

Module 23 : Trade Strategy & Execution / /

Module 23.1 : Trade Motivations

Four categories of Trade Motivations :

1. Profit seeking (i.e. generate alpha)

- need to act on insights before the rest of the market. Alpha decay is deterioration in alpha once an investment decision has been made. higher rates of alpha decay → trade in shorter timeframes & greater trade urgency.
- To minimize info leakage, managers may execute their trade in multiple venues including less transparent ones like dark pools. dark pools can be multilateral trading facilities (MTFs) bringing together buyers and sellers or systematic internalizer (SIs) which are single-dealer liquidity pools.

2. Risk management & hedging needs

3. Cash flow needs (primarily caused by investor subscription into & redemptions out of the fund)

- urgency depends on nature of CF
- Funds w/ less liquid holdings will find it hard to invest new client fund in a short time (i.e. cash drag). Manager can use equitization (use ETFs or derivatives to gain market exposure)

4. Corporate actions, margin calls & index reconstitution

Trading Strategy Inputs:

1. Order characteristics.

- side (in rising market it's more difficult to purchase securities).
- absolute size (i.e. no. of securities being traded)
- relative size (i.e. ADV)

2. Security characteristics

- security type
- short-term alpha (alpha decay leads to more urgent trading strategy)
- Price volatility
 - high price volatility leads to high Execution risk (i.e. risk of adverse price movement over trading horizon)
- Security liquidity

3. Market conditions (i.e. volatility & liquidity levels)

4. Individual risk aversion. (high risk aversion → means more concern about adverse movement in security prices than market impact costs → higher urgency)

EXAMPLE: Trading costs

A portfolio manager is discussing a list of buy and sell orders with the firm's head trader. The trader is specifically interested in how order size, security liquidity, and rate of alpha decay affects market impact risk and execution risk, respectively.

1. For each of the factors listed (order size, security liquidity, and rate of alpha decay), briefly **describe** how the factor affects the *market impact cost* of the trade. (Note: Consider each factor in isolation.)

2. The portfolio manager makes the following two statements:

Statement 1: High market impact costs could be mitigated by executing the order over a longer trading horizon.

Statement 2: If done correctly, this will not lead to an increase in any other types of trading cost.

Discuss whether the two statements are true or false. Briefly **justify** your response.

1. Higher order size → Higher market impact cost
lower security liq → Higher market impact cost
Higher alpha decay → Higher market impact cost

Trader's dilemma : Market Impact Cost vs. Execution Risk.

2. Statement 1 is true. (longer trading horizon means the manager can break the order up into smaller parts of lower impact cost)
Statement 2 is false (longer trading horizon will lead to higher execution risk).



MODULE QUIZ 23.1

1. Which of the following motivations to trade is *most likely* to require the executing trader to target closing prices?
 - A. Margin calls.
 - B. Profit seeking.
 - C. Cash flow needs (redemption).
2. An increase in security liquidity is *most likely* to decrease:
 - A. execution risk only.
 - B. market impact only.
 - C. both execution risk and market impact.

1. C.

2. B

Module 23.2 : Reference Price BM for Trade Execution

Reference Prices : used to determine trading cost

4 categories of ref. prices :

① Pretrade BM (known before start of trading) :

- decision price (price @ the time which the port. manager made the investment decision)

- Previous close
- Opening price
- Arrival price

② Intraday BM:

- VWAP

avg. price, weighted by Volume, over the trading horizon, used when there are buy/sell orders.

- TWAP

avg. price, ignores Volume, over the trading horizon best to use when there are outliers or highly fluctuating volumes during the day.

③ Posttrade BM, used to reduce tracking errors.

④ Price Target BM, based on manager's view of FV.

