

WEEK 1

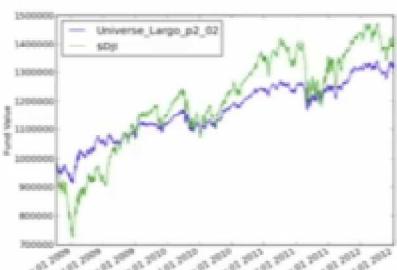
2016年2月21日 23:06

- Course Overview
- Portfolio Management
- Market Mechanics

Georgia Tech Interactive Computing

Common Metrics

- Annual return.
- Risk: Standard deviation of return.
- Risk: Draw down.
- Reward/Risk: Sharpe Ratio.
- Reward/Risk: Sortino Ratio.
- Jensen's Alpha.

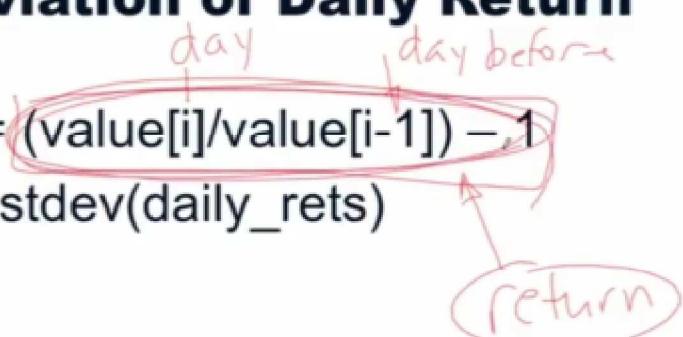


of this fund that goes up and down.

Georgia Tech Interactive Computing

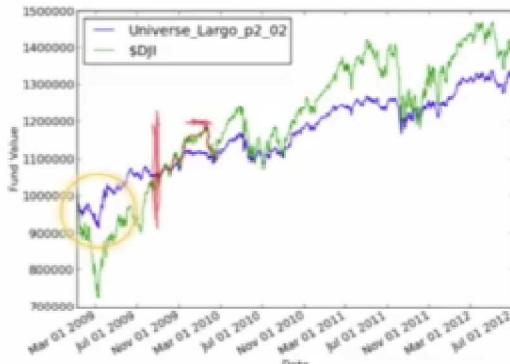
Standard Deviation of Daily Return

- $\text{daily_rets}[i] = \frac{\text{value}[i]/\text{value}[i-1]}{} - 1$
- $\text{std_metric} = \text{stdev}(\text{daily_rets})$



so remember that and keep it in mind.

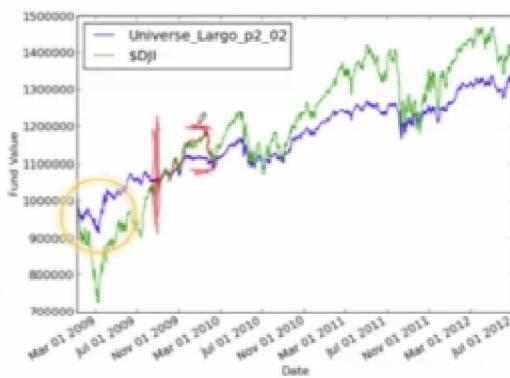
Max Draw Down



And the Max Draw Down is the difference between that trailing high point and

7

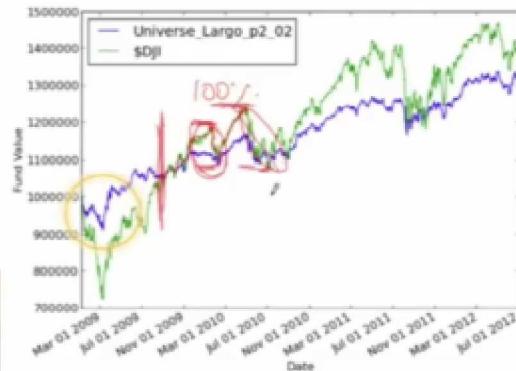
Max Draw Down



the current low point.

7

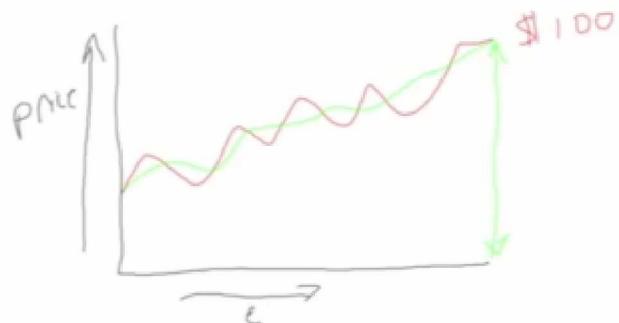
Max Draw Down



how ever far down you go,
is your draw down.

7

How To Compare Similar Portfolios?



- ➊ `daily_rets[i] = (value[i]/value[i-1]) - 1`
- ➋ `std_metric = std(daily_rets)`

Now both of those are components of Sharpe Ratio and we will dig into that right now.



2

Sharpe Ratio

- Most “important” measure of asset performance.
- How well does the return of an asset compensate the investor for the risk taken?
- The higher the Sharpe ratio the better.
- When comparing two assets each with the same return, higher Sharpe ratio gives more return for the same risk.

that has the higher Sharpe Ratio Is giving you more return for the same risk.

3



Sharpe Ratio

$$S = \frac{E[R - R_f]}{\sigma} = \frac{E[R' - R_f]}{\sqrt{\text{var}[R - R_f]}},$$

- Reward/Risk = How much reward are you getting for your risk?
- metric = $k * \text{mean}(\text{daily_rets})/\text{stdev}(\text{daily_rets})$)
- $k = \text{sqrt}(250)$ for daily returns

The reward is the expected return and

4

Sharpe Ratio

$$S = \frac{E[R - R_f]}{\sigma} = \frac{E[R - R_f]}{\sqrt{\text{var}[R - R_f]}}, \quad \frac{\text{daily Ret}}{S + d (\text{day})}$$

- Reward/Risk = How much reward are you getting for your risk?
- metric = $k * \text{mean}(\text{daily_rets})/\text{stdev}(\text{daily_rets})$
- $k = \sqrt{250}$ for daily returns

Sharpe Ratio

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Sharpe Ratio

$$S = \frac{E[R - R_f]}{\sigma} = \frac{E[R - R_f]}{\sqrt{\text{var}[R - R_f]}}, k * \frac{\text{daily Ret}}{\text{std(daily ret)}}$$

- Reward/Risk = How much reward are you getting for your risk?
- metric = $k * \frac{\text{mean(daily_rets)}}{\text{stdev(daily_rets)}}$
- $k = \sqrt{250}$ for daily returns

And for daily returns, that factor is always the square root of 250.

Sharpe Ratio

$$S = \frac{E[R - R_f]}{\sigma} = \frac{E[R - R_f]}{\sqrt{\text{var}[R - R_f]}}, k * \frac{\text{daily Ret}}{\text{std(daily ret)}}$$

- Reward/Risk = How much reward are you getting for your risk?
- metric = $k * \frac{\text{mean(daily_rets)}}{\text{stdev(daily_rets)}}$
- $k = \sqrt{250}$ for daily returns

250 is the number of days in a trading year.

Sharpe Ratio

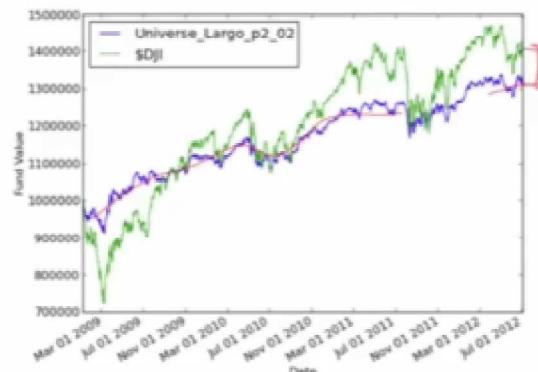
$$S = \frac{E[R - R_f]}{\sigma} = \frac{E[R - R_f]}{\sqrt{\text{var}[R - R_f]}}, k^* \frac{\text{daily Ret}}{\text{std(daily ret)}}$$

- Reward/Risk = How much reward are you getting for your risk?
- metric = $k^* \text{mean}(\text{daily_rets})/\text{stdev}(\text{daily_rets})$
- $k = \text{sqrt}(250)$ for daily returns

12 months in training year
monthly, we would use 12 here if we were looking at monthly returns.

