Balance sheet:

Equity also means the capital investment in a company

1. Home Equity

In the last lesson, we discussed some important correlations involving the real estate market, e.g., between real estate prices and the stock market, and between default and leverage. Specifically, we saw how the credit-price effect describes the relationship between real estate prices and the stock market.

In this lesson, we discuss more specifically how real estate prices interact with equity, in a second sense of the word equity. Before, we talked about real estate prices and the stock market, but equity can also refer to the capital invested in a company in the form of stock. That is, the stock market is where the equity in a public company is traded. The equity in a company (which is tracked on the balance sheet) usually takes the form of stock; for this reason, investing in stock is also called investing in "equities." Become very familiar with these two distinct but tightly interconnected meanings of the term "equity" as they will come up again and again. For this lesson, we mostly mean equity as the capital investment in a company, also known as the net worth or capital, which sits on the balance sheet.

The most important thing to know about the balance sheet is the **fundamental accounting equation**:

Assets = Liabilities + Equity

In essence, this equation shows you what is being balanced on the balance sheet. This equation is perhaps the most fundamental idea in corporate finance, and many important implications follow from it as we will see.

In the first "required reading" video "Introduction to Balance Sheets", you learn how individual people can also have a balance sheet, and this implies a personal net worth: the equity amount on their personal balance sheet. The second required video "More on Balance Sheets and Equity" further demonstrates how a personal balance sheet is impacted by the house price and mortgage.

For many homeowners, their home is their largest asset. And for many of these same homeowners, their mortgage is their main liability. If their home is worth *less* than they owe on their mortgage, they have "*negative equity*." (They are also considered "*under water*" on their mortgage, and they are at risk of defaulting on their mortgage loan.) But if their home is worth *more* than they owe on the mortgage, we say they have "*equity in their home*." Such a mortgagor may want to turn this equity in their home into cash in their bank account, which they can spend. As you learn about in the third required reading video "Home Equity Loans", a home equity loan (HEL) can accomplish this.

With these arguments, you are seeing the fundamental accounting equation

$$Assets = Liabilities + Equity$$

2. Corporate Equity

In section 1, we reviewed the simple personal balance sheet. We are ready now to look at a corporate balance sheet, which is structured in exactly the same way (Assets = Liabilities + Equity), just with different entries and somewhat larger amounts. The fourth required reading "The Balance Sheet" discusses the corporate balance sheet in general and also introduces a typical balance sheet for a bank. Banks are a very special type of corporate entity because of their centrality to the financial system, so it makes sense to have a more informed understanding of their balance sheet. Pay special attention to

1. The aspects of a bank's balance sheet that drive profitability;
2. The priority of stockholders in relation to creditors;
3. What happens when equity turns negative;
4. The typical assets and liabilities on a bank's balance sheet.

Example. *Consider bank X. Indicate if the following elements are to be included in assets, liabilities, or equity:*

1. *Cash*;
2. *Loans*;
3. *Deposits*;
4. *Bank Capital*

Answer.

1. Cash is clearly an asset. In fact, banks, due to their business and regulatory norms, must have a minimum amount of liquid cash available.
2. Loans are also an asset. The (primary) business of banks is that of lending money and earning interest. Therefore, loans can be compared to the plant and/or machinery for an industrial company. Hence, loans are assets.
3. Deposits are liabilities. This should be intuitive because banks use these liabilities to generate more income by using these deposits to finance loans for individuals, corporations, etc. Banks will be able to leverage this additional capital to make the extra income that they might have otherwise earned through the use of their own capital.
4. Bank capital is part of equity. The names should give it away, but we should be able to recognize that bank capital comprises funds raised by selling equity or financing that comes from retained earnings, i.e. part of the profits, that the bank does not pay out to its shareholders.

Example. *Assume that Bank XYZ has GBP 5,000,000 in cash, securities worth GBP 60,000,000, and loans totaling GBP 290,000,000. Furthermore, it has GBP 260,000,000 in deposits, and it also has borrowings for an amount of GBP 74,000,000. Finally, it has GBP 10,000,000 in reserves. What is Bank XYZ's equity or capital?*

Answer. The problem is not really more difficult than the one we solved in Section 1 of this lesson. It all comes down to attributing each entry to the correct category of assets and liabilities and using the fundamental equation of accounting.