23.d : Trading Strategy Selection

Trade Type	Description
ST Alpha	<p>Objective : Trade over short-term mispricing</p> <p>Urgency : High</p> <p>Reference prices :</p> <p>Execution method :</p>
LT Alpha	<p>Trade over long-term due to changes in fundamental conditions</p> <p>Urgency : High</p> <p>Reference prices :</p> <p>Execution method :</p>

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Risk Tolerance Urgency : High
Reference prices :
Execution method :

CF driven Urgency : High
(client
redemption) Reference prices :
Execution method :

CF driven Urgency : High
(new trade
mandate) Reference prices :
Execution method :



MODULE QUIZ 23.2

1. A portfolio manager who wishes to execute a trade passively over a trading day and mitigate the impact of outliers should use which of the following reference prices as a benchmark?
 - A. TWAP.
 - B. VWAP.
 - C. Arrival price.
2. A quantitative U.S. sector-focused equity fund is mandated to have a low tracking error. The benchmark index is undergoing a reconstitution at the end of the trading day, and the fund's NAV is calculated daily using closing market prices. The portfolio manager has generated a list of trades that need to be executed to reflect the index reconstitution. The appropriate execution strategy for these trades is *most likely*:
 - A. VWAP.
 - B. arrival price.
 - C. market on close.

1. A

2. C

Module 23.3 : Trade Execution & Strategy Implementation

Trade Implementation Choices :

High Touch Trades (high level of human involvement):

- Principal trades (broker risk trades)
 - dealer/market makers assume all/some of the risk
 - Quote-driven, RFQ, OTC or off-exchange are primarily principal trade markets.
- Agency trades (broker finds the other side of the trade & risk for order execution)

Electronic Trading :

- used in more liquid markets.
- usually order-driven (allow buyers & sellers to advertise their limit orders)
- generally involves Direct market access (DMA) and/or algo trading

Algo Trading :

primarily used for 2 purposes : profit seeking & trade execution

Types of Execution algo :

- Scheduled algo (execute trades using rules driven by historical volume or specific time period)
 - POV (percent of volume) aka. participation algo

• VWAP/TWAP

- liquidity-seeking algo

- appropriate for larger orders, less liquid markets, higher urgency, concerns w/ info leakage.

- arrival price algo

- dark strategies / liquidity aggregators.

- trades in dark pools with aggregators attempting to optimize trading alc multiple dark venues.

- Smart order routers (SORs)

- determines the best destinations (lit or dark) to route an electronic order to.

EXAMPLE: Selection of appropriate algorithm

A portfolio manager wishes to execute three trades as follows:

Stock	Side	Share Price	Order Size (Shares)	Average Daily Volume	Urgency
SFDL	Buy	\$8.50	10,000	20,000	High
TWEL	Buy	\$32.31	5,000	100,000	Low
UDSL	Sell	\$2.05	1,000,000	1,000,000	Low

The manager considers executing the orders using the following strategies:

- Scheduled algorithm.
- High-touch principal approach.
- Liquidity-seeking algorithm.

Recommend the most appropriate implementation strategy for each order. (Note: Each strategy should only be used once.)

SFDL : Liquidity Seeking

TWEL : Scheduled

UDSL : High-touch (Size = ADV)

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Recent Algo trading developments :

① Clustering

② High-Frequency market forecasting

23.f: Characteristic of Key Markets.

Equity: markets are most technically advanced

FI: usually deal in quote-driven, dealer-based market
Electronic RFQ systems are becoming more common.

Exchange-traded derivative: Electronic trading is common,
algo trading not as common & is used for
futures than for options, Buy-side uses DMA

OTC derivative: quote-driven, dealer-based market,
usually thru high-touch

Spot FX: takes place in OTC Market that use
both electronic trading & high-touch. 3 tiers of
market: interbank, interdealer, bank-to-client
Urgent trades → brokers
non Urgent trades → scheduled algo / high-touch

EXAMPLE: Trade approach by market

The trading desk of a large multiasset buy-side firm has received the following three orders:

Market	Size	Urgency
Futures	Small	High
Agency MBS	Medium	Low
Equity	Large	Low

The trading desk is considering executing the trades using DMA, scheduled algorithms, or high-touch broker risk approaches.

Recommend the most appropriate approach for each order. (Note: Each approach should only be used once.)

Equity, Large, non-urgent : Algo trading

Agent MBS, Medium, non-urgent : high-touch

Futures, Small, urgent : DMA

**MODULE QUIZ 23.3**

1. A trading desk has had the following orders submitted by the firm's portfolio managers:

Stock	Execution Risk Aversion	Market Impact	Order Size (% ADV)
PQR	Low	High	50%
STU	High	Low	10%
VWX	Low	Medium	20%

For which order is an arrival price strategy *most likely* to be most appropriate?

