

Level III of the CFA® Exam

Study Notes - Asset Allocation

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Table of Contents

1	- Capital Market Expectations, Part 1: Framework and Macro Considerations	3
2	- Capital Market Expectations, Part 2: Forecasting Asset Class Returns	40
3	- Overview of Asset Allocation	68
4	- Principles of Asset Allocation	95
5	- Asset Allocation with Real-World Constraints	139

Reading 1: Capital Market Expectations, Part 1: Framework and Macro Considerations

LOS 1a: Discuss the role of, and a framework for, capital market expectations in the portfolio management process;

Capital market expectations involve setting likely risk and return parameters for a portfolio. These expectations inform the asset allocation that is ultimately selected, which is the investment results' primary driver.

Macro expectations involve forecasting risk and returns for an entire asset class. In contrast, **micro expectations** involve setting expectations for individual securities. Expectations should show ***cross-sectional consistency***, meaning internal consistency within a specific asset class. In addition, expectations need to adhere to ***intertemporal consistency***, which refers to the maintenance of similar traits across various investment horizons.

In summary, Capital Market Expectations (CMEs) play the following roles:

- They are critical inputs in deciding strategic asset allocation.
- They allow portfolio managers to build efficient portfolios.
- They help formulate risk and return expectations for broad asset classes.
- They align the risk-return objectives with investor expectations.
- They can be used to identify short-term mispricing.

The 7-step Process

The CFA curriculum recommends investment professionals' adherence to a disciplined approach to setting capital market expectations. The approach involves the following 7-step framework:

- I. ***Specify expectations needed***: This initial step requires creating an explicit, written list of the asset classes and investment time horizons involved.

- II. ***Examine historical records:*** While not the final projection, analysts must study and understand previous asset class characteristics and attempt to understand what drives them.
- III. ***Specify methods and models:*** The most appropriate methods must be predetermined and used throughout the framework to ensure consistency.
- IV. ***Determine best sources of information:*** Established sources are the best. However, analysts are expected to stay abreast of emerging sources and fully understand the data used.
- V. ***Interpret current environment:*** Analysts must deliver a common set of assumptions with consistent methodologies and judgments based on experience.
- VI. ***Deliver documented expectations:*** The expectations should be supported by reasoning and assumptions in a documented form.
- VII. ***Monitor actual outcomes:*** As the expectations turn into outcomes, they should be recorded, monitored, and studied. This can improve and hone future forecasts.

Question

Which of the following *most likely* serves as the primary driver of portfolio returns?

- A. Portfolio asset allocation.
- B. Tax efficiency and tax location.
- C. Returns in the form of dividends versus capital gains.

Solution

The correct answer is A:

Capital market expectations inform the process of choosing a portfolio asset allocation, which positively correlates to portfolio returns.

B is incorrect. Taxes are considered a secondary consideration in portfolio management.

C is incorrect. Returns in dividends versus capital gains refer to investor preferences and do not change the portfolio's return since dividends can be 'homemade'.

LOS 1b: Discuss challenges in developing capital market forecasts;

Inappropriate capital market expectations could be devastating to portfolio performance. Several pitfalls could lead to false expectations and a less-than-optimal asset allocation. Regardless, the analyst is tasked with following a disciplined process and understanding potential challenges in developing capital market expectations.

The major challenges to developing capital market expectations are as follows:

- ***Limitations to using economic data:*** Acceptable economic data includes data from reputable sources such as the International Monetary Fund and the US Federal Reserve. The first limitation of using economic data has to do with the lag time between the collection and distribution of the data. The second limitation has to do with definitions in methodology changing over time. In addition, *rebasing* can change the way indexes are calculated. For example, what might be included in the consumer price index has changed over the course of its existence.
- ***Data measurement errors and biases*** include the following:
 - ***Transcription errors*** emanate from the incorrect recording of data.
 - ***Survivorship bias*** occurs when low-performing managers, funds, or securities are removed from a data set after becoming defunct. This inadvertently biases the returns of the index upward.
 - ***The use of appraisal data***, also known as smoothed data, refers to data or assets that are infrequently valued. When creating a time-series analysis, the lack of data points can cause the standard deviation to be underestimated.
- ***Limitations of historical estimates:*** Regime changes, or marked deviations in the structure and function of markets or complex systems, means analysts must remain aware of data being used and judge its merit based on their knowledge and experience. An example of a regime change could be the tech bubble of the early 2000s. After going sky-high, valuations came back to earth, and those levels of risk and return should not be expected to continue indefinitely. Regime changes lead to ***non-stationarity*** or the

idea that one time period is not statistically similar to another.