Example

	Return	Sharpe	STDEV	D-down	Corr
Fund	33%	.94	0.58%	-8.67%	0.89
\$DJI	43%	.63	1.23%	-27.38%	1.00



having a higher Sharpe Ratio because that standard deviation is so much smaller.

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Romney Paid 14% Effective Tax Rate in 2011

CNNMoney.com

Mitt Romney made \$13.7 million last year and paid \$1.94 million in federal income taxes, giving him an effective tax rate of 14.1%, his campaign said Friday.

Iranian Hackers Target Bank of America, JPMorgan, Citi

Iranian hackers have repeatedly attacked Bank of America, JPMorgan and Citigroup over the past year, as part of a broad cyberattack.

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AAPL Historical Prices | Apple Inc. Stock - Yahoo! Finance

	Date	Open	High	Low	Close	Volume	Adj Close
1	Jun 28, 2012	571.67	574.00	565.61	569.05	19,101,300	566.82
2	Jun 27, 2012	575.00	576.74	571.92	574.50	7,249,900	572.04
3	Jun 26, 2012	571.33	574.49	567.33	572.63	9,876,300	569.58
4	Jun 25, 2012	577.30	579.60	570.37	570.77	10,870,800	568.33
5	Jun 22, 2012	579.04	582.19	575.42	582.10	10,158,700	579.81
6	Jun 21, 2012	585.44	588.22	577.44	577.87	11,655,400	575.20
7	Jun 20, 2012	588.21	589.29	580.89	589.74	12,819,400	583.24
8	Jun 19, 2012	583.40	590.00	583.10	587.41	12,907,300	584.90

* Data price adjusted for dividends and splits.

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Currency in USD.

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Historical Prices

Set Date Range

Start Date: Dec 1 2011 End Date: Dec 31 2011

Eg. Jan 1, 2010

Daily Weekly Monthly Dividends Only

Get Prices

Prices

Date	Open	High	Low	Close	Volume	Adj Close
Sep 20, 2012	699.16	700.06	693.62	698.70	12,000,300	698.70
Sep 19, 2012	700.26	703.99	699.57	702.10	11,874,100	702.10
Sep 18, 2012	698.25	698.80	694.81	698.78	12,375,400	698.78
Sep 17, 2012	698.25	698.80	694.81	698.78	12,375,400	698.78

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4 Jun 28, 2012 571.67 574.00 565.81 569.05 10,101,300 566.62
 5 Jun 27, 2012 575.00 576.74 571.92 574.50 7,249,900 572.04
 6 Jun 26, 2012 571.33 574.49 567.33 572.03 9,876,300 569.58
 7 Jun 25, 2012 577.30 579.80 570.37 570.77 10,870,800 568.33
 8 Jun 22, 2012 579.04 582.19 575.42 582.10 10,158,700 579.61
 9 Jun 21, 2012 585.44 588.22 577.44 577.67 11,655,400 575.20
 10 Jun 20, 2012 588.21 589.25 586.80 589.74 12,819,400 583.24
 11 Jun 19, 2012 583.40 590.00 583.10 587.41 12,907,300 584.90

* Close price adjusted for dividends and splits.

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Date,Open,High,Low,Close,Volume,Adj Close
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 2012-07-26,579.76,580.40,570.36,574.88,14522400,572.61

And that's the data that you get,
 we'll pick it apart in a second.

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Date,Open,High,Low,Close,Volume,Adj Close

2012-09-20	699.16	700.06	693.62	698.70	12000300	698.70	
2012-09-19	700.26	703.99	699.57	702.10	11674100	702.10	
2012-09-17	699.35	699.80	694.41	699.78	14215400	699.78	
2012-09-14	689.96	696.98	687.89	691.28	21445500	691.28	
2012-09-13	677.37	685.50	674.77	682.98	21370000	682.98	
2012-09-12	666.85	669.90	656.00	669.79	25436700	669.79	
2012-09-11	665.11	670.10	656.50	669.59	17999400	669.59	
2012-09-10	680.45	683.29	662.10	662.74	17428500	662.74	
2012-09-07	678.05	682.48	675.77	680.44	11773800	680.44	
2012-09-06	673.17	678.29	670.80	676.27	13971300	676.27	
2012-09-05	675.57	676.35	669.60	670.23	12013400	670.23	
2012-09-04	665.76	675.14	664.50	674.97	13139000	674.97	
2012-08-31	667.25	668.60	657.25	665.24	12082900	665.24	
2012-08-30	670.44	671.55	662.85	663.87	10810700	663.87	
2012-08-29	675.25	677.47	672.60	673.47	7243100	673.47	
2012-08-28	674.98	676.10	670.47	674.80	9556600	674.80	
2012-08-27	679.99	680.87	673.54	675.68	15250300	675.68	
2012-08-24	659.51	669.48	655.55	663.32	15619300	663.32	
2012-08-23	666.11	669.90	661.15	662.63	15004600	662.63	
11	2012-08-22	654.42	669.00	648.11	668.87	20190100	668.87
12	2012-08-21	670.82	674.88	650.33	656.06	29025700	656.06
13	2012-08-20	650.01	665.15	649.90	665.15	21906600	665.15
14	2012-08-17	640.00	648.19	638.81	648.11	15812900	648.11
15	2012-08-16	631.21	636.76	630.50	636.34	9090500	636.34
16	2012-08-15	631.20	634.00	627.79	630.83	9180800	630.83
17	2012-08-14	631.87	638.61	630.21	631.69	12148900	631.69
18	2012-08-13	623.39	630.00	623.25	630.00	998300	630.00
19	2012-08-10	618.71	621.76	618.70	621.70	6962100	621.70
20	2012-08-09	617.85	621.73	617.80	620.73	7915800	620.73
21	2012-08-08	619.39	622.88	617.10	619.86	8739500	617.21
22	2012-08-07	622.77	625.00	618.04	620.91	10373100	618.26
23	2012-08-03	613.53	617.98	611.56	615.70	12318600	613.07
24	2012-08-02	602.84	610.69	600.25	607.79	11862800	605.19
25	2012-08-01	615.91	618.40	602.00	608.81	13732200	608.22
26	2012-07-31	603.23	611.70	602.72	610.76	16511700	608.15
27	2012-07-30	590.92	599.44	587.82	595.03	13540800	592.00
28	2012-07-26	579.01	585.83	571.59	585.16	14426300	582.00
29	2012-07-26	579.76	580.40	570.36	574.88	14522400	572.42
30	2012-07-26	579.76	580.40	570.36	574.88	14522400	572.42

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Date,Open,High,Low,Close,Volume,Adj Close

D	1	Date	Open	High	Low	Close	Volume	Adj Close
2	2	12/30/11	403.51	406.28	403.49	405	6416500	403.27
3	3	12/29/11	403.4	405.65	400.51	405.12	7713500	403.39
4	4	12/28/11	406.89	408.25	401.34	402.64	8166500	400.92
5	5	12/27/11	403.1	409.09	403.02	406.53	9467000	404.79
6	6	12/23/11	399.69	403.59	399.49	403.33	9621400	401.61
7	7	12/22/11	397	399.13	396.1	398.55	7227100	396.85
8	8	12/21/11	396.69	397.3	392.01	396.45	9391000	394.76
9	9	12/20/11	387.76	396.1	387.26	395.95	12043400	394.26
10	10	12/19/11	382.47	384.85	380.48	382.21	8411800	380.58
11	11	12/16/11	380.36	384.15	379.57	381.02	15052800	379.39
12	12	12/15/11	383.33	383.74	378.31	378.94	9150000	377.32
13	13	12/14/11	386.7	387.38	377.68	380.19	14531700	378.56
14	14	12/13/11	393	395.4	387.1	388.81	12104600	387.15
15	15	12/12/11	391.68	393.9	389.45	391.84	10752400	390.16
16	16	12/9/11	392.85	394.04	391.03	393.62	10606900	391.94
17	17	12/8/11	391.45	395.5	390.23	390.66	13441300	388.99
18	18	12/7/11	389.93	390.94	386.76	389.09	10883800	387.43
19	19	12/6/11	392.51	394.63	389.38	390.95	10128500	389.28
20	20	12/5/11	393.49	396.41	390.39	393.01	12757500	391.33

There is of course, the date.

