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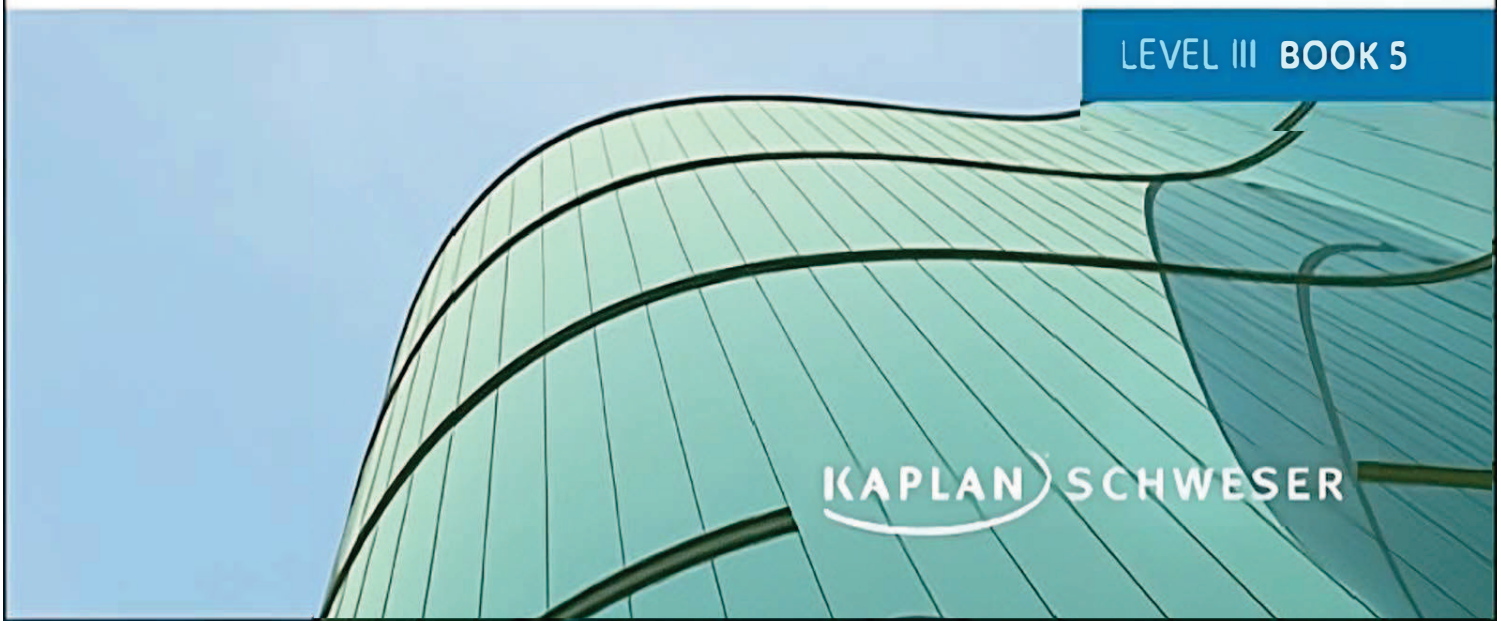
SchweserNotes™

Trading, Performance Evaluation, Manager Selection, Case Studies, and Ethical and Professional Standards

LEVEL III **BOOK 5**



KAPLAN SCHWESER

Book 5: Trading, Performance Evaluation, Manager Selection, Case Studies, and Ethical and Professional Standards

SchweserNotes™ 2024

Level III CFA®

KAPLAN SCHWESER

SCHWESERNOTES™ 2024 LEVEL III CFA® BOOK 5: TRADING, PERFORMANCE EVALUATION, MANAGER SELECTION, CASE STUDIES, AND ETHICAL AND PROFESSIONAL STANDARDS

Published in 2023 by Kaplan, Inc.

ISBN: 978-1-0788-3759-0

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READING 23

TRADE STRATEGY AND EXECUTION

EXAM FOCUS

This topic review evaluates the trade execution component of the portfolio management process. Understand trade motivations, trade characteristics, and how these—in conjunction with market conditions—determine the most appropriate approach for a trade. Crucial to determining the optimal trading approach are the costs of trading, which are both explicitly observable (i.e., commissions and fees) and implicitly part of the trading strategy (i.e., execution cost and opportunity cost). It is vital that you can calculate the total costs of trading using the implementation shortfall metric and decompose trading costs into component parts due to delay, trading, opportunity, and fixed fees. Finally, understand the areas addressed by the formal trade policy of an asset manager.