- ***Using ex-post risk and return:*** The use of ex-post (historical) data to justify ex-ante (future) metrics is essentially anchored upon the assumption that the past always repeats itself without fail. This is an inherently false assumption.
- ***Non-repeating data patterns:*** False relationships may appear to be driving capital market expectations. Analysts must understand what drives the movements to spot spurious relationships. In fact, spurious relationships are expected to be present in about 5% of all trials and can appear for an almost unlimited number of reasons (using a 95% confidence interval).
- ***Failing to account for conditioning:*** Closely related to non-repeating data patterns, data conditioning refers to a lack of proper interpretation of data, which may join inappropriate assumptions together. For example, using the average market boom and market bust returns for a particular firm could lead to faulty projections, given that a boom or boost could be reasonably expected to occur.
- ***Misinterpretation of correlations:*** This involves mislabeling the independent and dependent variables. An example could be the amount of corn grown and rainfall in a local region. While the two are certainly related variables, it would be incorrect to think the amount of corn grown would influence the amount of rainfall. Rainfall is the independent variable, and corn is the dependent variable.
- ***Psychological traps:*** Include both emotional and cognitive biases. Many of the following biases have previously been detailed in the reading on behavioral biases.

Anchoring bias: The first information received is over-weighted, and updates are slow to change from their original form.

Confirmation bias: Only information reinforcing the existing belief is considered, and such evidence may be actively sought while other evidence is ignored.

Status quo bias: Predictions are highly influenced by the recent past. At the same time, unwillingness to re-work an approach leads to an erroneous extrapolation of the

past into the future.

Overconfidence bias: This leads to ignorance of past mistakes, and the resultant accuracy of the forecast is overestimated.

Availability bias: What is easiest to remember is over-weighted.

Prudence bias: Forecasts are overly conservative to avoid making mistakes.

- ***Model or input uncertainty:*** This is a scenario in which an analyst does not know the tool to use for a particular forecast. ***Input uncertainty*** refers to the analyst not knowing what data to put in a model. An example could include an analyst being unable to decide to either use a 2-year or a 10-year risk-free rate for a particular discounted cash flow model.

Question

The use of appraisal data *most likely*:

- A. Overestimates Sharpe ratios.
- B. Underestimates Sharpe ratios.
- C. Does not apply to Sharpe ratios.

Solution

The correct answer is A.

Using appraisal data results in an infrequently recorded data set or less than the case under real-time asset pricing (as in the equities markets). This lack of data points produces underestimated standard deviations and variances, as not all of the data's fluctuations will be captured. Rather than reflect every change in the data, a certain periodic amount is assumed to arrive at the current asset price. Underestimated standard deviation results in an overestimated Sharpe ratio, as standard deviation is the denominator in the formula.

B is incorrect. The use of appraisal data is most likely to result in overestimated Sharpe ratios, not underestimated Sharpe ratios. The Sharpe ratio measures risk-adjusted returns, which compares a fund's historical or projected returns relative to an investment benchmark with the historical or expected variability of such returns. Using appraisal data can lead to an overestimation of the Sharpe ratio because it can result in an overestimation of the expected return and an underestimation of the risk.

C is incorrect. The use of appraisal data applies to Sharpe ratios. The Sharpe ratio is a widely used method for measuring risk-adjusted relative returns, and the use of appraisal data can affect the calculation of the Sharpe ratio by influencing the expected return and risk estimates used in the calculation. Therefore, the use of appraisal data applies to Sharpe ratios.

LOS 1c: Explain how exogenous shocks may affect economic growth trends;

Exogenous shocks refer to external factors (created outside the economic model) that profoundly affect an economy's growth. While some factors enhance growth, others impede growth. The following is a summary of typical shocks.

Sources of Exogenous Shocks

- ***Policy changes:*** These may include fiscal and monetary policy, minimal intrusion on the private sector, encouraging competition, support for infrastructure, and sound tax policy. Some changes, such as sound fiscal policy, are pro-growth, while others, such as erecting trade barriers, may inhibit growth.
- ***New products and technology:*** Technological advancement and innovations allow workers to produce more goods and services with constant labor and capital input. Examples could include the automobile or printing press, which have a spillover effect and make other industries more productive.
- ***Geopolitics:*** Like policy changes, geopolitics refers to the political climate of a particular economy. Geopolitics often refers to international conflict and can encourage the stockpiling of weapons that divert resources from other, more productive ends. Also, military de-escalation could have the opposite effect.
- ***Natural disasters:*** This always tends to be growth-inhibiting. The only instance in which natural disasters might promote growth could be the demolition of old capital that is replaced by newer, more technologically advanced assets.
- ***Natural resources/critical inputs:*** Natural resource discovery and extraction promote growth, while their depletion diminishes growth.
- ***Financial crises:*** Occur when the public loses faith in intermediaries' ability to funnel capital to the highest and best use. It could result in growth-inhibiting scenarios, such

as a run on banks or a stock market crash.?