Volume is how many shares traded that day.



	Date	Open	High	Low	Close	Volume	Adj Close
1	12/30/11	403.51	406.28	403.49	405	6416500	403.27
2	12/29/11	403.4	405.65	400.51	405.12	7713500	403.39
3	12/28/11	406.89	408.25	401.34	402.64	8166500	400.92
4	12/27/11	403.1	409.09	403.02	406.53	9467000	404.79
5	12/23/11	399.69	403.59	399.49	403.33	9621400	401.61
6	12/22/11	397	399.13	396.1	398.55	7227100	396.85
7	12/21/11	396.69	397.3	392.01	396.45	9391000	394.76
8	12/20/11	387.76	396.1	387.26	395.95	12043400	394.26
9	12/19/11	382.47	384.85	380.48	382.21	8411800	380.58
10	12/16/11	380.36	384.15	379.57	381.02	15052800	379.39
11	12/15/11	383.33	383.74	378.31	378.94	9150000	377.32
12	12/14/11	386.7	387.38	377.68	380.19	14531700	378.56
13	12/13/11	393	395.4	387.1	388.81	12104600	387.15
14	12/12/11	391.68	393.9	389.45	391.84	10752400	390.16
15	12/9/11	392.85	394.04	391.03	393.62	10606900	391.94
16	12/8/11	391.45	395.5	390.23	390.66	13441300	388.99
17	12/7/11	389.93	390.94	386.76	389.09	10883800	387.43
18	12/6/11	392.51	394.63	389.38	390.95	10128500	389.28
19	12/5/11	393.49	396.41	390.39	393.01	12757500	391.33

And the data that we're gonna work with here is adjusted close.



	Date	Open	High	Low	Close	Volume	Adj Close
1	12/30/11	403.51	406.28	403.49	405	6416500	403.27
2	12/29/11	403.4	405.65	400.51	405.12	7713500	403.39
3	12/28/11	406.89	408.25	401.34	402.64	8166500	400.92
4	12/27/11	403.1	409.09	403.02	406.53	9467000	404.79
5	12/23/11	399.69	403.59	399.49	403.33	9621400	401.61
6	12/22/11	397	399.13	396.1	398.55	7227100	396.85
7	12/21/11	396.69	397.3	392.01	396.45	9391000	394.76
8	12/20/11	387.76	396.1	387.26	395.95	12043400	394.26
9	12/19/11	382.47	384.85	380.48	382.21	8411800	380.58
10	12/16/11	380.36	384.15	379.57	381.02	15052800	379.39
11	12/15/11	383.33	383.74	378.31	378.94	9150000	377.32
12	12/14/11	386.7	387.38	377.68	380.19	14531700	378.56
13	12/13/11	393	395.4	387.1	388.81	12104600	387.15
14	12/12/11	391.68	393.9	389.45	391.84	10752400	390.16
15	12/9/11	392.85	394.04	391.03	393.62	10606900	391.94
16	12/8/11	391.45	395.5	390.23	390.66	13441300	388.99
17	12/7/11	389.93	390.94	386.76	389.09	10883800	387.43
18	12/6/11	392.51	394.63	389.38	390.95	10128500	389.28
19	12/5/11	393.49	396.41	390.39	393.01	12757500	391.33

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is actually different than
the real close of that day.

	A	B	C	D	E	F	G	H	I
1	Date	Open	High	Low	Close	Volume	Adj Close		
2	12/30/11	403.51	406.28	403.49	405	6416500	403.27		
3	12/29/11	403.4	405.65	400.51	405.12	7713500	403.39		
4	12/28/11	406.89	408.25	401.34	402.64	8166500	400.92		
5	12/27/11	403.1	409.09	403.02	406.53	9467000	404.79		
6	12/23/11	399.69	403.59	399.49	403.33	9621400	401.61		
7	12/22/11	397	399.13	396.1	398.55	7227100	396.85		
8	12/21/11	396.69	397.3	392.01	396.45	9391000	394.76		
9	12/20/11	387.76	396.1	387.26	395.95	12043400	394.26		
10	12/19/11	382.47	384.85	380.48	382.21	8411800	380.58		
11	12/16/11	380.36	384.15	379.57	381.02	15052800	379.39		
12	12/15/11	383.33	383.74	378.31	378.94	9150000	377.32		
13	12/14/11	386.7	387.38	377.68	380.19	14531700	378.56		
14	12/13/11	393	395.4	387.1	388.81	12104600	387.15		
15	12/12/11	391.68	393.9	389.45	391.84	10752400	390.16		
16	12/9/11	392.85	394.04	391.03	393.62	10606900	391.94		
17	12/8/11	391.45	395.5	390.23	390.66	13441300	388.99		
18	12/7/11	389.93	390.94	386.76	389.09	10883800	387.43		
19	12/6/11	392.51	394.63	389.38	390.95	10128500	389.28		
20	12/5/11	393.49	396.41	396.41	391.33				

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And the reason for
this difference has to do with dividends.

	A	B	C	D	E	F	G	H	I
1	Date	Open	High	Low	Close	Volume	Adj Close		
2	12/30/11	403.51	406.28	403.49	405	6416500	403.27		
3	12/29/11	403.4	405.65	400.51	405.12	7713500	403.39		
4	12/28/11	406.89	408.25	401.34	402.64	8166500	400.92		
5	12/27/11	403.1	409.09	403.02	406.53	9467000	404.79		
6	12/23/11	399.69	403.59	399.49	403.33	9621400	401.61		
7	12/22/11	397	399.13	396.1	398.55	7227100	396.85		
8	12/21/11	396.69	397.3	392.01	396.45	9391000	394.76		
9	12/20/11	387.76	396.1	387.26	395.95	12043400	394.26		
10	12/19/11	382.47	384.85	380.48	382.21	8411800	380.58		
11	12/16/11	380.36	384.15	379.57	381.02	15052800	379.39		
12	12/15/11	383.33	383.74	378.31	378.94	9150000	377.32		
13	12/14/11	386.7	387.38	377.68	380.19	14531700	378.56		
14	12/13/11	393	395.4	387.1	388.81	12104600	387.15		
15	12/12/11	391.68	393.9	389.45	391.84	10752400	390.16		
16	12/9/11	392.85	394.04	391.03	393.62	10606900	391.94		
17	12/8/11	391.45	395.5	390.23	390.66	13441300	388.99		
18	12/7/11	389.93	390.94	386.76	389.09	10883800	387.43		
19	12/6/11	392.51	394.63	389.38	390.95	10128500	389.28		
20	12/5/11	393.49	396.41	396.41	391.33				

And I'll explain that in a later session.

Screenshot of Microsoft Excel showing a table of Apple stock price data from December 2011. The table includes columns for Date, Open, High, Low, Close, Volume, and Adj Close. Row 2 shows the formula =405. The formula bar at the top shows =405.

	A	B	C	D	E	F	G	H	I
D	1	Date	Open	High	Low	Close	Volume	Adj Close	
1	2	12/30/11	403.51	406.28	403.49	405	6416500	403.27	
2	3	12/29/11	403.4	405.65	400.51	405.12	7713500	403.39	
3	4	12/28/11	406.89	408.25	401.34	402.64	8166500	400.92	
4	5	12/27/11	403.1	409.09	403.02	406.53	9467000	404.79	
5	6	12/23/11	399.69	403.59	399.49	403.33	9621400	401.61	
6	7	12/22/11	397	399.13	396.1	398.55	7227100	396.85	
7	8	12/21/11	396.69	397.3	392.01	396.45	9391000	394.76	
8	9	12/20/11	387.76	396.1	387.26	395.95	12043400	394.26	
9	10	12/19/11	382.47	384.85	380.48	382.21	8411800	380.58	
10	11	12/16/11	380.36	384.15	379.57	381.02	15052800	379.39	
11	12	12/15/11	383.33	383.74	378.31	378.94	9150000	377.32	
12	13	12/14/11	386.7	387.38	377.68	380.19	14531700	378.56	
13	14	12/13/11	393	395.4	387.1	388.81	12104600	387.15	
14	15	12/12/11	391.68	393.9	389.45	391.84	10752400	390.16	
15	16	12/9/11	392.85	394.04	391.03	393.62	10606900	391.94	
16	17	12/8/11	391.45	395.5	390.23	390.66	13441300	388.99	
17	18	12/7/11	389.93	390.94	386.76	389.09	10883800	387.43	
18	19	12/6/11	392.51	394.63	389.38	390.95	10128500	389.28	
19	20	12/5/11	393.49	396.41	390.39	393.01	12757500	391.33	

/ the standard deviation of daily return.

