WorldQuant University

Financial Markets
Module 7

MSc Financial Engineering

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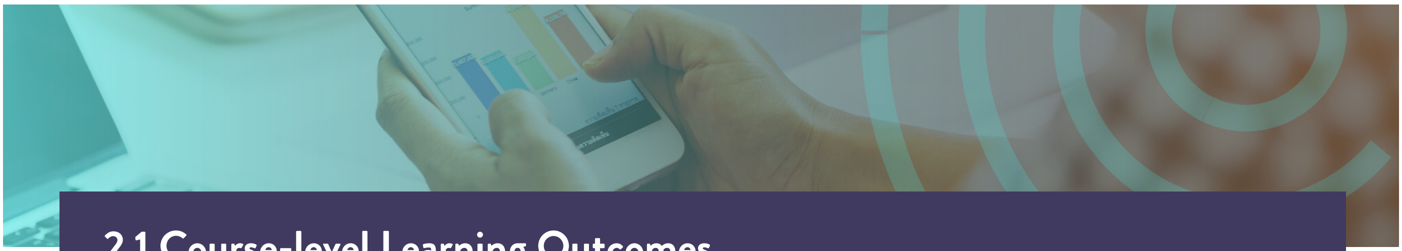
1. Brief

This document contains the core content for Module 7 of Financial Markets, entitled Market Making and Trading. It consists of four video lecture scripts, four sets of supplementary notes, and a peer review question.

2. Course Context

Financial Markets is the first course presented in the WorldQuant University (WQU) Master of Science in Financial Engineering (MScFE) program. The course sets the tone for the wider program, providing the context for the field of financial engineering, while introducing you to the financial markets, analysis of market events and valuations of financial instruments.



2.1 Course-level Learning Outcomes

Upon completion of the Financial Markets course, you will be able to:

1. Describe the types and components of financial markets.
2. Identify and define the key characteristics of financial instruments.
3. Evaluate the different ways in which financial instruments address risk.
4. Perform valuations of simple financial instruments (especially bonds and options).
5. Understand the impact of credit risk within financial markets.

2.2 Module Breakdown

The Financial Markets course consists of the following one-week modules:

1. Introduction to Financial Markets
2. Market Regulation
3. Interest and Money Markets
4. Fixed Income and Bond Markets
5. Stock and Equity Markets
6. Futures, Options and Derivatives
7. Market Making and Trading

3. Module 7

Market Making and Trading

This module reconsiders the various financial markets introduced in the previous modules, but from a more practical perspective. Instead of considering the different types of investments and markets, the different roles in the financial markets are addressed. This gives important context to the earlier modules and adds further information about how the financial markets operate on a more practical and granular level.

3.1 Module-level Learning Outcomes

Upon completion of the Market Making and Trading module, you will be able to:

1. Define and show their understanding of several key terms, such as the buy side, the sell side and a market maker.
2. Describe the fundamental structure of the financial markets in terms of different types of entities involved in trading.
3. Demonstrate sound understanding of the concerns that face different role players in the financial markets.

3.2 Transcripts and Notes

3.2.1 Transcript: The Buy Side versus The Sell Side (Part 1)

In the final module of the course, we're going to consider financial markets from a different perspective. Up until now, we have been considering the various sub-markets in which the various types of investment are traded. Now, instead of categorizing these different markets our focus will shift, and, in this module, we'll categorize and study the various players in these markets. This will give important context for what we have learned about the sub-markets, as well as the particular assets and instruments that trade in them.

Practitioners in financial markets draw a critical distinction between the buy side and the sell side when it comes to the activities in the financial markets. It is particularly important and useful to incorporate this distinction in our understanding for numerous reasons. Firstly, this distinction and the associated terminology is commonly used in practice, and it is essential in understanding financial documents, practitioners, news and the like. Secondly, it is a useful duality when contemplating the financial markets, their participants, and behavior. The distinction can provide some clarity when trying to consider all of the complexities involved in real-world markets.

The buy side refers to the activities of the players whose primary concern is buying and holding financial investments to make a profit. An investor who simply wants to invest their money for a profit, for example, will be involved in the buy side of the financial market. More generally, the buy side is comprised of entities with capital to invest, who are seeking to utilize it by investing their capital in the financial markets.

Inversely, the sell side refers to market activities that cater to the buy-side players; that is, the selling of investment products and services to the buy side, to assist in making profit. Although we will consider the details of the buy side first, let's briefly consider a simple example of a sell-side function to understand both sides of the coin. Suppose a company wishes to raise money by issuing bonds. Issuing bonds involves a whole host of legal, logistical and regulatory challenges, and the company will usually hire an investment bank to assist with the issuance. This example demonstrates a sell-side activity — buy-side players, who wish to purchase the newly-issued bonds, will deal with the investment bank, who will facilitate the issuance and cater to their needs. Investment banks are thus prominent sell-side entities.