MODULE 23.1: TRADE MOTIVATIONS

Video covering this content is available online.

LOS 23.a: Discuss motivations to trade and how they relate to trading strategy.

The four categories of trade motivation include the following:

1. **Profit seeking.** Active portfolio managers seek to outperform their benchmark (i.e., generate alpha) trading securities they believe to be mispriced.
   - Managers need to act on their insight before the rest of the market; hence, a key consideration is the rate of **alpha decay**. Alpha decay is deterioration in alpha once an investment decision has been made. Managers with higher rates of alpha decay (e.g., managers trading on daily news flow) need to trade in shorter time frames; therefore, they have greater trade *urgency*. Other managers (e.g., managers with insights based on long-term company fundamentals) will have lower rates of alpha decay and therefore a lower trade urgency.
   - To minimize **information leakage** (i.e., alert the market to the security mispricing through their trading activity), managers may execute their trade in multiple venues. This may include less transparent venues called **dark pools**, which are trading systems with low pretrade transparency. Orders entered into a dark venue cannot be seen by other market participants

before the trade occurs; hence, users know that there is no risk of information leakage. The disadvantage of dark pools is that traders can't see orders on the other side of the trade, so they do not know the pretrade likelihood of execution. Dark pools are referred to as alternative trading systems (ATSs) in the United States. In Europe, dark pools may be multilateral trading facilities (MTFs) bringing together buyers and sellers, or systematic internalizers (SIs), which are single-dealer liquidity pools. An execution venue with high pretrade transparency is called a lit venue. National stock exchanges are examples of lit venues.

2. **Risk management and hedging needs.** Portfolios need to be traded to maintain targeted risk exposures. This may be simply rebalancing the portfolio after a change in market conditions (e.g., a fixed income manager targeting a fixed duration level), or hedging to remove a risk factor from a portfolio (e.g., an equity manager hedging foreign exchange exposure). Derivatives trades may be used to facilitate risk management; however, this does require that appropriate liquid derivative contracts exist and that the fund mandate permits their use. When these conditions are not satisfied, trades in underlying securities will be required. Funds that use leverage need to monitor risk levels closely, since leverage magnifies risk.
3. **Cash flow needs.** These trades are primarily caused by investor subscriptions into, and redemptions out of, the fund.
   - The urgency of the trades depends on the nature of the cash flow, the liquidity of fund investments, and the liquidity terms promised to fund investors. For example, a manager investing in listed securities might promise daily liquidity to investors, whereas a hedge fund manager using less liquid securities might require a one-month notice for redemptions.
   - Funds with less liquid holdings will find it difficult to invest new client funds in a short time frame. This may lead to *cash drag*, where the low returns of cash cause the fund to underperform the benchmark. To avoid cash drag, a manager may engage in *equitization* strategies where liquid securities such as exchange-traded funds (ETFs) or derivatives are used to gain market exposure while the investment in underlying securities occurs over time.
   - Client redemptions are usually based on the fund's net asset value (NAV) using the closing prices of securities. Liquidating securities at closing prices, therefore, eliminates the risk of selling at prices different to those needed to meet redemptions. When determining which securities to sell to meet redemption requests, managers should consider both liquidity and tax implications.
4. **Corporate actions, margin calls, and index reconstitution.**
   - Corporate actions on portfolio holdings such as mergers, acquisitions, or spinoffs may require portfolio trading. Income-related corporate actions such as dividends or coupons income may need reinvesting. Funds that make regular distributions to investors may have to sell securities when income from investments is insufficient to meet these distributions.
   - Margin calls on leveraged positions as well as derivatives positions that are suffering losses may require urgent sales of portfolio holdings.

- When the benchmark index is reconstituted, managers may need to execute trades to reflect the change. This is particularly important for index-tracking funds. Since the value of the index benchmark usually is based on closing prices, trading at closing prices minimizes the fund's tracking error to the benchmark.

Trading Strategy Inputs

LOS 23.b: Discuss inputs to the selection of a trading strategy.