Screenshot of Microsoft Excel showing a table of Apple stock price data from December 2011. The table includes columns for Date, Adj Close, and daily_ret. The formula bar at the top shows =sqrt(250)*F4/F5.

	A	B	C	D	E	F	G	H	I
D	1	Date	Adj Close	daily_ret		total return			
1	2	12/1/11	386.27	0.00%		0.04401067			
2	3	12/2/11	388.03	0.46%					
3	4	12/5/11	391.33	0.85%	Avg daily ret	0.00			
4	5	12/6/11	389.28	-0.52%	STD daily ret	+ 0.01			
5	6	12/7/11	387.43	-0.48%	Sharpe Ratio	=sqrt(250)*F4/F5			
6	7	12/8/11	388.99	0.40%					
7	8	12/9/11	391.94	0.76%					
8	9	12/12/11	390.16	-0.45%					
9	10	12/13/11	387.15	-0.77%					
10	11	12/14/11	378.56	-2.22%					
11	12	12/15/11	377.32	-0.33%					
12	13	12/16/11	379.39	0.55%					
13	14	12/19/11	380.58	0.31%					
14	15	12/20/11	394.26	3.59%					
15	16	12/21/11	394.76	0.13%					
16	17	12/22/11	396.85	0.53%					
17	18	12/23/11	401.61	1.20%					
18	19	12/27/11	404.79	0.79%					
19	20	12/28/11	400.92	-0.96%					

AAPL-short.xls

Fri 2:49 PM admin2

Date Adj Close daily_ret total return

	Date	Adj Close	daily_ret	total return
1	12/1/11	386.27	0.00%	0.04401067
2	12/2/11	388.03	0.46%	
3	12/5/11	391.33	0.85%	Avg daily ret 0.00
4	12/6/11	389.28	-0.52%	STD daily ret 0.01
5	12/7/11	387.43	-0.48%	Sharpe Ratio =sqrt(250)*F4
6	12/8/11	388.99	0.40%	
7	12/9/11	391.94	0.76%	
8	12/12/11	390.16	-0.45%	
9	12/13/11	387.15	-0.77%	
10	12/14/11	378.56	-2.22%	
11	12/15/11	377.32	-0.33%	
12	12/16/11	379.39	0.55%	
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15	12/21/11	394.76	0.13%	
16	12/22/11	396.85	0.53%	
17	12/23/11	401.61	1.20%	
18	12/27/11	404.79	0.79%	
19	12/28/11	400.92	-0.96%	
20				

/ the standard deviation of daily return



AAPL-short.xls

Fri 2:49 PM admin2

Date Adj Close daily_ret total return

	Date	Adj Close	daily_ret	total return
1	12/1/11	386.27	0.00%	0.04401067
2	12/2/11	388.03	0.46%	
3	12/5/11	391.33	0.85%	Avg daily ret 0.00
4	12/6/11	389.28	-0.52%	STD daily ret 0.01
5	12/7/11	387.43	-0.48%	Sharpe Ratio =sqrt(250)*F4/F5
6	12/8/11	388.99	0.40%	
7	12/9/11	391.94	0.76%	
8	12/12/11	390.16	-0.45%	
9	12/13/11	387.15	-0.77%	
10	12/14/11	378.56	-2.22%	
11	12/15/11	377.32	-0.33%	
12	12/16/11	379.39	0.55%	
13	12/19/11	380.58	0.31%	
14	12/20/11	394.26	3.59%	
15	12/21/11	394.76	0.13%	
16	12/22/11	396.85	0.53%	
17	12/23/11	401.61	1.20%	
18	12/27/11	404.79	0.79%	
19	12/28/11	400.92	-0.96%	
20				

/ the standard deviation of daily return



AAPL-short.xls

Date	Adj Close	daily_ret	total return
12/1/11	386.27	0.00%	0.04401067
12/2/11	388.03	0.46%	
12/5/11	391.33	0.85%	Avg daily ret 0.00
12/6/11	389.28	-0.52%	STD daily ret 0.01
12/7/11	387.43	-0.48%	Sharpe Ratio 3.0426333
12/8/11	388.99	0.40%	
12/9/11	391.94	0.76%	
12/12/11	390.16	-0.45%	
12/13/11	387.15	-0.77%	
12/14/11	378.56	-2.22%	
12/15/11	377.32	-0.33%	
12/16/11	379.39	0.55%	
12/19/11	380.58	0.31%	
12/20/11	394.26	3.59%	
12/21/11	394.76	0.13%	
12/22/11	396.85	0.53%	
12/23/11	401.61	1.20%	
12/27/11	404.79	0.79%	
12/28/11	400.92		

Sharp ratio for Apple, for that month, is three, that's a high sharp ratio.



The Order Book

○ Ask	\$100.10	100
○ Ask	\$100.05	500
○ Ask	\$100.00	1000
○ Bid	\$99.95	100
○ Bid	\$99.90	50
○ Bid	\$99.85	50

you can think of it like a big blackboard at the exchange where



The Order Book

○ Ask	\$100.10	100
○ Ask	\$100.05	500
○ Ask	\$100.00	1000
○ Bid	\$99.95	100
○ Bid	\$99.90	50
○ Bid	\$99.85	50

the bid prices are what people
are willing to pay for the shares.



The Order Book

TBM

○ Ask	\$100.10	100
○ Ask	\$100.05	500
○ Ask	\$100.00	1000
○ Bid	\$99.95	100
○ Bid	\$99.90	50
○ Bid	\$99.85	50

spread

Usually for a very liquid
assets like say IBM or Apple.



The Order Book

IBM		
Ask	\$100.10	100
Ask	\$100.05	500
Ask	\$100.00	1000
Bid	\$99.95	100
Bid	\$99.90	50
Bid	\$99.85	50

This spread is just a few cents.



The Order Book

IBM		
Ask	\$100.10	100
Ask	\$100.05	500
Ask	\$100.00	1000
Bid	\$99.95	100
Bid	\$99.90	50
Bid	\$99.85	50

But for some equities that don't trade very often, you may see a larger spread.



The Order Book

○ Ask	\$100.10	100
○ Ask	\$100.05	500
○ Ask	\$100.00	1000 cross the spread
○ Bid	\$99.95	100
○ Bid	\$99.90	50
○ Bid	\$99.85	50

Now all of a sudden,
100 shares of those get taken.



The Order Book

○ Ask	\$100.10	100
○ Ask	\$100.05	500
○ Ask	\$100.00	1000 900 cross the spread
○ Bid	\$99.95	100
○ Bid	\$99.90	50
○ Bid	\$99.85	50



The Order Book

○ Ask	\$100.10	100
○ Ask	\$100.05	500
○ Ask	\$100.00	1000 <i>900</i> cross the spread
○ Bid	\$99.95	100
○ Bid	\$99.90	50
○ Bid	\$99.85	50



Then a trade gets executed.

The Order Book

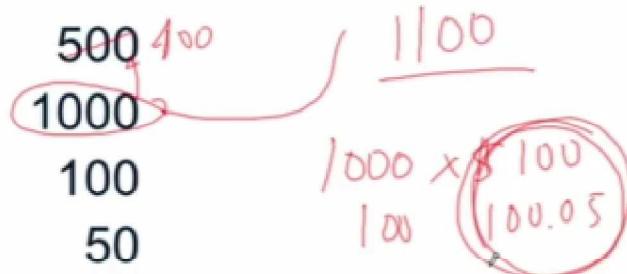
○ Ask	\$100.10	100
○ Ask	\$100.05	500
○ Ask	\$100.00	1000 <i>900</i> cross the spread
○ Bid	\$99.95	100
○ Bid	\$99.90	50
○ Bid	\$99.85	50



That's one thing that can happen.