In this lesson's complementary set of notes we'll go into detail about the buy side of the financial markets. An important initial aspect is that the buy side is comprised of various different types of entity, each of which are buying into financial investments for different reasons. For some examples, a pension fund and a private investor are both buy-side entities. A pension fund receives pension contributions and needs to invest these contributions so that it will have enough money to pay the contributors their pension benefits in the future. The pension fund contributors give their money to the pension fund, who then invests the money on their behalf. Ultimately, private individuals are providing the capital for investment, but it is the pension funds that actually make the investments and control the investment and risk decisions. Thus, pension funds are one type of player on the buy side of the financial markets.

The way that this type of information should be integrated with what we already know is by developing our understanding of the types of participants that act in the markets we've learned about previously. For instance, in Module 4 we learned about bond markets. Now we are learning about the types of investors that would wish to purchase and hold the bonds that trade in the bond markets. We have learned about the features of bond investments, as well as the risks that bond investments involve. We should now be thinking about how different investors — different sell-side and buy-side entities — would view these features and these risks.

3.2.2 Notes: The Buy Side

In order to consider the buy side in more detail, we will consider the important types of entity that comprise the buy side.

Our first consideration involves mutual funds, which are collective investment schemes in which many investors pool their money to invest collectively, and then share the resulting investment profits. Usually, the investors will hire a fund manager, who will invest the money on the investors' behalf. The fund manager (which may consist of a large team) will earn a fee for their service, which entails making the investment decisions. In addition, they will possibly earn some percentage of any profits that are made. Fund managers are highly incentivized to choose investments that perform well. In addition to the direct profits they may earn, fund managers value their reputation greatly. This is because they compete with each other in order to attract more funds into their management from other mutual funds in the market.

Now, let's consider pension funds, which are like mutual funds in that they are also collective investment schemes, but differ by having a much more specific purpose. Let's consider the goal of mutual funds, which fund managers must attempt to achieve. It is to make as much profit on the investment as possible which necessarily entails the consideration and incorporation of the ever-present risk that is always relevant alongside considerations of return/profit. The goal of a pension fund is to ensure that, using investments made with pension contribution money, future pension payments are made as per the agreement of the pension fund (there are different types of pension plans; some agree on specific amounts to be paid in the future, while some agree that the amount will depend on the performance of the investments). Choosing a suitable investment approach is therefore critical. Like with mutual funds, pension funds are put into the hands of professional fund managers.

Insurers (that is, insurance firms) are another type of buy-side entity. These entities receive insurance premiums and need to invest the money so that they can pay out insurance claims. If insurers can invest in a way that gives a large return (a large profit) with little risk, then they can succeed in providing insurance to customers and potentially make a further profit for their shareholders. While insurers could invest the money themselves, they would typically turn to the professional fund management industry, who have expertise in investing money.

It seems apparent that fund managers are a very important part of the buy side (and may also be called investment managers or asset managers). In the case of pension funds, individual people make pension contributions to a pension fund, after which the pension fund gives the pooled money to a fund manager to invest. All of this belongs on the buy side of the financial markets. Note that part of the buy side is composed of individuals who invest their money themselves, this is called retail investment. Retail investment is much smaller than institutional investment, where dedicated institutions of professional fund managers make the investment decisions.

The fund management industry (also known as the asset management or investment management industry) is made up of many fund management firms, who specialize in making optimal investment decisions. Equally they aim to establish and maintain reputations of good investment performance and advice. It is a very large and competitive industry, and the players range from enormous, long-established investment advisors to small highly specialized consultancies. Note that some funds choose to "insource their fund management"; which means that instead of hiring an asset management firm, the fund will directly hire fund-management experts. Pension funds are sometimes large enough so that the economies of scale involved in insourcing make it a more suitable approach.

Sovereign wealth funds are another type of prominent buy-side entity. These are investment funds owned by national governments, which the governments can invest their revenues to assist with financing the government and its operations. Sometimes governments borrow money via the bond markets, and sometimes investing money in the financial markets is also an appropriate financial action.

Hedge funds are another type of buy-side entity. Hedge funds are like mutual funds, in that they are simply collective funds with the goal of making profits for their investors. However, hedge funds have the distinct purpose of aiming for a low risk investment with the aim of providing a hedge. More particularly, their purpose is to generate an investment that behaves differently to the rest of the market (and therefore provides a hedge — an offsetting position — to other investments in the market). Hedge funds therefore take different investment approaches, often including unusual assets and/or complicated derivative strategies. Largely because of these complexities, hedge funds are regulated in a different way to mutual funds. For example, hedge funds might not be allowed to accept the funds of the general public, but only certain types of accredited investors.

