>	<i>Exchange C shares</i>
50.49	300	200	
50.48	100	800	
50.47	100	300	400
50.46		900	600
50.45	2,000	2,000	2,000

- For each exchange, what are the protected bids (prices and quantities)?
- A trader wants to sell 1,000 shares limit 50.45 using ISOs. What is the minimum quantity that must be submitted to A? to B? to C?
- A trader wants to sell 6,000 shares limit 10.48 using ISOs. What is the minimum quantity that must be submitted to A? to B? to C?
- If the trader submits sell 2,000 shares limit 10.45 to each exchange using ISOs, are there any trade-throughs of displayed bids that aren't protected.

- 17.3. ISOs. Protected quotes with undisplayed orders. The bid sides of the books at three market centers are:

<i>Price</i>	<i>Exchange A</i>		<i>Exchange B</i>		<i>Exchange C</i>	
	<i>Shares (Displayed)</i>	<i>Shares (<u>Undisplayed</u>)</i>	<i>Shares (Displayed)</i>	<i>Shares (<u>Undisplayed</u>)</i>	<i>Shares (Displayed)</i>	<i>Shares (<u>Undisplayed</u>)</i>
10.49	100	900	800	2,000		
10.48	300	100	200	200		
10.47	400		500		200	400
10.46			700		1,000	
10.45	800		200		2,000	

- For each exchange, what are the protected bids (prices and quantities)?
- A trader simultaneously sends the following sell orders, all with limit prices of 10.46, all marked ISO: sell 800 to A, sell 2,000 to B, sell 500 to C. What executions occur?