The Order Book

○ Ask	\$100.10	100
○ Ask	\$100.05	500
○ Ask	\$100.00	1000
○ Bid	\$99.95	100
○ Bid	\$99.90	50
○ Bid	\$99.85	50



This is how market orders drive prices up if there's lots of buying and

4

The Order Book

○ Ask	\$100.10	100
○ Ask	\$100.05	500
○ Ask	\$100.00	1000
○ Bid	\$99.95	100
○ Bid	\$99.90	50
○ Bid	\$99.85	50



And the final 50 would get sold at that price.



4

The Order Book

○ Ask	\$100.10
○ Ask	\$100.05
○ Ask	\$100.00
○ Bid	\$99.95
○ Bid	\$99.90
○ Bid	\$99.85



then we'd drop down to
this price even lower.



The Order Book

○ Ask	\$100.10
○ Ask	\$100.05
○ Ask	\$100.00
○ Bid	\$99.95
○ Bid	\$99.90
○ Bid	\$99.85



So the aggregate price drops
significantly quickly.



thinkorswim

Main@thinkorswim [build 1826.13]

Monitor Trade Analyze Scan MarketWatch Charts Tools Help

All Products Forex Trader Futures Trader Pairs Trader Active Trader Setup Help

AAPL Apple Inc. COM ETB NASDAQ 654.45 654.45 654.45 654.45

UNDERLYING TRADE GRID

	Ex	Y Bid	B5 Ex	A Ask	A5
AAPL	654.41	654.41	654.41	654.45	654.45
BSE	654.41	654.41	654.41	654.45	654.45
Y	654.41	654.41	654.41	654.45	654.45
NASDAQ	654.41	654.41	654.41	654.45	654.45
ARCA	654.37	654.37	654.37	654.45	654.45
BATS	654.37	654.37	654.37	654.45	654.45
EDGX	654.24	654.24	654.24	654.45	654.45
CINN	654.20	654.20	654.20	654.45	654.45

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TODAY'S OPTIONS STATISTICS

OPTIONS TIME & SALES All exchanges All series All strikes Any quantity Any price

WDCET 360

Click icon to add media

Okay, we'll delve into a little bit more of these details in the next video.



Georgia Tech Interactive Computing

The Order Book

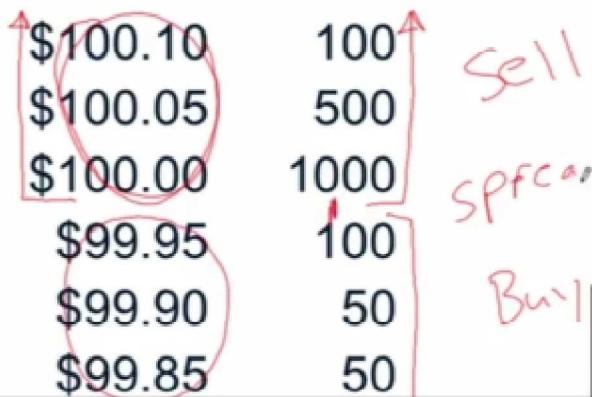
Ask	\$100.10	100	sell
Ask	\$100.05	500	
Ask	\$100.00	1000	
Bid	\$99.95	100	s
Bid	\$99.90	50	
Bid	\$99.85	50	Buy

And again,
this difference here is called the spread.



The Order Book

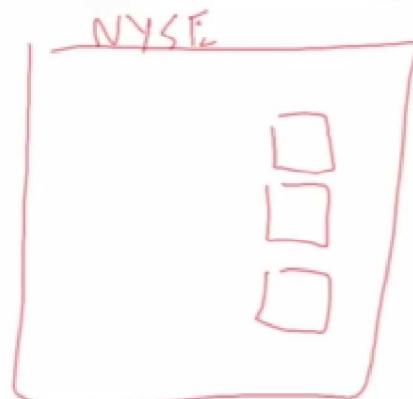
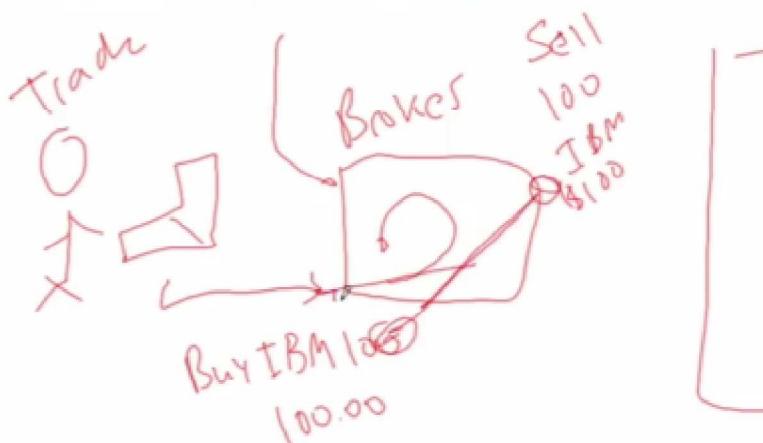
- Ask \$100.10
- Ask \$100.05
- Ask \$100.00
- Bid \$99.95
- Bid \$99.90
- Bid \$99.85



And again,
this difference here is called the spread.

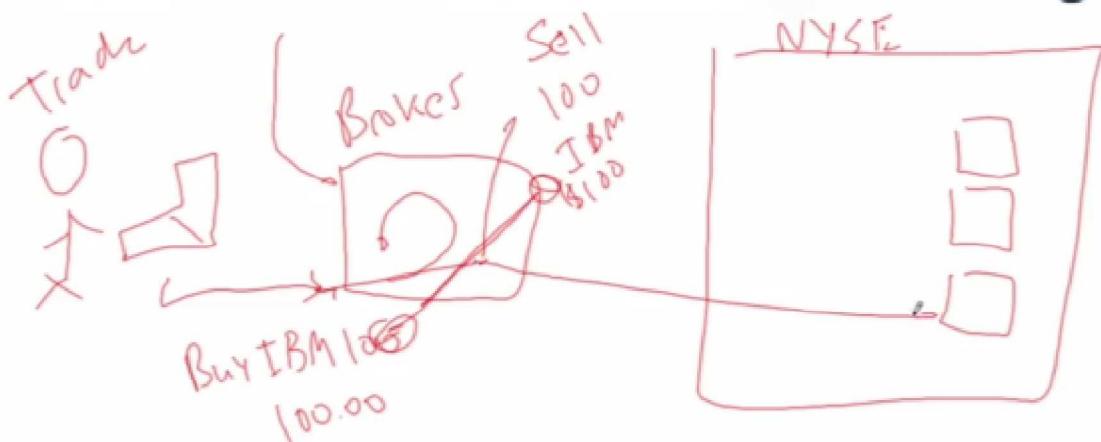


How Brokers Connected to Exchanges



pair them, and
settle the trade right there.

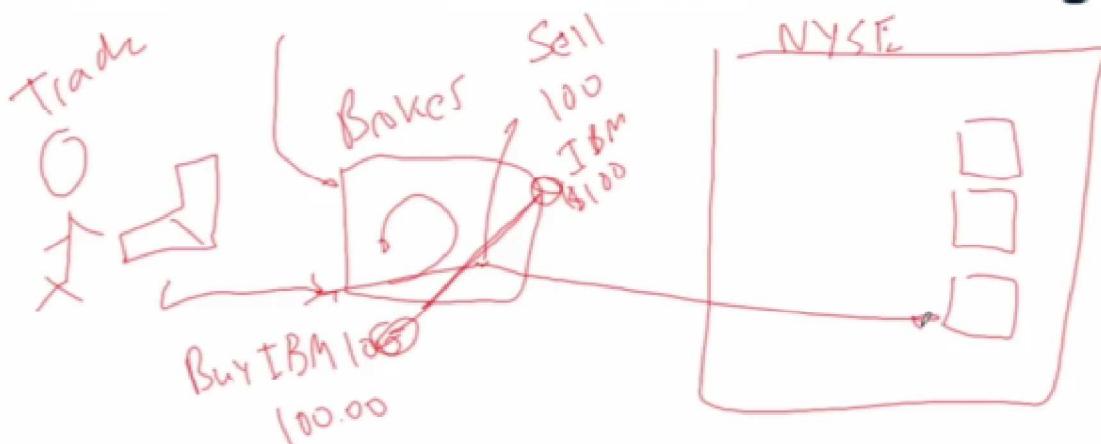
How Brokers Connected to Exchanges



Well, for one reason, it costs them money
to have the Exchange execute the order.