Although the different types of entities we've examined have differing goals and contexts, the main goal of buy-side investing is shared nonetheless – and that is to make good investment profits without taking large risks. The buy side entities must therefore be aware of the all the details and the numerous aspects of the financial markets we have considered. An asset management firm, for example, needs to be aware of the whole investment landscape (the different assets and instruments available for purchase, as well as the features and risks that they exhibit), so that they can make investments that are suitable, and hopefully optimal, for the exact situation. It should be apparent that different situations have different investment requirements, and asset managers need to be experts in understanding and managing these situations properly. In addition to understanding the assets on offer in the financial markets, asset managers (and other buy-side entities) should also understand the other contextual factors that are important. For example, tax law and regulations are often highly relevant to how one can invest optimally.

We can relate this to our prior learning and the major markets we have covered (the money, equity, bond and derivative markets) as these are where the buy side can invest. We should be able to see why institutional investors have many advantages over smaller retail investors. There are many benefits brought by the economies of scale of larger investment funds, in addition to the risk-management strategy of diversification. As you'll recall, diversification means spreading one's investments widely, so that any unprofitable investments are hopefully balanced out by other more profitable investments. Institutional investors, who manage the collected funds of many investors in the form of a single large fund, can enjoy the benefits of diversification much more easily than small investors. A large mutual fund might spread its investments over several categories such as stocks, short-term debt, long-term debt, commodities, real estate, off-shore investments and derivative positions to add hedges and speculations. This allows their investments to be relatively less vulnerable if one market is performing badly.

Asset allocation is another important idea in asset management. The asset allocation is the way that the total fund is split between different investment categories. If a fund manager thinks that certain equity investments are undervalued and will give good returns in the future, she might suggest that the fund increase its equity allocation. The different share valuation techniques given in Module 5 might be used to form such a view. On the other hand, a fund manager might think that earning the yield associated with government bonds is a good strategy, given the risk-return requirements of the situation. Accordingly, they could advise that the bond allocation be increased (one can also make speculative trades on bonds; if a fund thinks interest rates will decrease, they can purchase bond and profit from the price increase if that occurs).

3.2.3 Transcript: The Buy Side versus The Sell Side (Part 2)

In today's video we'll consider the sell-side component of the financial markets and financial services industry. In the previous video, we defined the sell side as the activities that cater to or facilitate activities of the buy-side entities. It is therefore useful to consider the perspective of the buy side and imagine what typical buy-side players require. Understanding this will help to understand how the sell side has come into existence to fulfil these requirements.

The job of an asset manager is to use the investment capital they are given to purchase assets that will provide an investment profit. Now let's suppose that an asset manager wishes to purchase some shares in the company Apple. Although this sounds quite simple in principle, there are many practical challenges in making such a purchase.

The shares of a company like Apple trade on a stock exchange (in fact, due to the size of Apple, on many stock exchanges). As you may recall a stock exchange is not as simple as a shop where one can walk in and make a purchase. This is due to many legal, regulatory, practical and security-related reasons – there are complicated rules for how Apple's shares can be purchased on a particular exchange.

Therefore, the asset manager will purchase the stock indirectly, whereby they will usually need to approach a stock broker, who will purchase the stock on the asset manager's behalf. It is the stock broker's job to manage the complicated rules of the exchange.

Firstly, they need to ensure they are in a position that allows them to trade at all — exchanges are sometimes very restrictive about who is allowed to make trades, and sometimes only a few licensed brokers are given access to the exchange.

Secondly, the broker would know precisely how to execute the trade — which would have to be done in a very particular way. The broker would need to know how to use the electronic platforms of the exchange and would need to understand precisely how to enter an offer on the share at a certain price. The limitation of access is because many potential mistakes can be made in this process. For example, one can make an offer to buy shares at a certain price and might have the offer taken up by many more sellers than one intended.

Equally, documentation or certification of some kind might be required to accompany the offer to trade or might be needed to finalize a trade. Brokers have familiarity and established relationships with exchanges enabling them to meet these and other challenges.

Finally, the broker's expertise allows them to offer investment advice to the asset manager. They might suggest that Apple is not, in their opinion, a suitable investment at that time, and might suggest an alternative strategy. Since the asset manager can choose between many stock brokers, the quality of the investment advice can be a crucial factor in the brokerage business. Brokerage firms often try to differentiate themselves by employing research teams in order to advise their clients.

This idea of brokerage is fundamental to the sell side aspect of the financial markets. Firms will offer these brokerage services to the buy side, and thereby facilitate the trades that buy side players wish to make. The buy side players will need to pay fees to brokers in exchange for these services. Brokers will compete with each other (by offering low fees, high-quality advice and convenient and efficient execution of trades) to win the business of the buy side.