Now, the assets are cash, securities, loans, and reserves. Reserves is probably the only item that could make things difficult: it is an asset because, (as recalled earlier) due to the nature of its business and regulatory norms, banks must have a minimum amount of liquid cash. That is the bare minimum, and typically, banks keep excess reserves for safety.

Liabilities consist of deposits and borrowings.

Hence,

$$\text{Assets} = 5,000,000 + 60,000,000 + 290,000,000 + 10,000,000 = \text{GBP } 365,000,000.$$

Also,

$$\text{Liabilities} = 260,000,000 + 74,000,000 = \text{GBP } 334,000,000.$$

Hence,

$$\text{Equity} = \text{Assets} - \text{Liabilities} = 365,000,000 - 334,000,000 = \text{GB } 31,000,000.$$

3. Measuring Leverage with the Equity Multiplier

Now that we know about the balance sheet, we can discuss the concept of leverage in a new way. Before, leverage described how we can buy more than we can afford, for example, by buying securities "on margin" or buying a home using a mortgage. We can actually quantify leverage using the main components of the balance sheet in several ways. One type of leverage ratio is called the equity multiplier[1]:

$$\text{Equity multiplier} = \frac{\text{Assets}}{\text{Equity}}.$$

Since Assets = Liabilities + Equity, you can substitute the right-hand side of this equation for assets in the above equation, as follows:

$$\text{Equity multiplier} = \frac{\text{Liabilities} + \text{Equity}}{\text{Equity}}.$$

This second formula makes it even clearer that leverage increases with liabilities. The more debt (liabilities) a person or a company has, the more leverage they have or the more "leveraged" they are.

Example. *Let's use our previous example of the homeowner: Assets = Euro 500,000, Equity = Euro 10,000. Then*

$$\text{Equity multiplier} = \frac{500,000}{10,000} = 50x.$$

Observe the "x" notation: we generally say an entity is "50x" leveraged when the equity multiplier is calculated to be 50.

If we had used the second formula, then Liabilities = Euro 490,000, and

$$\text{Equity multiplier} = \frac{490,000 + 10,000}{10,000} = 50x.$$

Obviously, we get the same answer either way, but the second way shows that the liabilities drive the leverage. (By the way, 50x would be considered highly leveraged.)

4. Modeling Default with Options

Now that you are comfortable with the idea of equity, how equity can change, and how equity can be positive or negative, you are ready for the next required reading (Foote and Willen) for this lesson, which uses options theory to explain why and when mortgage borrowers default. It may help you to review the earlier discussion (in Module 5, Lesson 2) about how a mortgage is like an option. A model that accurately describes or predicts probability of default can be very useful from a credit risk perspective and from a valuation perspective: if you can be more confident about the level of default in a mortgage pool, you can be more confident about the appropriate price to pay for the MBS with that mortgage pool as the underlying.

You will see in the new reading that a borrower's mortgage can be seen as a long call option on the value of the house: as with any long option, there is potential for significant payout (say, if the house price rises), but the potential loss is relatively minimal (if the house price declines, the borrower only loses their equity).

A mortgage can also be seen as a long put with a strike at the mortgage amount, combined with the underlying security. If the house price increases, the borrower profits from the increased equity in the home, but if the house price declines below the mortgage amount, the borrower can sell the underlying house to the lender by defaulting. You may want to review the option payoff diagrams in Module 4, Lesson 1 to remind yourself of these dynamics. The application of options theory beyond calls and puts on stocks should become very natural to you as you analyze more exotic financial products and relationships.

Pay special attention to the development of the model to explain mortgage defaults, from these simple options analogies of the frictionless option model (FOM) to the double trigger model (DTM) and the more sophisticated combinations of the DTM and FOM models. Also, note how the assumptions involved change from model to model, and ask yourself if the assumptions are realistic. For example, what is the role of negative equity in each model? Does negative equity alone cause mortgagors to default? For example, which models assume that the mortgagor can borrow funds to make the mortgage payment? The evaluation of a model's assumptions is critical to your decision making about which models make sense to use in which situations.

5. Recourse vs. Non-Recourse

While we mentioned net worth is the equity on a personal balance sheet, most of our discussion of equity has focused on home equity: the equity in a house that is mortgaged, whether that equity is positive or negative. Obviously, "home equity" and the equity on a personal balance sheet (net worth) are related: significant home equity may translate into significant personal equity, or at the very least, it will offset some of the other liabilities on the personal balance sheet to increase the personal equity somewhat. But while these two equities are related, they are not the same.