Question

The government of Country X is planning to privatize numerous local corporations and implement strict measures, including fines and the possibility of jail time, against intellectual property (“IP”) theft. The following measures is the government *most likely* to take?

- A. Privatization: growth-inhibiting; IP Measures: growth-enhancing.
- B. Privatization: growth-enhancing; IP Measures: growth-enhancing.
- C. Privatization: growth-inhibiting; IP Measures: growth-inhibiting.

Solution

The correct answer is B.

Privatization means private-sector control rather than government-controlled corporations. It is growth-enhancing because it encourages competition. Additionally, private companies are more focused on making profits and cutting costs, contributing positively to the economy. Note that lack of political interference with private companies is growth-enhancing.

Intellectual property protection is growth-enhancing as it promotes innovation and protects the rights of creators to profit from their innovations and inventions.

A is incorrect. It suggests that privatization is growth-inhibiting, while privatization is generally viewed as improving overall economic efficiency. Official decision-makers believe it reduces the fiscal burden and the external national debt. They also expect that this process will stimulate both technical efficiency and investments to increase the pace of economic growth.

C is incorrect. It suggests that privatization and IP measures are growth-inhibiting. As mentioned earlier, privatization is generally viewed as growth-enhancing. Additionally, strict measures against intellectual property theft can also be growth-

enhancing. Intellectual property protection ensures returns on innovation and incentivizes further innovation. The macro view portrays that the IP of a country forms the core of competition, economic growth, and productivity, where there is a universal consensus that the theft of IP results in raised costs, low revenues, and eroding profits. Therefore, strict measures against IP theft can help protect innovation and promote economic growth.

LOS LOS 1d: Discuss the application of economic growth trend analysis to the formulation of capital market expectations;

The expected trend growth rate is an all-important element in developing capital market expectations. Its primary use is in developing expected returns for asset classes. In addition, it informs potential currency movements and government policy.

Critical considerations of economic trend growth rate include:

- Higher trend growth rates imply **higher yields** on government bonds.
- Discounted cash flow models incorporate the trend growth rate when forecasting returns.
- Higher trend growth rates may imply higher stock returns.
- A higher trend growth rate may result in a faster-growing economy, given that increased inflation is sustainable.

GDP Growth Decomposition

GDP can be thought of as a combination of two components:

- I. Growth from labor.
- II. Growth from labor productivity.

The first factor consists of potential labor force size growth and actual labor force participation. The second factor consists of growth from increasing capital inputs and growth in total factor productivity. **Total factor productivity** represents innovation and technological advancements and can be described as the overall dynamism of an economy. It is thought of as a leverage factor for capital inputs. Capital inputs involve any assets used to run a business, including computers, PP&E, inventory, etc. When growth from labor and labor productivity do not explain the GDP growth, the leftover is explained by total factor productivity (hence the term *residual*).

Asset Returns and Trend Growth Rate of GDP

Both theory and empirical evidence demonstrate that real default-free bond yields are mean-reverting and will move toward the real GDP trend growth rate. The following formula also demonstrates the importance of the long-term growth rate of GDP in determining aggregate equity market prices.

$$\text{Price} = \text{GDP} \times \frac{\text{Earnings}}{\text{GDP}} \times \frac{\text{Price}}{\text{Earnings}}$$

This equation ties out algebraically and omits 'Price', which is the general price for an entire market such as the S&P 500. The 'Earnings' part is also a general reference to the corporate earnings of the same market.

The second term, Earnings/GDP, relates to the amount of GDP that goes to firms, not private citizens. So, GDP is the available profits allocated to businesses and private citizens. The third term relates to the relative market valuation concerning its earnings. How expensive is the market at current valuations? How much must an investor pay in order to access \$1.00 of the underlying earnings?

The second and third terms in the equation can influence markets in the short run, although they are essentially mean-reverting and follow a trend. GDP is the primary driver of aggregate stock market valuation over the long run.

In the long run, the economic growth rate is a significant variable. Even small differences in growth rates matter because of the power of compounding. Thus, even a few policy actions affecting the long-term growth rate, even by a small amount, will have a significant economic impact.

Question

Stanley Milner, CFA, is a financial analyst tasked with calculating equity values for country ZA2. Based on the following information, which factor can *least likely* be expected to increase the equity index in country ZA2?

- A. Equity valuation multiples trend lower. GDP trend growth goes from 4.5% to 4.65%.
- B. GDP trend growth goes from 4.5% to 4.65%.
- C. Corporate earnings represent an increasingly more significant percentage of GDP.

Solution

The correct answer is A.