The following set of notes outlines the sell side in more detail.

3.2.4 Notes: The Sell Side

Like in the previous set of notes, we will consider the important types of entity that comprise the sell side. At the same time, we'll consider the requirements of the buy side — and how this relates to the sell side's role, which is to facilitate the buy side's investing. Therefore, bearing the buy side's requirements in mind will be useful.

Brokers are a crucial part of the sell side, since they facilitate the trading of investments. Most investments cannot be traded by anyone who wishes to trade, usually a license or accreditation, and often certain expertise, is necessary to make trades in stocks, bonds, derivatives amongst others. Since the licensing and the expertise can differ across different markets, certain brokerage firms may specialize in particular types of trade. For instance, a stock broker deals with equity investments, and needs to ensure they can trade on the relevant exchanges in the way described in our previous video. A derivatives broker faces different challenges. For example, the market for forward contracts is an OTC market, which does not involve an exchange. If someone wants to enter a short forward contract, they would contact their derivatives broker, who would have a network of other parties and brokers they could approach to find someone who is willing to enter the agreement as a short party.

Broker-dealers offer the same service that brokers do, but they also make trades themselves, whereas a broker never trades on their own behalf; they only trade on behalf of their clients. When acting in this brokerage capacity, a broker-dealer is said to be making agency trades, whereby they are merely acting as an agent for their client, who wishes to make the trade. When a broker-dealer is trading on its own behalf (when acting as a dealer), it is said to be making principal trades.

A dealer is an idea that is more general than its financial application. A car dealer or an antiques dealer does the same thing as a dealer in the financial markets (that is, buying and selling as opportunities arise during the course of business); the only difference is the market in which they work.

Brokers are well-positioned to become dealers because they develop expertise about particular markets and investments, and also because they have a network of potential buyers and sellers. It is important to note that the dealing function of a broker-dealer has a different goal than the brokerage function. Regarding dealing, the goal is to make an investment profit on the net total of the all the trades that are executed. The risk taken in this process of investing must also be considered. Whereas with brokering, the goal is to earn fees, not investment profit. When brokering, the money being invested does not belong to the broker-dealer, instead the client is entitled to the profit.

Understanding brokers and broker-dealers is not necessarily an important aspect in understanding the abstract concepts of financial theory, but they are very important in the practical functioning of the financial markets. For one thing, brokers and broker-dealers are involved in so many of the trades that take place that they have become an important source of price and trade information, as well as other financial news. One should note how dealers improve the liquidity of the market — if you want to sell an asset, you don't necessarily have to wait for someone who wishes to hold the asset to arrive on the market, you might be able to sell to a dealer (who has the intention of selling it later for a profit). Thinking of a non-financial example, such as a car dealer, can be useful in understanding this.

Note that dealers belong on the sell side of the financial markets, even though they are involved in investing for a profit in some sense. The difference between buy side investments and dealers' investments is the intended timespan of the investment. Dealers do not intend to hold large quantities of assets at any given time, they only need to hold inventory so that they are ready to sell as well as to buy. The intention in buy-side investing is different: it is to hold investments as they grow and produce profit (whether through income or capital growth), not to hold investments so that they can sell them in the near future.

Finally, note that a broker-dealer might become a market maker, which is a very special type of dealer. That is the topic of the next video.

Investment banks are the other important type of entity on the sell side, in addition to brokers, broker-dealers and market makers. The primary service that investment banks offer is the facilitation of the issue of securities. We have seen in earlier modules that entities raise funds by issuing equity or debt securities. Just like the complications associated with purchasing an Apple share, issuing these securities can be complicated in practice, both for legal and regulatory reasons. It may also be for the simple reason that it can be very difficult to issue securities for an appropriate price.

If your company is issuing bonds, you would like their initial sale (their issuance on the primary market) to have as high a price as possible (as this would mean you get more funding now, for the same future obligation to the pay the par value of the bonds). However, bond investors on the buy side would, of course, prefer a low price. Investment banks are experts at managing this uncertainty and the potential problems around it (for example, setting the price too high to attract enough investors for all the issued bonds can be turn out to be costly). Investment banks ensure that the bonds are issued and promoted in such a way as to meet the demands of the buy side — an example of one of their sell-side activities.