As you will read about in this required reading (Harris and Meir), most mortgages in the United States are "non-recourse," meaning that the lender can take control of the collateral (the house in the case of a mortgage), but the lender cannot make any additional claims on the borrower, even if the proceeds from the sale of the house do not cover the mortgage amount: we say the lender "does not have recourse" to the borrower with a non-recourse mortgage. In Europe, on the other hand, mortgage lenders generally do have recourse, meaning they can take and sell the house and then continue to seek repayment from the borrower. The paper infers some interesting ideological differences between European nations and the United States. More important for our purposes, however, is the reappearance of moral hazards and information asymmetries that follow from both types of mortgages. Pay attention in this reading to how recourse mortgages allocate the risks of default very differently compared to non-recourse mortgages.

6. Conclusion

In this lesson, we learned the three main components that balance the balance sheet, be it a personal balance sheet or a corporate balance sheet like that of a bank. We calculated the leverage ratio using these components and saw how debt and leverage are very intertwined. We looked at how models can be constructed from previous models, such as options theory, to explain complicated phenomena such as default behavior, which can be very useful in the valuation of MBSs. We also took note of how moral hazards and information asymmetry seem to lurk in so many corners of financial markets and how government policies respond to these by, for example, allowing or prohibiting recourse mortgages. We are seeing that financial engineering must take into consideration a wide array of behavioral and regulatory issues in order to be practical.

The housing finance problem:

Bah et al. describe how several potential housing finance solutions have fared so far: each has its own risks, limitations, and constraints. Pay attention to these, as any useful model to assess the risk and value of investments in one of these programs would include these parameters. As you read about these financing alternatives, ask the following questions (Bah et al. answer them all rather explicitly):

Housing Microfinance (HMF):

- What are the likely positive outcomes when a microfinance institution begins to provide HMF in addition to its other lending activities? Note: *Microfinance institutions* (MFI) are financial institutions that provide small loans to poor households and small businesses.
- What are the main drivers of market growth for HMF?
- What are the main constraints on the growth of this financing activity?

Contractual savings for housing (CSH):

- What is the difference between an open and closed CSH system?
- In what ways does a CSH minimize credit risk?
- What are the main challenges to the viability of CSH systems?

Housing bonds:

- Based on the examples provided by Bah et al., what type of financial institution is most likely to be successful when issuing housing bonds?

Mortgage liquidity facilities (MLF):

- What are the benefits of mortgage liquidity facilities for the main stakeholders: the lenders, the homebuyer borrowers, and the government?
- In what ways do MLFs help improve standards in the lending market?

Intermediate housing loans or micromortgages:

- Why has the progress of South Africa's micromortgage program been so slow?

Integrated partnerships:

- What are the innovative ways that various partnerships are expanding access to housing finance for low- and middle-income households?
- How well does traditional mortgage underwriting assess "informal employment" when considering credit risk?
- Residential REITs have proven successful in many countries, so why are there none in Africa?

2. REITs, REOCs, and Renting

The second required reading further investigates the financing, and the financialization, of the rental housing market, especially the role of REITs and REOCs (real estate operating companies) in both of these phenomena. What is financialization? Fuller reiterates Aalbers's definition of the term as the most important and appropriate:

"[Financialization means] the increasing dominance of financial actors, markets, practices, measurements and narratives, at various scales, resulting in a structural transformation of economies, firms (including financial institutions), states and households.... [F]inancialization means the increasing role of financial motives, financial markets, financial actors, and financial institutions in the operation of the domestic and international economies" (552).

Based on this description, the concept has clear significance for almost every topic in financial engineering, including (obviously) housing finance.

In Module 5, we discussed the collapse of the mortgage market, which brought on the Great Financial Crisis. Fuller mentions that REITs and REOCs bought up many of the real estate portfolios that were sold off at this time (555), which explains why they are among "the largest landlords in the U.S. and Canada—-and Germany-based REOC Vonovia is the single largest corporate landlord in Europe, owning over 400,000 homes" (Fuller 556). REITs and REOCs are structurally very similar (Fuller 555). Both REITs and REOCs:

- Primarily own residential real estate
- Derive most of their income from rent or property sale
- Are publicly listed on an exchange
- Eliminate the hassle of actually owning, letting, and maintaining physical property, and
- Allow even small investors to buy a slice of the income generated by a number of different properties.