3

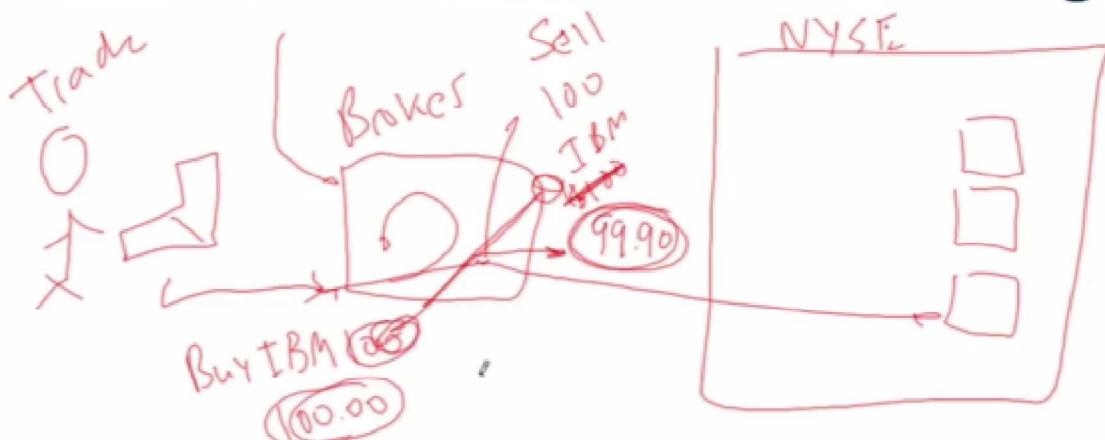
How Brokers Connected to Exchanges



The other is,
sometimes they're able to make some money,

3

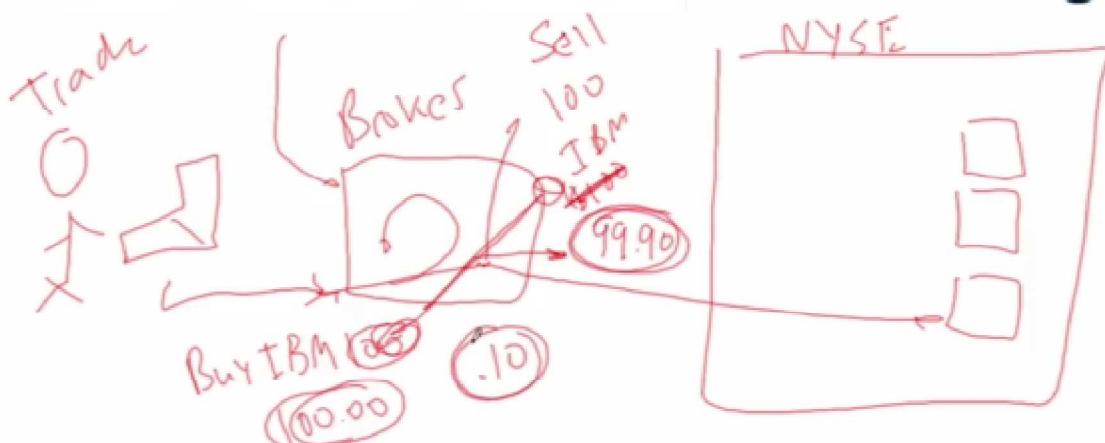
How Brokers Connected to Exchanges



then they sell them to you at 100 and
they make \$0.10.

3

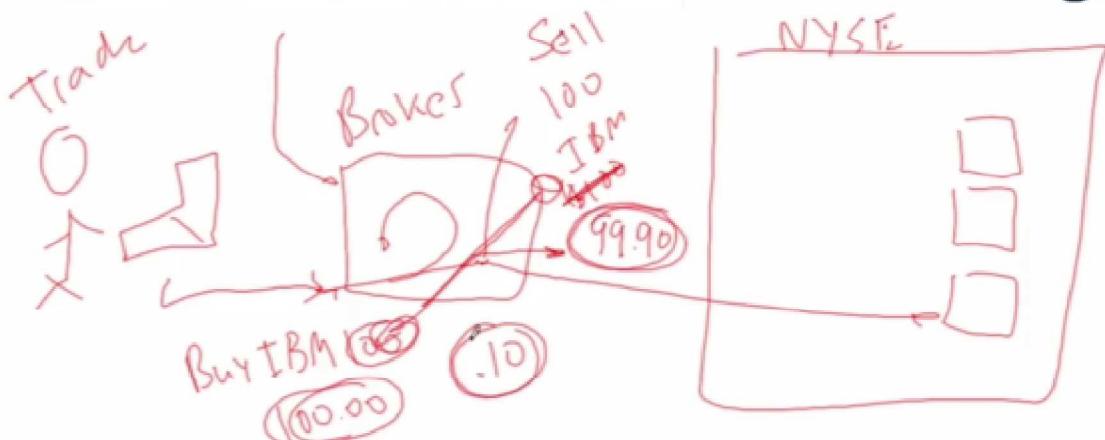
How Brokers Connected to Exchanges



And they didn't have to do anything but
facilitate this trade.

3

How Brokers Connected to Exchanges



And they didn't have to do anything but facilitate this trade.

3

Types of Orders (with your Broker)

- Additional possibilities:
 - Sell short (to open) → Be >
 - Buy (to close)

- More complex orders (stop limit)

What selling short is,
is it's a bet against a stock.



4

Mechanics of Short Selling

- Borrow the shares

Sell IBM 100 \$100

- Sell them

\$10,000

- You now have:

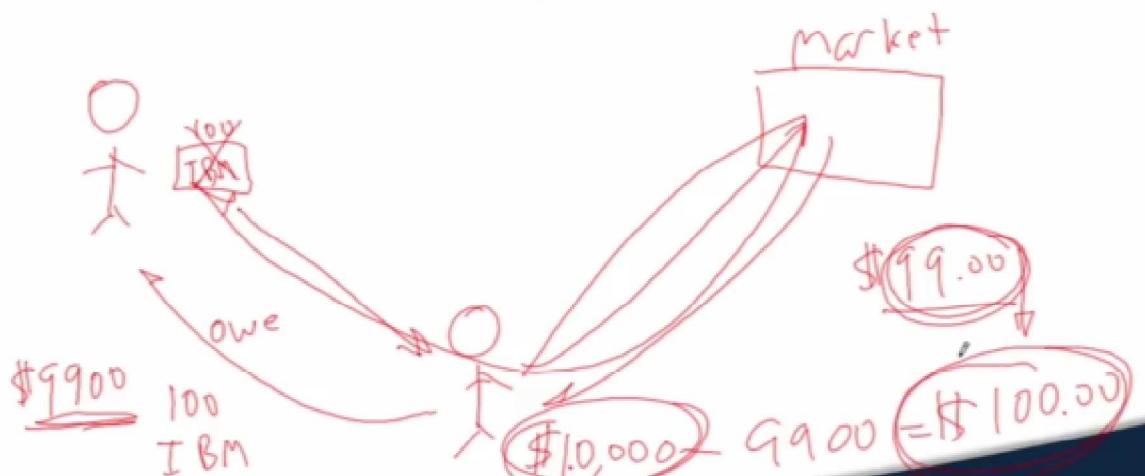
- Asset: Cash \$10,000

- Liability: Shares owed



to someone to return to them at some point in the future this 100 shares.

Short Selling Example



you're left over with your net profit.

Short Selling Example



However, there's an unlimited downside.