Investment banks engage in other sell side activities, most notably the selling of derivatives. In some sense, this means that an investment bank might act as a dealer (or a market maker) for derivatives, but it is important to note how the nature of a derivative compared to other assets affects matters. Recall that derivatives are almost always cash settled, therefore when you sell a derivative, it means that you will incur a future cash flow. This means that one does not need to hold inventory to sell a derivative; instead one can simply enter the short position. When selling a bond, you need to hold the bond in order to sell it. (One can attempt to short an asset like a bond — which essentially means to sell it without necessarily owning it — but this is difficult to do in practice). Investment banks enter the short position on derivative contracts that the buy side are demanding (i.e., the buy side will wish to enter certain long positions; investment banks will enter the corresponding short positions so that the derivative contract can come into existence).

The buy side wants to achieve a high return with low risk, and they use the ideas of speculation and hedging to assist with this. Derivatives offer effective and highly flexible ways of speculating and hedging. The buy side will buy derivatives (for example, enter the long position on a put option) from investment banks (who then enter the short position) — this is the sell side facilitating and assisting with the investments of the buy side.

3.2.5 Transcript: Market Makers

In the previous set of notes, we introduced the idea of a dealer in the context of the financial markets. To reiterate, brokers, who have the ability to trade in the financial markets, might choose to trade for themselves in addition to the trading on behalf of their clients. The goal of this additional trading is to make profits to add to the fees they charge their clients.

A dealer will opportunistically buy assets that they view as underpriced and sell assets they view as overpriced. For instance, let's imagine a broker-dealer purchases a share on behalf of their client for $100. The client pays the $100, which the broker-dealer passes over to the seller and pays the broker-dealer a fee. If the broker dealer thinks the share purchase is a good deal at $100, they might also buy some for themselves. Perhaps they think the share is in fact worth $105, and since it is available at $100, it is undervalued. To the dealer purchasing an additional share on their own behalf appears to be a good opportunity to make extra money.

Now, let's examine market makers, which we briefly mentioned before. A market maker describes an entity that is willing to buy and sell certain financial instruments or assets at prices that it quotes. A market maker must constantly publish a price at which it is willing to buy instruments and a price at which it is willing to sell those same instruments. This is similar to the activity of the dealer but involves a much stronger commitment.

In our example, a dealer can observe the price of $100, and decide whether it gives a good trading opportunity and, accordingly, whether they are willing to trade at that price. A market maker, on the other hand, must specify, in advance and at all times, the prices at which they are willing to trade. In this example, they might say they are willing to buy the share at a price of $99 and are willing to sell it at a price of $101.

Dealers buy and sell when they see the opportunity, however market makers do not have this flexibility – instead they must specify what they perceive to be a good selling price and a good buying price in advance, and they must be willing to make trades at these prices. This lack is flexibility is onerous for a few reasons. One is that market makers cannot be sure whether their offered prices will be taken up; specifying their buying and selling prices is therefore risky and uncertain.

Another reason is that they need to hold inventory so that they can sell to anyone who wishes to buy at the price they offer. Maintaining inventory levels, and adjusting the quoted buying and selling prices, is a delicate matter that can result in losses if done poorly.

In exchange for meeting these requirements and bearing these risks, market makers reap certain benefits. The first is that their always-open offer to trade attracts many investors (or, more precisely, many brokers who are representing buy-side entities). Therefore, they have the potential to make larger profits. The second is that they get to earn profits based the difference between the two prices that they offer, if they can get their trades to cancel out.

Suppose a broker phones the market maker we considered earlier and says they would like to sell their share at the price of $99 – the price at which the market maker was willing to buy and therefore what they must accept. Then another broker wishes to purchase the share at the quoted $101. The market maker then sells the share they have just bought and makes a profit of $2. This number (the difference between the buying and selling prices) is known as the bid-ask spread.

3.2.6 Notes: Market Making and the Bid-Ask Spread

We have seen the two capacities broker-dealers possess – they have the capacity to act as dealers by trading for themselves, as well as brokering and trading on behalf of their clients. In this dealing capacity, the broker-dealer will attempt to profit by capitalizing on their familiarity and expertise of the particular markets they specialize in. When acting in this capacity they will draw on their central, well-informed and connected position in the markets. Additionally, we have seen how dealers can commit to being market makers, whereby they commit to quoting buying prices (or bid prices) and selling prices (or ask prices/offer prices) for certain assets. The difference between the two prices, for a particular asset, is known the bid-ask (or the bid-offer) spread.

That the term "spread" is used in many ways in finance, to refer to some difference between two quantities. For example, the credit spread is the different between risk-free and credit-risky yields or interest rates. When referring to the bid-ask spread we mean the difference between the bid and the ask price.

To unpack the bid-ask spread let's consider the role it plays for market makers. The willingness of the market maker to trade attracts many counterparties, as brokers will attempt to establish relationships with market makers so that they can arrange trades quickly and efficiently. The market maker can then attempt to profit off the bid-ask spread. For every buy-side pair of trades they make (which each cancel out), they make a profit, due to the bid-ask spread. If they manage their inventory correctly and manage to adjust their prices in such a way to ensure that their trades cancel, they will make this profit without facing any risk (this is because of the exact cancellation of their trades, so their total profit is not sensitive to market prices).