Figure 1: REITs vs. REOCs

REITs	REOCs
"Pass-through" entities to distribute the vast majority of their profits to shareholders in the form of dividends	Ordinary corporations that more easily reinvest profits into their operations
Shareholders pay the required taxes	Pay corporate tax on their own earnings

Adapted from: Fuller, Gregory W. "The Financialization of Rented Homes: Continuity and Change in Housing Financialization." *Review of Evolutionary Political Economy,* vol. 2, 2021, p. 555. https://doi.org/10.1007/s43253-021-00050-7.

As you read about how REITs developed across regions, think about the factors you would want to be sure to include in a pricing or risk model for an REIT investment in the United States, Europe, and East and Southeast Asia. For example, in the U.S., if a particular REIT indicates that its properties are near employers such as Amazon, Facebook, and Google, perhaps you would want to include information from forecasts relating to these companies. If Google announces plans for expansion or cost cutting, there may be an impact on the performance of certain REITs. Regulation and politics also have price and risk implications; for example, statutory rent controls would certainly impact profits from residential rental properties. So does litigation: if an REIT's property management is overly aggressive with its tenants, a class-action lawsuit could mean significant losses. Finally, pay attention to the three ways that Fuller claims REITs and the financialization of rental housing may benefit the housing market (related to incentives, transparency, and the alignment of interests).

3. Conclusion

This lesson introduced various novel ways that governments and financial markets have sought to address or profit from (respectively) the housing situation. In most cases, many people still do not have access to housing finance. We discussed how REITs and REOCs are shaping the housing market, and we discussed many factors to consider when analyzing an REIT, such as regulations, demographics, economic conditions, and even how the performance of certain technology companies can affect prices for certain REITs.

In the next lesson, we discuss this type of fundamental analysis in more detail, and we compare it to other strategies for selecting investment opportunities, especially stocks.

1. Fundamental Analysis

In the last lesson, we witnessed how economics, demographics, politics, and regulation can impact an investment and should be accounted for in risk and valuation analysis. Specifically, incorporating such factors into a model represents a type of fundamental analysis because they affect the fundamental or intrinsic value of the investment. As you can already see, fundamental analysis takes into account how an investment is expected to perform based on a very broad context of macroeconomic (affecting the economy as a whole) and microeconomic (related to individual financial entities and their interactions with each other) information.

Recall from the last lesson's discussion that some real estate investment trusts (REITs) purchased much of their property at low prices in the Great Financial Crisis (a major macroeconomic event) and are now preferred by many investors due to their stable cash flows throughout the economic cycle. We also saw that we can investigate the individual residential properties owned by REITs, so we can make plausible forecasts about their ability to maintain rent revenues based on what type of renters are moving to and from a particular city and why. For example, if Facebook is expanding or cutting operations in a particular city, considering how this may affect rent revenues for a particular REIT is microeconomic analysis.

We have already seen how to value equities using dividend models in Module 2. However, that is just one of several techniques available. The most fine-tuned type of modeling is based on discounted cash flows. This method requires focused attention on the company's balance sheet and income statement and an ability to forecast the company's future based on what the company is doing and the economic environment in which it operates. Note that, for some very large companies, the environment could be more or less the entire world.

Performing a DCF is well beyond the scope of this course, but you should at least take a look at this image Example of DCF model. Notice the mix of historical data and estimated data (the blue numbers). As you can see, analysts are called upon to make a lot of choices, and to make educated guesses, they need to carefully examine the company's financial statements. This is a level of microanalysis, wherein the financial statements consist of the balance sheet that was discussed in Module 4, as well as the cash flow statement, the income statement, and the statement of equity.

Another fundamental approach to valuation uses what is called **relative valuation**. Essentially, we compare the company we are interested in to a group of carefully selected peers and use the median, or the average, or even a weighted average of the multiples of that group to value our company. The weights could be based on the market value of each of the peer companies on the total market value for the group. Alternatively, we could assign a positive or negative premium to those multiples if our company is perceived to be better or worse than the group of peers, respectively.

Here, you can find an example taken from the author's professional work about 10 years ago Relative Valuation

Here, you can find an example taken from the author's professional work about 10 years ago Relative Valuation Example. Note the many different multiples that were collected.