Once the decision to invest has been made by the portfolio manager, the executing trader and the portfolio manager must work together to identify the optimal trading strategy given the manager's objectives. Key factors that dictate the appropriate trading strategy are (1) order characteristics, (2) security characteristics, (3) market conditions, and (4) individual risk aversion. These factors are discussed as follows:

1. **Order characteristics.** These include side, absolute size, and relative size.
   - **Side** refers to the direction of the order (buy, sell, short buyback (cover), or short sell). This is particularly important when there is price momentum expected where securities are moving in one direction. For example, it will be more costly to purchase securities in a rising market than to sell them. A list of only buy orders or only sell orders will have greater market risk exposure compared to a list of buys and sells with offsetting market risk exposures.
   - **Absolute size** refers to the number of securities being traded. Larger orders will have a higher *market impact cost* than smaller orders. Market impact cost is the adverse effect of the order on prices—the act of buying (selling) puts upward (downward) pressure on prices. Managers will generally trade larger orders with less urgency (if possible) to mitigate the market impact of the order.
   - With **relative size**, managers will often consider order size as a percentage of **average daily volume (ADV)**. Orders that constitute a higher percentage of ADV are expected to have higher market impact costs.
2. **Security characteristics.** These include security type, short-term alpha, price volatility, and security liquidity.
   - **Security type.** Different security types [e.g., underlying securities, ETFs, American depositary receipts (ADRs), global depositary receipts (GDRs), derivatives, and foreign exchange (FX) contracts] trade in different markets with different costs, regulations, and liquidity.
   - **Short-term alpha.** For active managers, a high rate of alpha decay requires a more urgent trade strategy. A manager will also have higher urgency in adverse market conditions (i.e., buying into a rising market or selling into a falling market).
   - **Price volatility.** High price volatility implies high *execution risk*, defined as the risk that an adverse price movement will occur over the trading horizon.

- **Security liquidity.** Greater liquidity decreases execution risk and market impact cost. Narrow bid-ask spreads and large volume available for trading (i.e., market depth) are two key indicators of high liquidity.

3. **Market conditions.** Key market conditions that affect trading cost are volatility and liquidity levels. These can both change adversely (increased volatility and lower liquidity) in times of market crisis, such as the credit crisis of 2008. This can also occur for individual strategies. For example, quantitative equity fund managers experienced a liquidity shock in August 2007 due to managers, having herded into similar trades, attempting to liquidate at the same time. Even in normal market times, volatility and liquidity will be dynamically changing, and traders need to reflect this in their expectations. Lower liquidity suggests longer trading horizons; however, higher volatility might cause investors to speed up trades and incur higher costs to avoid execution risk of adverse price movements.
4. **Individual risk aversion.** A portfolio manager/trader with higher risk aversion is typically more concerned about the market risk of adverse movements in security prices than market impact costs and therefore will trade with more urgency.

These trade strategy inputs are key factors driving the two major costs of trading: market impact and execution risk. Market impact comes from trading too quickly, causing adverse price movements and information leakage as the market notices the liquidity imbalance in the market. On the flip side, execution risk, the risk of adverse price movements over the trading horizon, is caused by trading too slowly. Therein lies the **trader's dilemma**—alleviating market impact causes execution risk, and vice versa. Skillful traders will use their experience and judgment to balance these costs of trading.

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.

Answers:

1. A larger order size will most likely lead to a higher market impact cost; the trader will have to trade at more adverse prices to execute a larger transaction.

   Higher liquidity results in narrower bid-ask spreads and higher market depth, both contributing to lower market impact cost; the trader will likely be able to execute the trade close to current market prices.

   Higher alpha decay prompts traders to trade quickly, leading to a higher market impact cost.
2. Statement 1 is true. Executing the order over a longer trading horizon will mean the manager can break the order up into smaller parts and therefore lower the market impact cost of the trade.

   Statement 2 is false. Executing a trade over a longer time horizon will lead to higher execution risk; the risk of an adverse price movement increases with the trading horizon.

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.

MODULE 23.2: REFERENCE PRICE BENCHMARKS FOR TRADE EXECUTION

Video covering this content is available online.

LOS 23.c: Compare benchmarks for trade execution.

Reference prices are used to determine expected trading costs, which enables managers/traders to select the optimal strategy for a trade. Reference prices are also a key input in the calculation of the actual cost of trading for posttrade evaluation.

Reference prices can be categorized as pretrade, intraday, posttrade, or price target. Details of these categories are as follows.

- **Pretrade benchmarks** are known before the start of trading. These include:
  – *Decision price*. This is the price at the time the portfolio manager made the investment decision.
  – *Previous close*. This is the closing price on the previous day (often used as a proxy for decision price by quantitative managers using systematic rules-based, data-driven strategies).
  – *Opening price*. This is the opening price on the day (often used as a proxy for decision price for subjective fundamental managers investing in

securities for a long-term alpha, since it does not punish or reward traders for news released overnight when markets were closed). Note that if a trade is to be entered into an opening auction, which sets the day's opening price of a security at a trading venue, then this opening auction price is *not* a good benchmark since it can be affected by the trade.
  – *Arrival price*. This is the price of the security when the order is sent to the market for execution. Active portfolio managers trying to generate alpha will often specify a benchmark for an arrival price.