- A. PQR.
 - B. STU.
 - C. VWX.
2. Request-for-quote (RFQ) systems are *most likely* to be used to implement trading strategies in which of the following markets?
- A. Equities.
 - B. Fixed income.
 - C. Exchange-traded derivatives.

1. B

2. B

Module 23.4: Trade Cost Measurement

Total cost of trading can be measured using implementation shortfall (IS) :

$$IS = \text{paper return} - \text{actual return}$$

paper return : hypothetical portfolio would have if the trade were executed \oplus the original decision price w/ zero cost.

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IS is expressed as basis point of total cost of the paper portfolio

EXAMPLE: Implementation shortfall

A portfolio manager decides to buy 50,000 shares of stock SJB at 9:00 am when the stock price is \$20.00 (this is the decision price for the trade) and submits instructions to the firm's trader. The trader uses a limit price of \$20.50 and in total manages to purchase 40,000 shares at an average price of \$20.34. The fund is charged a commission of \$0.02 per share, and there are no other fees. At the end of the day, SJB closes at \$20.55.

Calculate (in basis points) the total IS for this trade.

$$\text{paper return} = (20.55 - 20) \times 50,000 \\ = \$27,500$$

$$\text{actual return} = (20.55 - 20.34 - 0.02) \times 40,000 \\ = \$7,600$$

$$\text{IS (In abs. term)} = 27,500 - 7,600 = \$19,900$$

$$\text{Initial Cost} = 50,000 \times 20 = \$1 \text{ MM}$$

IS can be decomposed to :

① **Execution cost**

- **Delay cost** (b/c of adverse price movements in the time b/w PM submitting the order to trader & trader releases it to the market)
- **Trading cost** (b/c of market impact of executing the trade) aka **market impact cost**.

② **Opportunity cost** (cost of not trading any unfilled part of the trade)

③ **Fixed fees.**

In the previous example,

$$\text{Delay cost} = \$40,000 \times (20.10 - 20) = \$4,000$$

$$\text{Trading cost} = \$40,000 \times (20.34 - 20.10) = \$9,600$$

$$\text{Opportunity cost} = 10,000 \times (20.55 - 20) = \$5,500$$

paper profit on 10,000 shares not purchased

$$\text{Fixed Fees} = 40,000 \times 0.02 = \$800$$

Improving Execution Performance

Delay costs can be minimized w/ efficient trading practices that give traders the pretrade and posttrade analysis they need to make a swift decision on an optimal trading strategy.

Analysis of trading (market impact) costs can also help traders establish proper price BM & appropriate urgency.

EXAMPLE: Implementation shortfall detailed analysis

A portfolio manager decides to sell 100,000 shares of Future Recreation (FTRB) at 1:05 pm when the share price is £2.56. The trading desk of the firm receives the order and conducts a review of the trade details to determine the optimal trade strategy. Due to the low market volume, it is decided that a high-touch agency broker approach is optimal with a limit price of £2.50. The trader submits the order to a broker at 1:13 pm when the share price is £2.59. By the end of the day, the broker had executed 70,000 shares at an average price of £2.60. Commission for the trade is £400. At the end of the day, the stock closes at a price of £2.54 per share.

1. Calculate the total IS for the trade in basis points.
2. Decompose IS into the delay, trading, opportunity, and fixed-fee costs.

$$\begin{aligned}1. \text{ Paper return} &= (2.54 - 2.56) \times 100,000 \\&= 2000\end{aligned}$$

$$\begin{aligned}\text{actual return} &= -(2.54 - 2.60) \times 70,000 - 400 \\&= 0.06 \cdot 70K - 400 \\&\approx 3,800\end{aligned}$$

$$\begin{aligned}IS &= (2000 - 3,800) \div (100,000 \times 2.56) \\&= -70.3 \text{ bps}\end{aligned}$$

$$2. \text{ Delay cost} = 70,000 \times (2.56 - 2.59) = -£2,100$$

$$\text{Trading Cost} = 70,000 \times (2.59 - 2.60) = -£700$$

$$\text{Opportunity cost} = 30,000 \times (2.56 - 2.54) = 600$$

$$\text{Fixed Fee} = 400$$

Module 23.5: Evaluating Trade Execution

$$\begin{aligned}\text{absolute cost} (\$) &= \text{side} \times (\text{execution price} - \text{BM price}) \\&\quad \times \text{shares executed}\end{aligned}$$

$$\begin{aligned}\text{total cost (bps)} &= \text{side} \times (\text{execution price} - \text{BM price}) \\&\quad \div \text{BM price} \times 10000\end{aligned}$$