It is critical to note that this depends on a market maker's ability to adjust their bid and ask prices quickly in response to supply and demand. If a market maker is only being asked to sell and not to buy, it is a signal that the market's view of the asset's value is increasing (as investors wish to buy but not sell at the quoted prices). The market maker must adjust their prices quickly in response to events unfolding, and accounting for changes to supply and demand, if they want their positions to cancel out. Market makers nonetheless face the risk that their positions do not exactly cancel out, which exposes them to market risk.

Market makers can also attempt to make profits opportunistically, based on all the trades they are involved in. This would involve exposing themselves to market risk, and because asset values can always move against their favor, they face the risk of a loss.

However, market makers do not simply have free-reign as there may be regulations that place constraints on what degree and type of risks market makers are allowed to take. Note also that there can be regulations, as well as self-imposed rules and conventions, around the issue of broker-dealing. This is because acting as a broker-dealer can introduce conflicts of interest. For example, a broker might be purchasing an asset on its client's behalf but might be tempted to buy some for themselves if the price is low. Perhaps they can only get a certain number of shares at a low price and can secure that price for itself (in a dealing capacity), while giving its client a higher (less favorable) price.

Asset price

In financial theory, we tend to think of an asset price as a straightforward number at any point in time. We can see from this description that the reality can be a lot more complicated. In practice, there is an ask price, a bid price and one can also talk about the last-traded price (the price of the most recent trade that actually took place). With these ideas in hand we are able to improve our picture of financial markets. Recall the difference between OTC markets (where trades are made directly between parties or their brokers) and exchange traded markets (where trades are supervised by an exchange).

Suppose someone wishes to make a trade or enter a derivative in an over-the-counter market (such as the forward market). As such they or the broker that represents them would be someone on the buy side. They can try to find a willing counterparty who will make the trade with them (whether a purchase or a sale, or whether a long or short derivative position), but it is often more convenient to approach the market makers, who are well known entities and will be willing to trade with you. Take note of the phrase "market maker", which indicates the way in which market makers ensure the functioning of the market to be possible.

In an exchange-traded market (such as the futures market), someone wishing to trade does not need to seek a counter party, they simply need to make an offer on the relevant exchange. As previously mentioned, the exchange, in effect finds a counterparty for this entity, and this counterparty is often a market maker. After all, market makers are ready to trade at quoted prices, and so the exchange can pair your trade off with a market maker (if the price you're willing to pay/accept makes this profitable for the exchange, based on the market maker's price).

When we described the futures market in module 6, we did not introduce this concept of a market maker, and only considered individual traders and the exchange. In fact, market makers do a lot of the work of making exchange-based trading possible. The exchange will pass over all inventory and market risks to the market makers, and the market makers are often required to register with the exchange and follow certain rules.

It is crucial to see how the idea of liquidity is connected to the different prices we mentioned above (the ask price, the bid price and the last-traded price). If an asset is traded very often and by very many traders (such as major commodities like gold or oil), then it will offer a very liquid investment. This is because an investor can sell the asset at any point, easily and without much cost. This is possible because there are many traders wanting to buy the asset every day, and your additional supply of the asset does not have any major effect on the asset's total supply and demand.

Furthermore, there are likely to be many market makers participating in the market for this asset, and they will all have to compete with each other to have small bid-ask spreads. If there are a great many trades of the asset, they can still make a lot of profit from high volume trades with small bid-ask spreads. The small bid-ask spreads have the added benefit of making the market more favorable to trade in. Recall that the spread is the profit the market maker gets for a cancelling pair of trades; that profit is paid by the two trades' counterparties, who would therefore prefer a smaller bid-ask spread.

If an asset is not traded very often or by very many traders, it will not be very liquid. If there are fewer potential buyers, it is harder to sell an asset quickly at a reasonable price. You may have to lower your price to induce a buyer to enter the trade. Although market makers improve the liquidity of a certain asset (because they serve as potential counterparties), they tend to have larger bid-ask spreads for illiquid assets. One reason is that the lower volume of trades for them to earn the bid-ask spread on. Another is the added difficulty of managing inventory in an illiquid asset (where there is added difficulty and cost in trading and adjusting inventory levels), and the added difficulty of making opportunistic profits from trading an illiquid environment.