- **Intraday benchmarks** are based on prices during the trading period. These are used by managers who trade passively over a day or funds that may be rebalancing or minimizing risk. Intraday benchmarks include:
  – *Volume-weighted average price (VWAP)*. This is defined as the average price of all trades, weighted by volume, over the trading horizon. Managers may use the VWAP benchmark when they want to participate with volume patterns over a day (e.g., when rebalancing a portfolio over a day). Managers specify VWAP to help achieve the objective of using the cash received from sell orders to fund buy orders of the rebalancing.
  – *Time-weighted average price (TWAP)*. This is the equal-weighted average price of all trades executed over the trading horizon (i.e., TWAP ignores volume). TWAP may be appropriate for managers who wish to remove the impact of outliers (i.e., large trades that occur at the highs or lows of the day) since they believe they are less able to participate in these extreme trades. It is also appropriate in market environments with highly fluctuating volume throughout the day.
- **Posttrade benchmarks** are determined after trading has been completed. The most frequently used posttrade benchmark is the closing price, often used by managers who wish to execute at the closing price to reduce the tracking error of the fund. A drawback of this benchmark is that since the closing price is not known until after the trading is completed, a manager cannot assess trading performance during the trading horizon.
- **Price target benchmarks** are prices used by profit-seeking managers aiming to earn short-term alpha, related to the manager's view of the fair value of the security. For example, a manager may believe that a security that is currently priced at $10 has a true fair value of $10.50. This manager could use a price target benchmark of $10.50 in a strategy that purchases as many shares as possible below this level.

Trading Strategy Selection

LOS 23.d: Recommend and justify a trading strategy (given relevant facts).

The trading strategy selected by the manager and trader should reflect the costs and risks discussed in the previous section and be consistent with the manager's objectives. Examples of some common trade types and their most appropriate trading strategy are shown here:

Trade Type	Description
Short-term alpha	**Objective:** Trade short-term mispricing in a liquid equity market (e.g., overreaction to news flow). **Urgency:** High **Reference prices:** Price target benchmark linked to the manager's estimate of fair value combined with an *arrival price benchmark* for orders when placed in the market **Execution method:** Computer algorithm (discussed later)
Long-term alpha	**Objective:** Trade over the long term due to changes in fundamental conditions (e.g., sell average-sized positions in illiquid bonds that are expected to experience deteriorating credit conditions over the next year). **Urgency:** Low **Reference prices:** Difficult to use in practice **Execution method:** Sell securities gradually over a few weeks in small parts to avoid information leakage and pressure on dealer's prices.

Risk rebalance	**Objective:** Rebalance or hedge risk exposure (e.g., reduce risk levels in liquid FX markets by liquidating long and short positions to bring fund volatility down to a target level). **Urgency:** It is low, since the trader is both buying and selling, which lowers execution risk. Execution risk would be higher for trades on only one side of the book since then the trader has directional exposure. **Reference prices:** TWAP **Execution method:** Algorithmically target TWAP over the next couple of days.
Cash flow driven (client redemption)	**Objective:** Liquidate the holding to meet client redemptions (e.g., liquidate small-cap fund to meet redemptions, which will be calculated using the closing prices of securities in the portfolio). The fund bears the risk that liquidations are not made at the closing prices used to calculate the redemption. **Urgency:** The trade needs to be completed by the end of the trading day. **Reference prices:** Closing price **Execution method:** Execute a reasonable amount of liquidity in the closing auction; execute the remainder before the close of trading (e.g., at VWAP).
Cash flow driven (new trade mandate)	**Objective:** Invest new client funds (e.g., invest large amount with a mandate to track a small-cap index with a 3% tracking error). Performance measurement will begin at the current day's closing price. **Urgency:** Liquidity is too low to execute in underlying securities by the end of the day, but immediate exposure is required by the client. Liquid index futures contracts exist. **Reference prices:** Closing price **Execution method:** Obtain immediate exposure to index through a long position in index futures to eliminate cash drag. Build underlying stock positions over time to reduce market impact, while simultaneously unwinding the futures position. There are two issues with this method: ■ There may not be a closing auction for the futures contract, in which case the futures trade would need to be done as close to the market close as possible. ■ The mandate must allow derivatives positions.