The first required reading (Roy 272-275) gives an overview of some basic ratios for a fundamental analysis of the financial statements using relative methods.

Some helpful notes for the first reading:

- In section 3, Projected Earnings Growth:\

  - "a high P/E ratio may make a stock look like a good buy" *should read* "a low P/E ratio may make a stock look like a good buy" ("low," not "high")
  - PEG = "P/E ratio 4 ÷ Annual EPS Growth" *should read* PEG = "P/E ratio ÷ Annual EPS Growth" (No "4" in the calculation formula)
- In section 5, Price to Book:\

  - "P/E Ratio = Market Price per share / Book value per share" *should read* "P/B Ratio = Market Price per share / Book value per share" ("P/B," not "P/E")

Where Roy indicates "Book value per share = Shareholder's Funds / Number of shares," you should understand that "Shareholder's Funds" refers to what we have been calling equity on the balance sheet.

The second required reading (Drakopoulou 1-8) builds on the ratios and other terminology explained in the first reading. For example, when Drakopoulou defines "relative valuation techniques, [as] the value of a stock is estimated based upon its current price relative to variables considered to be significant valuation, such as earnings, cash flow, book value, or sales" (2), you should recall the P/E, Price-to-Book, and Price-to-Sales ratios that you have already seen. You might also notice that you are already familiar with the EIC (economic, industry, and company) approach as top-down analysis. Drakopoulou expands on the basics and introduces additional analysis types, such as "Discounted Cash Flow techniques," "growth at a reasonable price (GARP) investing," and filtering investments based on performance indicators such as "Current earnings per share should be up 25%... Quarterly sales should also be up 25% or more or accelerating over prior quarters," and so on (Drakopoulou 2-3).

2. Technical Analysis

While fundamental analysis attempts to measure or forecast a stock's *intrinsic* or objective value based on macroeconomic and microeconomic information, technical analysis basically ignores these kinds of information and relies on price and trading volume (the number of shares traded in a time period) data. Technical analysis searches this data for patterns that indicate when and how the price will change. For example, a technical analyst might observe that a stock's price does not go above or below certain levels. If a stock's price increases to a certain level a few times, but does not increase above that price level, this price level is the **resistance level**. On the other hand, if a stock's price decreases to a certain level a few times, but does not decrease below that price level, this price level is the **support level**. If the stock price finally goes above the resistance level, the "bullish breakout" suggests the stock will increase significantly more (so this is a "buy signal"). If the stock price finally goes below the support level, the "bearish breakout" suggests the stock will decrease significantly more (so this is a "sell signal"). A slight variation on this incorporates moving averages of the price, instead of just the price. That is, a bullish breakout occurs when the 10-day moving average of the price exceeds the resistance level.

Another technical concept you will read about is momentum, the velocity of price changes. The simplest assessment of momentum is

Momentum = Current Price − Price "x" periods ago

For example, if Champion Breweries was trading at 2.30 NGN 10 days ago and is trading at 2.40 NGN today, the 10-day momentum is 0.10 NGN. The "10 days" is not exactly arbitrary: the period you use for the momentum calculation should be based on experience or research. And you might observe several periods of momentum: your research may indicate that the 10-day momentum is a useful indicator in some situations, but the 20-day momentum is useful in others. Depending on your holding period (e.g., how long you expect to keep a stock that you bought), you may find that 10-minute momentum is more relevant or that 100-day momentum is what you should pay attention to.

Many technical indicators are just a combination of the more basic ones, e.g., the moving average convergence divergence (MACD). This is a long name, but the actual calculation is not as intimidating; it simply tracks the difference between two moving averages, for example, the 12-day and the 26-day. When the 12-day moving average rises above the 26-day moving average, this may be a buy signal. Conversely, when the 12-day moving average falls below the 26-day moving average, this may be a sell signal.

Drakopoulou discusses these and many more technical indicators, as well as their advantages and disadvantages. For example, since a moving average is by definition the average over multiple time periods, there is some lag, or delay, before a significant price change is fully reflected. If a stock has been trading around 100 NGN for the past 10 days, the 10-day moving average price would be very close to 100. If the next day, the price drops to 90 NGN (a significant 10% drop), the 10-day moving average would now be 99, which does not by itself suggest a drastic drop. Even a 50% drop would only change the 10-day moving average to 95.