If an asset or market is liquid, there will be a significant difference between bid and ask prices, and so sometimes these two prices are summarized as the mid-price: the price exactly halfway between the bid and the ask. You should now be able to see that the size of the difference between bid and ask prices (that is, the bid-ask spread) is a measure of market liquidity. This is the basis for the theoretical abstraction of a single price for an asset, as opposed to the many different notions of bid prices, ask prices, last-traded prices and mid prices. In a highly liquid market, these different prices become very similar, sometimes so similar that one can safely say that "this asset has a price of $X", knowing that the asset can be bought or sold at the something very close to this price. Despite this, it is essential to know and understand the meaning of the different types of prices, because they are based on the way in which trades actually take place, and because they are necessary to describe and understand the mechanics of an illiquid market.

3.2.7 Transcript: The Role of Asset Managers and Traders

We'll conclude the Financial Markets course by considering the individual roles that need to be filled on both the buy and the sell side.

Let's first consider the role of an asset manager. Being an asset manager means being involved in, and possibly in charge of, the investment decisions of some investment capital. This capital may come from multiple sources on the buy side; for instance, an asset manager can work at a pension fund, and manage the investment of the pension contributions, or an asset manager can work at a specialized asset management firm that manages mutual funds, who will then manage their capital.

Working as an asset manager can take on a few different forms. Some individuals will be in ultimate control of the assets under management and make the specific decisions around what is bought and sold. Whereas some individuals will have roles that involve assisting these decision makers. Asset managers hire analysts and researchers that make recommendations to the ultimate decision makers.

Now as you may recall, the asset managers will use the services of the sell-side to facilitate the trades they wish to make. In particular, brokers often offer investment advice to their clients. The buy-side analysts will receive the research from the sell-side, which is often very specialized information related to specific markets and the prevailing market conditions. Buy-side analysts then consider this research and advice in light of the fund's particular context. In other words, they will consider the investment policies, conventions, constraints, and regulations, amongst others, of their particular investment's situation alongside the information about the available investments.

Some of the more specific concerns of these roles at an asset management firm will be considered in detail in our final set of notes.

Now let's consider what working on the sell side entails. There are many roles and many variations of them, but, given our description of the financial markets, we can consider the most significant ones.

A trader is an individual who buys and sells (i.e. trades) assets and financial instruments. In light of our discussion of the buy-side we can see how traders are needed on the complementary sell-side of financial markets. The first role we'll examine related to traders is at a brokerage firm. It is important to note that the term trader refers to an individual working at a broker; whereas the term broker refers to the firm or entity traders work for. Usually, these traders act as intermediaries between their clients and market makers. When a client wants to make a trade, these traders will execute this trade (an agency trade) by finding a market maker as a counterparty. There are many other types of trader, such as a floor trader, who works for an exchange. They will trade with the brokers (or, more specifically, the traders of brokers) and market makers of the exchange.

Brokers will also hire analysts and researchers, who will be responsible for the advice and recommendations given to their clients. Some of these analysts will be more removed from the day-to-day trading and may analyze long-run trends in the market in question, which they can then pass on to their clients. Inversely, some analysts will work more closely with the traders, giving advice on specific trades proposals and researching alternatives.

In the following, and final set of Financial Markets notes, we'll examine how broker-dealers and market makers also require traders. Working as a trader at an investment bank, in its broker-dealing or market making capacity, is known as a "front office" role. Front office roles are ones that generate money directly. The so-called "middle office" and "back office" refer to the roles and departments that assist and support the front office. For example, a typical middle office function is risk management — those responsible for ensuring the risks taken on by the front office are appropriate. Risk-management concerns might result in traders being tasked with making trades (hedging trades) to address the risks involved with the front office trades and positions. The back office includes the many other roles that are required for the front and middle office to operate; this includes, amongst others, administrative, recruitment and IT roles.

This brings us to the end of the final video of the Financial Markets course. Don't forget to read the last set of notes and complete all remaining assessments. I hope you enjoyed this introduction to the field of Financial Markets, and good luck for the rest of the program.

3.2.8 Notes: Managing Risk

Asset manager goals

The primary goal of an asset manager is to make investment profits without taking large amounts of risk. This is the goal that all employees of an asset management firm must contribute to, whether they are themselves making investment decisions, or assisting a larger team in making decisions. While this is the general goal of asset managers, the goal can take on a more specific form which depends on the investment decision in question. Asset managers therefore need to not only make good investments but make investments that suit their situation. They need to consider the specific requirements and risk attitude of the investors. They also need to consider regulations, tax, and the best way to make use of the sell-side services available to them. The buy-side analysts will consider the investment policies, conventions, constraints, regulations etc. of their particular investment situation, alongside the information about the available investments.