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.

MODULE 23.3: TRADE EXECUTION AND STRATEGY IMPLEMENTATION

LOS 23.e: Describe factors that typically determine the selection of a trading algorithm class.

Video covering this content is available online.

Once an appropriate trading strategy has been identified, the trade must be implemented. Trade implementation choices are described as follows:

High-touch approaches involve high levels of human involvement. This is usually required for large trades (known as block trades), since finding the other side to larger trades is more difficult, or in less liquid markets. High-touch approaches include:

- **Principal trades (broker risk trades).** This is where dealers or market makers assume all or some of the risk relating to executing the order, which is priced into their spread. **Quote-driven**, **over-the-counter (OTC)**, or **off-exchange markets** are primarily principal trade markets. Principal trades also include **request-for-quote (RFQ)** markets where market makers do not provide continuous quotes, but only do so on request.
- **Agency trades.** This is where the broker finds the other side of the trade, and risk for order execution remains with the portfolio manager/trader.

Electronic trading involves trading via computer and is used in more liquid markets. Trading here is typically *order driven* in that electronic systems allow buyers and sellers to advertise their limit orders in a central limit order book. A limit order is an order to trade at a certain (limit) price or better. For example, a trader may execute a buy order with a limit of $20. This means the trader will buy the security for any price up to $20, but not pay more than $20. Similarly, a seller limited at $20 will sell at any price above $20, but not lower. Electronic trading generally involves **direct market access (DMA)** and/or **algorithmic trading** (defined next). DMA allows buy-side portfolio managers/traders to access the order book of the exchange directly through a broker's technology infrastructure.

Algorithmic trading is the use of programmed rules to electronically trade orders, primarily used for two purposes: *profit seeking and trade execution*.

Profit-seeking algorithms use real-time market data to determine which securities to buy and sell, and are employed by electronic market makers, quantitative funds, and high-frequency traders.

Execution algorithms trade according to the rules specified by the manager to meet their objectives. Types of execution algorithms include the following:

- *Scheduled algorithms—percent-of-volume (POV), VWAP, and TWAP algorithms.* These execute trades using rules driven by historical volumes or specified time periods.
  - *POV algorithms* (a.k.a. participation algorithms) send orders according to a volume participation schedule (e.g., "participate as 5% of traded volume").

- Advantage: They automatically exploit increased liquidity when available.
- Disadvantage: They continue to trade at any (potentially adverse) price, and may not fill the order in a specified time if there is a lack of trading.

– VWAP and TWAP algorithms are *time-slicing algorithms*. VWAP algorithms attempt to match the VWAP price for the period by carving up the trade and sending orders based on *historical* intraday volumes. The usual intraday volume profile is to trade more at the open and close and less in the middle of the day. TWAP algorithms perform a similar task; however, they ensure an equal number of shares is traded in each time period (e.g., each hour).

- Advantage: They ensure that a specified number of shares are executed in a specified time period.
- Disadvantage: They may force trades in times of low liquidity or trade too little in times of high liquidity.

- *Liquidity-seeking algorithms* (a.k.a. opportunistic algorithms) aim to take advantage of favorable liquidity conditions when offered by the market. For example, for a buyer, this algorithm would wait until a large seller appeared and then enter a market order. These orders use both lit and dark venues.
- *Arrival price algorithms* seek to trade close to market prices prevailing at the time the order is entered. These algorithms will trade more aggressively (i.e., faster) than other algorithms to trade more shares at close to the arrival price.
- *Dark strategies/liquidity aggregators* execute trades in dark pools, with aggregator algorithms attempting to optimize trading across multiple dark venues.
- *Smart order routers (SORs)* are algorithms that determine the best destination (either lit or dark) to route an electronic order to get the best result. SORs focus on getting the best price for market orders, or the highest probability of execution for limit orders.

PROFESSOR'S NOTE

While the descriptions just listed are important, the LOS requires you to select which algorithm is most appropriate for a given order or set of orders. We will discuss this exam-critical information next.

Which Algorithm?

Scheduled algorithms are appropriate for relatively small orders in liquid markets for managers with less urgency (i.e., greater risk tolerance for longer execution periods) and/or who are concerned with minimizing the market impact (e.g., a risk rebalancing trade executed over a trading day).

Liquidity-seeking algorithms are appropriate for larger orders in less liquid markets with higher urgency while trying to mitigate the market impact. They are also appropriate when a manager is concerned that displaying limit orders may lead to information leakage, or when liquidity is typically thin with sporadic episodes of high liquidity.