Additional topics in trade strategy and cost management

Topics

- Trade strategy
  - How large are trading costs
  - Illustrative calculations from ITG's ACE (Agency Cost Estimator)
    - Buy 1,000,000 of Intel
    - Buy 100,000 of Powell Industries
- Cost measurement
  - What benchmarks are used?
  - A closer look at VWAP
  - Measuring the cost of missed trades

ITG's ACE

- Generates predicted transaction costs for hypothetical trades.
- Statistical model based on performance of *actual* trades.
- Benchmark price is the previous day's closing price.
- Perspective: it's just before the start of trading. What will it cost us to . . . ?

Buy 1,000,000 shares of INTC in one day

Cost Estimates

Ticker: INTC (45814010) - United States
Tue, December 10 2002, 13:57 EST

General Information

Exchange:	OTC	**Bid-Ask spread:**	$0.010 (6 bps)
Closing price:	$17.68	**Daily volatility:**	$0.715 (404 bps)
Shares:	1,000,000	**Daily $ volume:**	$1,159,412,096
Trade value:	$17,680,000	**% $ volume:**	1.5%
Daily Expected Return:	$0.000 (0 bps)		

Our order is small relative to all trading.

ACE Estimates

Expected total cost:	$46,851
Expected cost / share:	$0.047 (26 bps)
Standard deviation of cost:	$0.162 (91 bps)
Reliability:	**Very reliable**
Trading days:	1

Percentile:	**Cost**	**Confidence Interval**
66-Percentile:	$0.118 (67 bps)	(-0.108, 0.202)
95-Percentile:	$0.313 (177 bps)	(-0.270, 0.364)

Trade Strategy

Ticker: INTC (45814010) - United States
Tue, December 10 2002, 13:57 EST

Edit trade strategy

Daily Totals

Day	Shares	% Daily Volume
1	1,000,000	2%

Hourly Breakdown

Time	Day 1
09:30 - 10:00	770,000
10:00 - 10:30	160,000
10:30 - 11:00	40,000
11:00 - 11:30	20,000
11:30 - 12:00	10,000
12:00 - 12:30	0
12:30 - 13:00	0
13:00 - 13:30	0
13:30 - 14:00	0
14:00 - 14:30	0
14:30 - 15:00	0
15:00 - 15:30	0
15:30 - 16:00	0
	1,000,000

Buy 100,000 shares of POWL in one day

Cost Estimates

Ticker: POWL (73912810) - United States
Tue, December 10 2002, 14:05 EST

General Information

Exchange:	OTC	Bid-Ask spread:	$0.175 (94 bps)
Closing price:	$18.60	Daily volatility:	$0.472 (254 bps)
Shares:	100,000	Daily $ volume:	$436,708
Trade value:	$1,860,000	% $ volume:	425.9%
Daily Expected Return:	$0.000 (0 bps)		

ACE Estimates

Expected total cost:	$366,783
Expected cost / share:	$3.668 (1,972 bps)
Standard deviation of cost:	$0.286 (154 bps)
Reliability:	Very unreliable
Trading days:	1

Percentile:	Cost	Confidence Interval
66-Percentile:	$3.793 (2,039 bps)	(3.393, 3.942)
95-Percentile:	$4.138 (2,225 bps)	(3.108, 4.228)

… in 10 days

Cost Estimates

Ticker: POWL (73912810) - United States
Tue, December 10 2002, 14:06 EST

General Information

Exchange:	OTC	**Bid-Ask spread:**	$0.175 (94 bps)
Closing price:	$18.60	**Daily volatility:**	$0.472 (254 bps)
Shares:	100,000	**Daily $ volume:**	$436,708
Trade value:	$1,860,000	**% $ volume:**	425.9%
Daily Expected Return:	$0.000 (0 bps)		

ACE Estimates

Expected total cost:	$200,750
Expected cost / share:	$2.007 (1,079 bps)
Standard deviation of cost:	$0.865 (465 bps)
Reliability:	Reliable
Trading days:	10

Percentile:	**Cost**	**Confidence Interval**
66-Percentile:	$2.387 (1,283 bps)	(1.177, 2.838)
95-Percentile:	$3.430 (1,844 bps)	(0.312, 3.703)

… in 30 days

Cost Estimates

Ticker: POWL (73912810) - United States
Tue, December 10 2002, 14:18 EST

General Information

Exchange:	OTC	**Bid-Ask spread:**	$0.175 (94 bps)
Closing price:	$18.60	**Daily volatility:**	$0.472 (254 bps)
Shares:	100,000	**Daily $ volume:**	$436,708
Trade value:	$1,860,000	**% $ volume:**	425.9%
Daily Expected Return:	$0.000 (0 bps)		

ACE Estimates

Expected total cost:	$202,498
Expected cost / share:	$2.025 (1,089 bps)
Standard deviation of cost:	$1.492 (802 bps)
Reliability:	**Very reliable**
Trading days:	30

Percentile:	**Cost**	**Confidence Interval**
66-Percentile:	$2.680 (1,441 bps)	(0.592, 3.458)
95-Percentile:	$4.478 (2,408 bps)	(-0.900, 4.950)

Cost measurement

- Recall: For a buy order: cost = trade price – benchmark price
- If benchmark = quote midpoint prior to order, we get the effective cost.
- If benchmark = quote midpoint 5 min subsequent to execution, we get the realized cost

Benchmarks

- The most popular benchmarks are
- VWAP
  - What did we pay for the stock relative to everyone else who bought on that day?
- Closing price on trade date
  - If we reversed our position at the closing price, what would our loss have been?
  - Example: We bought at 100 per share; the stock closed at 102. Our cost is 100 – (102) = –2 (a gain)

Other benchmarks

- High/low/open/close & averages of these prices
- VWAP exclusive of our trades
- Closing bid or ask
- Multi-day VWAP
- VWAP to close
- VWAP within (e.g.) a fifteen minute window around the trade
- Preceding bid or ask
- Subsequent bid or ask

Timing VWAP

- Monday AM. Institution to broker: "Buy 10,000 shares [not held]. Do it sometime this week. We'll be measuring your performance relative to the day's VWAP."
- Broker's strategy:
  - Wait until 3:30 pm. If the stock is up for the day, this means that current prices are high relative to the VWAP to that point. Don't buy; wait until Tuesday.
  - Repeat game on Tuesday, etc.
  - If you find a day when (as of 3:30 pm) the stock is down, then current prices are lower than VWAP. This is time to buy. Your customer will see that you bought lower than the day's VWAP.

Measuring the cost of missed trades

- Many trading strategies reduce cost by running the risk of missing the trade.
- Example: The market is 100 bid; 101 offered.
  - If we buy with a market order, the effective cost is 101 – (100+101)/2 = 0.50.
  - Suppose we put in a limit order to buy at the bid.
    - *If this fills*, effective cost = 100 – (100+101)/2 = –0.50.
    - But *if it doesn't fill*, how should we value the lost trade?

One approach to failed limit orders

- Forcing/imputing a hypothetical execution
  - If my limit order strategy misses the market, I'll impute a fill at the day's closing offer price.
- Example
  - The market is 100 bid / 100.10 offered (BAM=100.05) I put in a limit order to buy at 100.
  - The market moves higher. I cancel the original order and resubmit at 100.40
    - If this order executes, cost = 100.40–100.05 = 0.35
    - If it doesn't execute, I impute a cost of non-execution = Closing Offer Price – 100.05.
- This will exaggerate the penalty of non-execution.