6

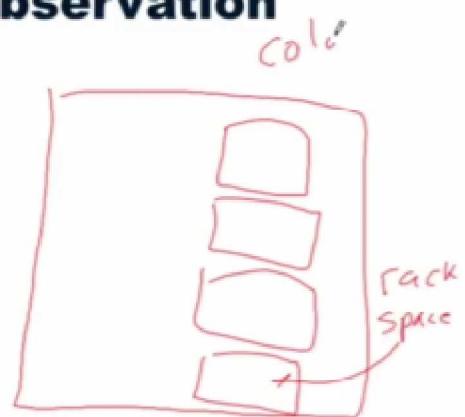
Short Selling Example



So, shorting stock can be somewhat risky.

6

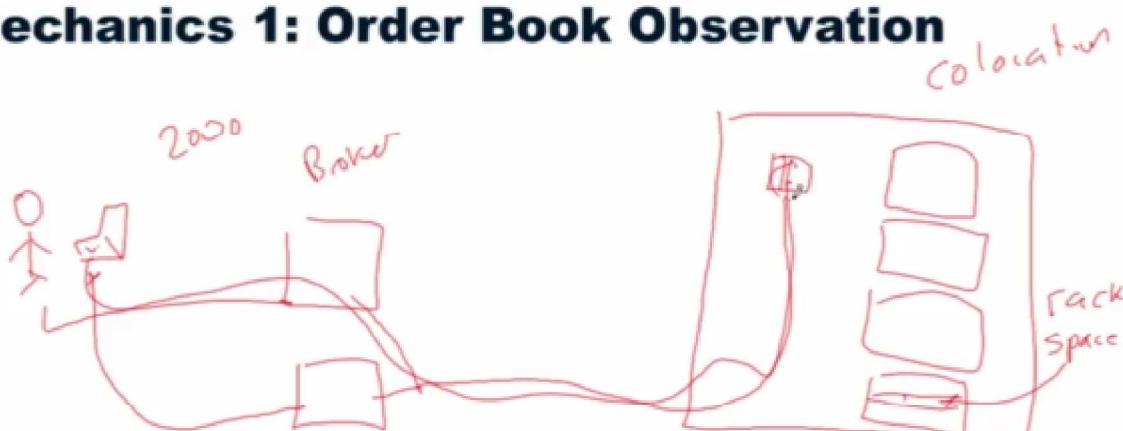
How Hedge Funds Exploit Market Mechanics 1: Order Book Observation



It's called colocation.

2

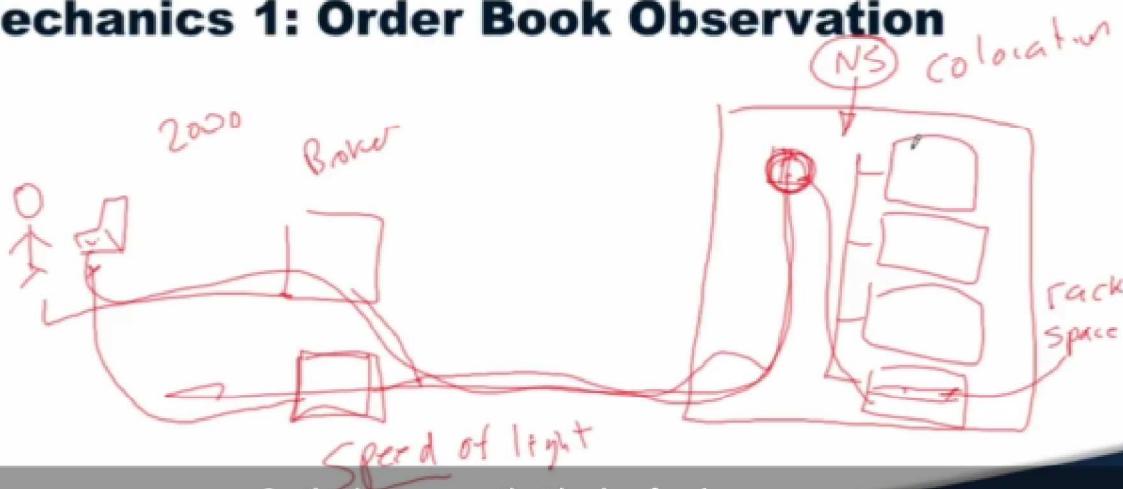
How Hedge Funds Exploit Market Mechanics 1: Order Book Observation



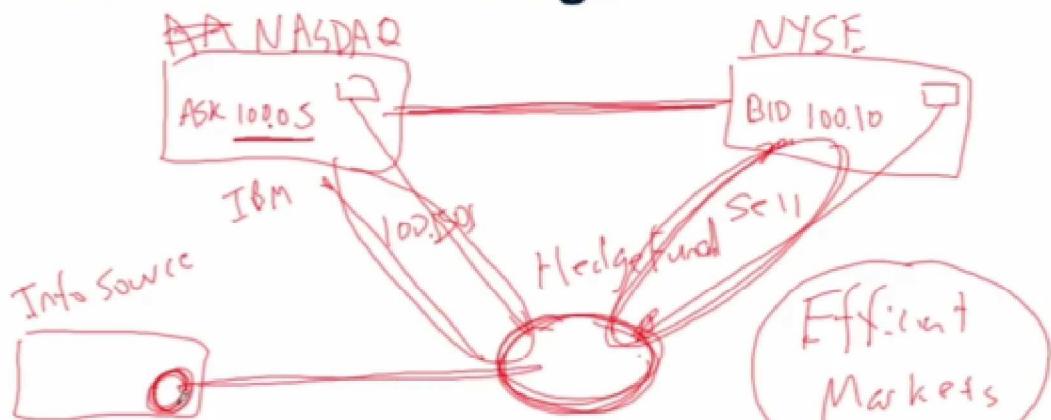
the hedge funds,
they see the order book immediately.

2

How Hedge Funds Exploit Market Mechanics 1: Order Book Observation

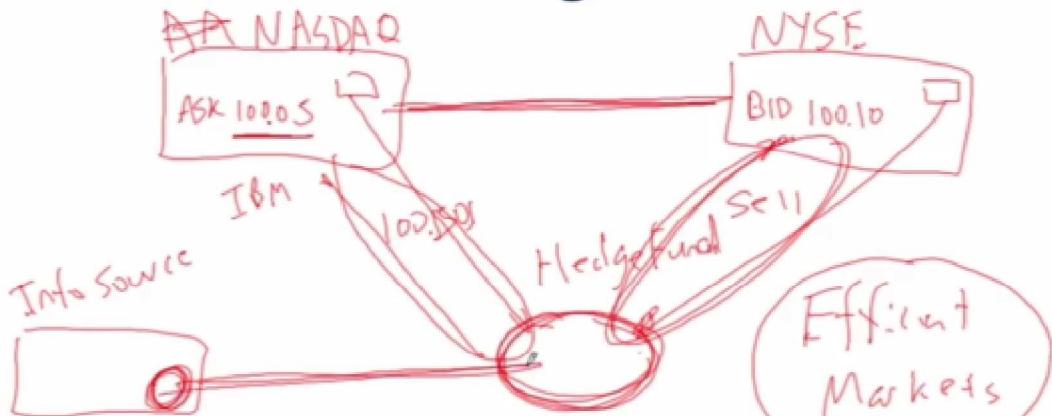


How Hedge Funds Exploit Market Mechanics 2: Arbitrage



They'll have a microwave channel back to their headquarters.