Now that we have described this goal in detail, let's recap some of the ideas involved in achieving it. Firstly, these investments tend to involve a long time horizon. The general mindset of an asset manager is to make investments with potential for desirable long-term performance, and to worry less about short-term fluctuations (unlike a market maker who must be highly concerned with daily and hourly fluctuations). This can be described as a buy-and-hold approach to investing. This long time horizon makes the buy side less frantic and time-pressured than the sell side. The sell side is involved in the trades that need to be made on particular days and is constantly seeking opportunities for profit. The buy side simply needs to ensure that its long-run investment plan is being properly executed. The asset management industry is still very competitive, but performance unfolds over longer time scales than on the sell side.

Secondly, the idea of risk is incredibly important to asset managers. It is well-known that riskier investments offer a risk premium: a larger return on average, to compensate investors for bearing the risk. Asset managers always need to balance risk and return. Often, they will formally describe their policy toward risk (see "the three Ps" below). Sometimes, the risk that they take on will be factored into how they are assessed or compensated (the idea of "risk-adjusted returns" speaks to this).

Before introducing the third supporting idea, let's introduce an important distinction to provide some context, which will illustrate an important dynamic on the buy side. This distinction pertains to how investments can be managed, in either an active or in a passive way. Active investing involves the asset manager using their discretion and expertise to develop a particular investment strategy.

This strategy can incorporate the views of the analysts and may also involve shorter term elements. For example, asset managers might have long-run investment and allocation plan but might decide to increase their bond allocation for the next month. Passive investing involves the asset manager minimizing their role, especially the discretion they use in customizing an investment strategy. The idea behind passive investing is to minimize the fees due to the asset manager — if fewer or no analysts are hired, and the decision-making processes is greatly simplified, meaning funds can be managed much more cheaply. Whether active management results in increased performance that justifies larger fees is a controversial and interesting debate in finance.

Finally, a third idea that supports profitable investment without excessive risk-taking are the "three P's", which relate to risk policy. The "three Ps" are a common idea on the buy side and in the asset management industry. The "three Ps" are philosophy, process and people. By forming an intelligent investment philosophy, by establishing appropriate processes for decision making, analysis etc., and by hiring people with relevant skills, asset managers will attempt to differentiate themselves from the competition. The investment philosophy would incorporate the policies and attitudes towards risk, the degree to which the strategy is active rather than passive, and possibly other aspects of the investment approach.

Brokers, broker dealers, trades and traders

In our previous video we examined how brokers require traders to execute trades on behalf of clients. Broker-dealers hire traders, both to execute agency trades (on clients' behalf) and also to execute principal trades. There are different types of trades, and different types of traders, responsible for the dealing function of a broker-dealer. Day traders are tasked with making short-term speculative trades. Whatever trades they make must be reversed by the end of each trading day, meaning their investment horizon is so short term that they cannot hold their positions overnight. An individual can also trade financial assets with their own money. There are retail day traders as well as those working at broker-dealers and market makers.

In addition to speculative trades, the traders at a broker-dealer could be required to enter hedging trades. These are trades that manage the risk inherent in their existing, speculative positions. Yet another category of trades that broker-dealer's traders can make (and specialize in) are arbitrage-based trades. These are trades that exploit price discrepancies or other statistical patterns. This type of trading requires highly specialized expertise, both in understanding the mathematics and statistics involved in constructing arbitrage trades, and also managing how these trades are executed (these trades are often algorithmic in nature, meaning that they are not individually considered but are decided by pre-specified trading rules coded into a computer program).

Note that brokers can vary in size a great deal, but broker-dealers tend to be large financial institutions. The economies of scale around hiring suitable expertise and other resources, and managing inventory are largely responsible for this. In addition, larger institutions can afford to absorb the risks associated with broker-dealing since the institutions are diverse collections of various profit and loss centers. Investment banks provide brokerage services along with other specifically purposed brokerage firms. Investment banks provide most and sometimes all dealing and market making services. One role at an investment bank is therefore working as a trader for the broker-dealer (or market making) capacity of the bank.

Market makers can also require traders for similar reasons. As you'll recall, the two ways in which a market maker can make money is through profit from the bid-ask spread, and they can also take on risks and attempt to profit from opportunistic positions. The first type of business doesn't require any trading; this is simply about cancelling the traders of buyers and selling and thereby earn the spread between the two trade prices. However, any deviation from the pure bid-ask model that the market maker will employ needs to be carefully managed by traders. To this end, they need to decide what sort of risks they are willing to take on (this is speculation) and whether they wish to manage these risks in some way, by making additional (hedging) trades.

Trading in order to hedge an investment is a very important idea in the context of a market maker for derivatives. Market making often involving managing an inventory of assets, but that things change in the context of derivatives. Instead of holding and selling inventory, the market maker simply enters short positions. The market maker's traders may work closely with other quantitative and risk-management experts (who sometimes work in the middle office) to ensure the risk of these short positions is appropriately managed.