EXAMPLE: Trade cost

A portfolio manager is executing a buy order using a market on close (MOC) benchmark. The manager purchases at \$25.50, and the closing price of the stock is \$25.60. Calculate the cost (in basis points) based on the closing price benchmark.

$$\text{Absolute cost} = +1 \times (25.50 - 25.60) = -0.10$$

$$\text{in basis points, the cost} = -0.10 \div 25.60$$

$$= -39.1 \text{ basis points}$$

To remove the impact of market movements on trade cost, use market-adjusted cost:

$$\text{index cost (bps)} = \text{side} \times \frac{(\text{index VWAP} - \text{index arrival price})}{\text{index arrival price}} \times 10000$$

$$\text{market-adjusted cost (bps)} = \text{arrival cost (bps)} - \beta \times \text{index cost (bps)}$$

Arrival cost = arrival cost of the trade based on an arrival price BM.

β = beta of the security vs. the index used to calculate index cost

EXAMPLE: Market-adjusted cost

A trader submits a buy order to a market when the security price is €10.00 and a relevant index price is €3,500. The order is executed over the next hour at an average price of €10.15. VWAP for the index over this period is €3,507, and the beta of the security is 1.5.

Calculate the market-adjusted cost of this trade in basis points.

$$\text{index cost (bps)} = \frac{(3507 - 3500)}{3500} \\ = 20 \text{ bps.}$$

$$\text{Arrival cost} \\ = (10.15 - 10) \div 10 \\ = 150 \text{ bps}$$

$$\text{market-adjusted cost} \\ = 150 - 1.5(20) = 120 \text{ bps}$$

Added Value.

$$\text{Added value (bps)} = \text{arrival cost (bps)} \\ - \text{estimated pretrade cost (bps)}$$

Trade Governance

1. Meaning of best execution
2. Factors that determine the optimal trading approach
3. a listing of approved brokers & execution venues
4. details of the monitoring processes



MODULE QUIZ 23.4, 23.5

1. A portfolio manager submits an order to sell 10,000 shares of stock STU to the trading desk when the price is \$32.50. After careful analysis of the trade details, the trading desk submits the order to the market when the price is \$32.60 with a limit of \$32.60. The trader executes 4,000 shares at a price of \$32.65 and commissions are \$0.03 per share. The stock closes at the end of the trading day at \$32.35. The total implementation shortfall (IS) for this trade, in basis points, is closest to:
A. 9.23 bps.
B. 12.92 bps.
C. 33.23 bps.
2. A portfolio manager executes a sell order at an average price of \$8.38. The arrival price of the order was \$8.40. The relevant index value at the time of order entry was 3,000 and the VWAP for the index over the trading period was 3,050. If the stock has a beta of 1.3, the market-adjusted cost of the trade is closest to:
A. -142.5 bps.
B. 23.8 bps.
C. 240.5 bps.
3. The trade policy of an investment firm makes the following two statements:
Statement 1: The head trader is exclusively responsible for firm-wide trade execution monitoring and implementation of sound trade governance.
Statement 2: A list of eligible brokers used by the firm is created and maintained by the BEMC of the firm. This committee ensures that only brokers who execute with the lowest implicit and explicit trading costs are admitted to the list.
How many of the statements are in line with trade governance best practice?
A. Zero.
B. One.
C. Two.

$$1. \text{ Paper return} = (32.35 - 32.50) \times 10,000 = -1,500$$

$$\text{actual return} = (32.35 - 32.65) \times 4,000 = -1,200$$

$$IS = -1500 - (-1200) = 300$$

$$(\text{in bps}) = 300 / (32.50 \cdot 10,000) = 9.23 \quad (\text{A})$$

$$2. \text{ index cost} = (3050 - 3000) \div 3000 \\ = 166 \text{ bps}$$

$$\text{arrival cost} = (8.40 - 8.38) \div 8.38$$

$$= 23.9 \text{ bps}$$

$$\text{market-adj return} = -166 + 1.3 \cdot 23.9 = -142.9 \quad (\text{A})$$

3. A