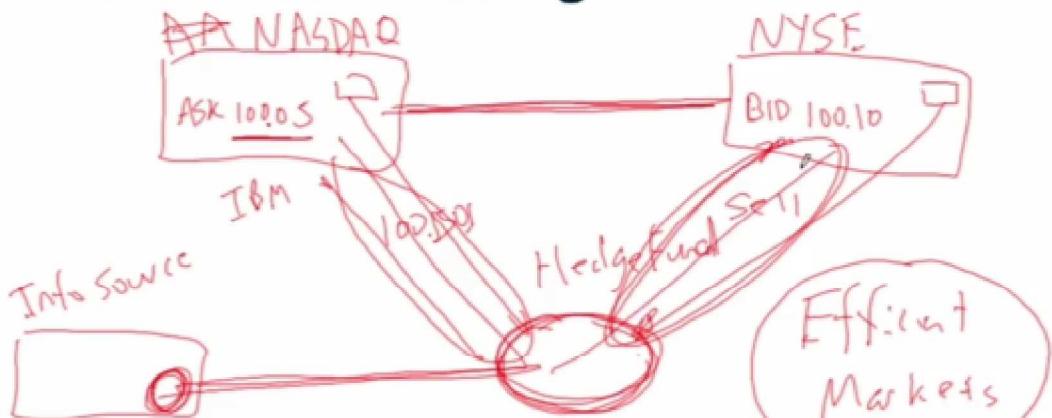
How Hedge Funds Exploit Market Mechanics 2: Arbitrage



In just milliseconds they can take that information and

3

How Hedge Funds Exploit Market Mechanics 2: Arbitrage

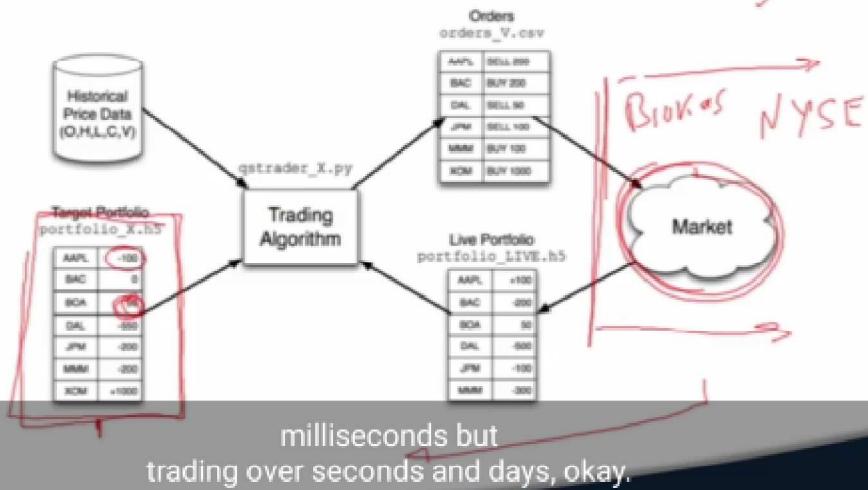


The speed of light really matters
in high frequency trading.

3

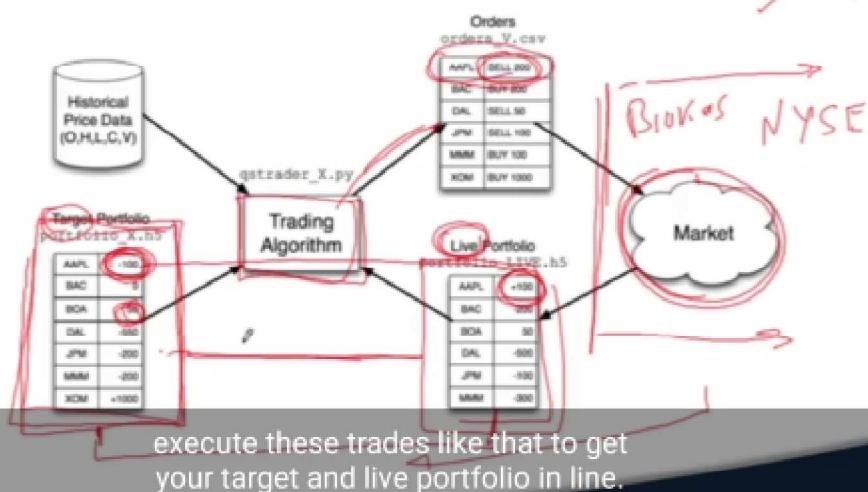
Inside a (slower) Quant Shop

~~DELT~~



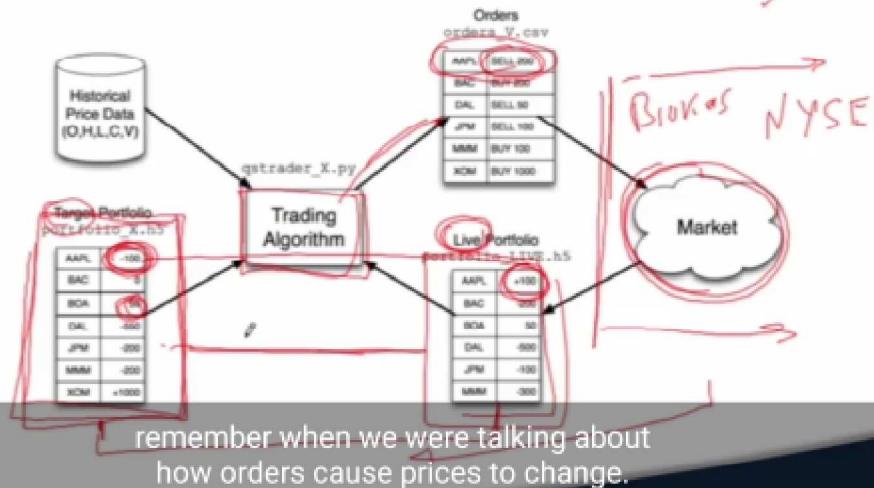
Inside a (slower) Quant Shop

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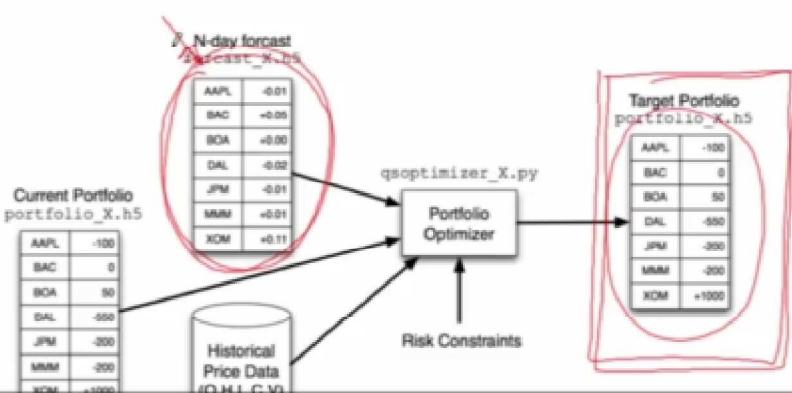


Inside a (slower) Quant Shop

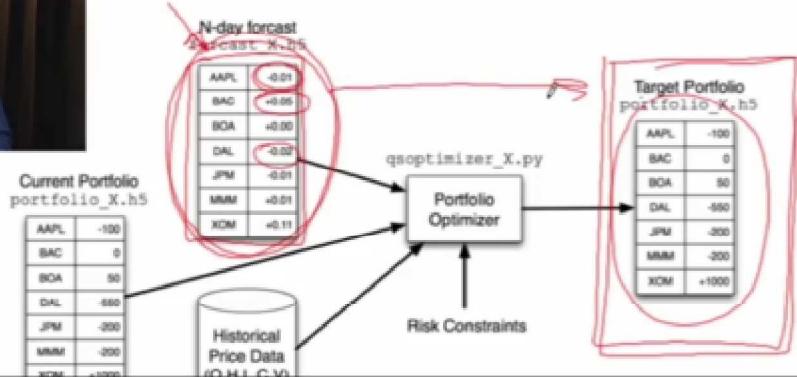
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Inside a Quant Shop

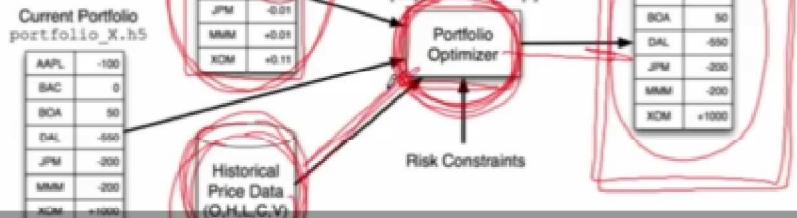
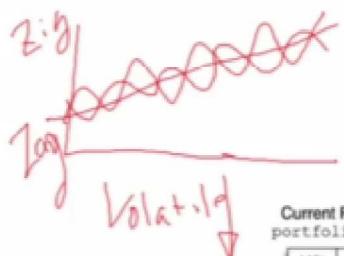


Inside a Quant Shop



And we wanna translate that into a target portfolio.

Inside a Quant Shop



They can observe the correlation between stock prices and other stock prices.