The third required reading (de Souza et al. 1-18) provides an overview of this evolution of technical analysis as well as an evaluation of technical analysis for trading stocks in the BRICS countries: Brazil, Russia, India, China, and South Africa.

We complete this section with an important remark. In the financial world, it is often said that *markets are efficient*. This means that they tend to incorporate all available information relatively fast, and opportunities to beat the market would not exist or would be present only briefly. Many professionals do not believe that, and this has created 3 different versions of market efficiency:

- **Weak Efficiency**: Today's stock prices reflect all the data of past prices, and therefore, no form of technical analysis can aid investors. Recall that technical analysis, unlike fundamental analysis, only considers past information.
- **Semi-strong Efficiency**: Public information is part of a stock's current price; therefore, investors cannot utilize either technical or fundamental analysis. As a consequence, only information not available to the public can help investors. Among the forms of non-public information, one should also include insider information, which is illegal in pretty much all jurisdictions.
- **Strong Efficiency**: All information, public and not public, is completely accounted for in current stock prices. Hence, no type of information can give an investor an advantage on the market. Basically, the market is impossible to beat.

Now, very few people believe in strong efficiency, but there is a certain amount of evidence that markets might be weakly efficient or somewhat semi-strong efficient, although there is no uniformity of opinions. A rich literature of statistical studies does exist on the topic, but that is a story for another time.

3. Behavioral Analysis

As mentioned by de Souza, technical analysis can be interpreted to "reflect the concept that price trends depend on the attitudes of individuals, i.e., the mass psychology of the crowd" (9).

Arguably, the most egregious examples where mass psychology plays a role in finance are "*bubbles*". The term **bubble**, in an economic context, generally refers to a situation where the price for an individual stock or a financial asset, or an entire sector of stocks, even an entire market, exceeds its fundamental value by a large margin.

How can this happen if investors are all rational human beings?

Well, bubbles occur because investors' demands are not driven by rationality but rather by speculation. In other words, it is not considerations about the intrinsic worth of the assets that causes prices to move.

In the beginning, demand for certain assets can be rational, but over time, valuations are out of sync with the true value of those assets. While demand lasts, the price of assets keeps rising. Some investors who were initially more cautious than the others may not have invested in those assets yet but start to feel regret about missing something potentially great, and they too buy into the bubble. This could be described as a herd effect.

This behavior causes the value of the investments to go even higher, and in some ways, it acts as a confirmation for some of the early investors that they were right to buy those assets. Thinking they are financial geniuses, they could buy even more of those assets. Some individuals who held out now start to doubt their initial decision and want in badly.

At some point, the bubble inevitably bursts because some events make it clear that the valuations are probably nothing more than wishful thinking.

However, some investors may still be reluctant to sell:

- If they were late buyers, they fear that in doing so they would lose their opportunity to make money;
- Others may stay in trying to squeeze a few more dollars out of their investments instead; and
- A few others may just be the super-optimistic types who see no problem with what is going on.

This may explain why prices at the beginning of the bubble bursting may correct slowly. Nevertheless, eventually, the bubble pops and a massive sell-off ensues.

When newspapers and media outlets in general start to doubt the real merit of certain investments or some well-known public financial figures speak against those assets or, even more so, become sellers, then the crowd at large starts to capitulate. The selling begins and the herd effect now causes a run to sell. The massive selloffs cause prices to decline even beyond their intrinsic values, but very few have the courage or the required ability to think about the actual fundamental values of those investments.

It is a fact that, in most cases, speculative bubbles are followed by equally spectacular crashes in the asset class that was affected by the bubble. This is just an example of how human behavior does not respond to cold calculations of intrinsic value. There is a lot more to this, but you will learn about it more in depth in the Portfolio Management course.

Madaan (56) explains some of the most significant findings in relation to the psychology of financial markets, namely:

- Overconfidence
- Anchoring
- Disposition effect
- Herding bias

However, there are a lot more, and as already noted a few paragraphs above, you will see an entire module on this while taking your Portfolio Management course.
At present, if you are interested, you may enjoy reading the paper by Almansour that appears among the references.

4. Sentiment Analysis

Arratia mentions that sentiment analysts "apply several ad hoc filters, as moving averages, exponential smoothers, and many other transformations to their sentiment data to concoct different indicators in order to exploit the possible dependence relation with the price or returns, or any other observable statistics" (196). This reference to prices recalls the approach taken by technical analysts. And "any other observable statistics" could include the insights gleaned from fundamental or behavior analysis.

In other words, any of these approaches can be combined with each other and/or with other approaches in novel ways. The only constraints are on your time for experimentation and testing and the availability of the required data. You may also need to take into account processing times for lengthy calculations, especially if you are trading equity in a high-frequency environment. However, the best model is not necessarily the most sophisticated or the most inclusive. On this note, this required reading about statistical arbitrage borrows from almost all of the above approaches to portfolio selection and synthesizes them into a variety of potentially profitable strategies that also significantly reduce many types of risk.

The best model depends on what you need. For example, if you want to understand a phenomenon, a simple model may be the best route. Recall the double trigger default model discussed in Lesson 1 of this module (Foote and Willen): default was predicted using a straightforward combination of options theory and some behavioral observations. Even the 5 Cs of credit analysis from Module 5 (though they do not, by themselves, constitute a fully fledged model) include intangible character alongside quantifiable capital and collateral. On the other hand, if you need the best prediction without necessarily a solid explanation for the prediction, you may find that the neural nets of deep learning are your best solution. They can often forecast very well though they are criticized for not being interpretable. This will of course be covered in a later course. This journey is still only beginning.

Very recently, sentiment analysis has emerged as a critical tool for understanding market dynamics and predicting future trends. As a consequence, the ability to analyze sentiments can provide valuable insights into the collective mood of the market, and in turn, this can enable more informed and strategic decision-making. The use of **Natural Language Processing** (NLP) has made available more sophisticated techniques compared to just a few years ago. Now, we have **deep learning**-based models available that have significantly improved sentiment analysis accuracy and reliability. However, despite these advancements, there are also challenges to sentiment analysis. For instance, financial texts, particularly news headlines, contain a lot of terminology that is very specific to certain sectors or the sentiment they convey can be very nuanced, and both elements make it quite complicated classifying those sentiments. Among the most recent tools, **ChatGPT** has emerged for its possible applications to finance given its ability to produce risk analysis through sentiment analysis, and financial institutions can enhance the accuracy and depth of sentiment analysis they rely upon.

5. Summary: Comparing the Different Types of Analyses

To summarize, let's consider what elements can lead to a decision to buy shares in McDonald's (MACD) according to the different types of analyses we have considered in this lesson. Doing so can help you remember key features of each analysis type.

1. **Fundamental Analysis**: Operating margin has been improving, sales are stable, so the stock should do well.
2. **Technical Analysis**: We are noticing an ascending triangle pattern with the price breaking out from the upper trendline resistance. This is a buy signal, so let's buy the shares of MACD.
3. **Behavioral Analysis**: MACD is showing success at increasing purchase frequency and margins through the introduction of new products on their menus. Recently, they have been growing the number of their restaurants, incorporating new features that people seem to like. In addition, they offer home delivery, table service at some of their new restaurants, and new technology that allows for self-service. These are steps in the right direction and will make the company do well in the future because they are listening to their customers, adding new ones and retaining old ones. Their shares are likely to have a bright future.
4. **Sentiment Analysis**: The company has become more price conscious in a post-pandemic inflationary environment, offering more value meals. Its new $5- meal is gathering a lot of interest among customers who appreciate the company being on their side. Restaurant chains, including McDonald's, Burger King, and Starbucks, are promoting affordability as consumers are beginning to trade down to eat at home due to the high costs of eating out. MACD has found a way to ride the current negative trend among consumers and should do well in the near future, so the stock is becoming a buy.

6. Conclusion

In this lesson, we discussed the major types of stock analysis and mentioned some of the specific metrics, ratios, and signals they use. We also noticed that these are often related; for example, technical analysis and behavioral analysis both assume a psychological dimension to trading markets. We also saw overlap between these investment approaches: sentiment analysis uses some of the same calculations as technical analysis. Lastly, there is no reason not to combine approaches. Fundamental analysis can certainly complement technical analysis, and sentiment analysis should not ignore the intrinsic value of a stock that only fundamental analysis attempts to calculate.

The first lesson of Module 7 will also consider valuation approaches with an expanded set of assets that includes not only bonds and options but also exchange-traded funds (ETFs).