Higher P/E ratios (valuation multiples) imply a more expensive aggregate stock market.

B is incorrect:

According to the formula:

$$\text{Price} = \text{GDP} \times \frac{\text{Earnings}}{\text{GDP}} \times \frac{\text{Price}}{\text{Earnings}}$$

Increasing GDP would increase the price of potential earnings for corporations. This has the effect of increasing aggregate equity values.

C is incorrect. Corporate earnings represent an increasingly significant percentage of GDP and a potential move higher in aggregate stock valuations as corporations earn more than private government citizens.

LOS LOS 1e: Compare major approaches to economic forecasting;

Economic forecasting typically falls under one of three distinct approaches:

- I. Econometric modeling.
- II. Economic indicators.
- III. Checklists.

Econometric Modeling

Econometric modeling is the use of statistical methods to map out relationships among economic variables. Models may range from simple to extensive and complex systems with hundreds of formulas. Modelers use economic variables such as interest rates, commodity prices, exchange rates, etc. The models will then produce the forecasts they were designed to calculate, including GDP or asset prices.

Strengths of Econometric Modeling

- Models can be quite robust.
- Many factors can be included.
- Data may be collected and consistently used within models to quickly generate output.
- Models deliver quantitative estimates of the impact of changes in exogenous variables.
- The modeling process imposes discipline and consistency in analysis.

Weaknesses of Econometric Modeling

- Models can be complex and time-consuming to formulate.
- Inputs are not easy to forecast.
- The relationship among variables may not be static.
- Models may be misspecified.

- A false sense of precision may arise.
- Econometric modelling rarely forecasts turning points well.

Economic Indicators

These are economic statistics released by official agencies and/or private organizations. These indicators contain information on an economy's recent activity or its current or future position in the business cycle. Analysts look at leading economic indicators since they have economy-related predictive powers. Notably, a *leading economic indicator* is designed to move ahead of the business cycle. A *diffusion index*, which measures multiple indicators at a time, may be used to gain a broader perspective on the timing of the business cycle. Examples of some common leading economic indicators include:

- I. The yield curve.
- II. The consumer confidence index.
- III. Weekly jobless claims.

Strengths of Econometric Indicators

- Generally intuitive and easy to construct.
- Focus primarily on identifying turning points.
- May be available from third parties, which makes them easy to track.

Weaknesses of Econometric Indicators

- Subject to frequent revision.
- Current data is unreliable since historical analysis input can provide false signals.
- May provide little more than binary directional guidance.

Checklists

To assess the overall economy, forecasters may consider a wide range of economic data. Checklists can include whatever important variables the forecasters deem worthy. They do not always take a standard form.

Strengths of Checklists

- Limited complexity.
- Flexible.
- Structural changes can easily be incorporated.
- Items can easily be added or dropped.
- They can draw on any information from any source as desired.
- Scope: Can include virtually any topics, perspectives, theories, or assumptions.

Weaknesses of Checklists

- Subjective.
- Arbitrary.
- Judgmental.
- Time-consuming.
- The manual process limits the depth of analysis.
- There is no precise mechanism for combining disparate information.
- Impose no consistency of analysis across items or different points in time.
- It may allow biased and inconsistent views, theories, or assumptions.

Question

Which of the three approaches listed previously is *most likely* subject to misspecification (bias)?

- A. Checklists.
- B. Economic indicators.
- C. Econometric modelling.

Solution

The correct answer is C.

As econometric modelling relies on building a model, it is *most likely* subject to misspecification. Since econometric modelling allows for the most precision out of all approaches, if its process (calculation methodology) is biased, it will continue producing biased results as output.

A and B are incorrect. In contrast, economic indicators and the checklist approach tend to lead to binary output or more simplistic results such as 'growing vs. shrinking' or 'improving vs. deteriorating' without always specifying precise numbers, as might be the case with econometric modelling.

LOS LOS 1f: Discuss how business cycles affect short- and long-term expectations;

The ***business cycle*** refers to variations of economic productivity—often measured in terms of GDP—around its long-term trend rate. It is this long-term trend rate that serves as an anchor for forecasting business environments. This is because the economy cannot sustainably grow faster than its long-term trend rate and because the long-term trend rate means reverting. Since the movements around the trend rate are ultimately stochastic, the business cycle phases can often vary in intensity and length. Despite these fluctuations, a pattern emerges. The business cycle exhibits stochastic processes because it reflects economic decisions that:

- Are made on imperfect information.
- Require significant resources to implement.
- Are difficult or costly to reverse.

The ***output gap*** is the difference between the actual output of an economy and the maximum potential output of an economy expressed as a percentage of gross domestic product (GDP).

Actual Output - Maximum Potential Output = (+/-) Output Gap

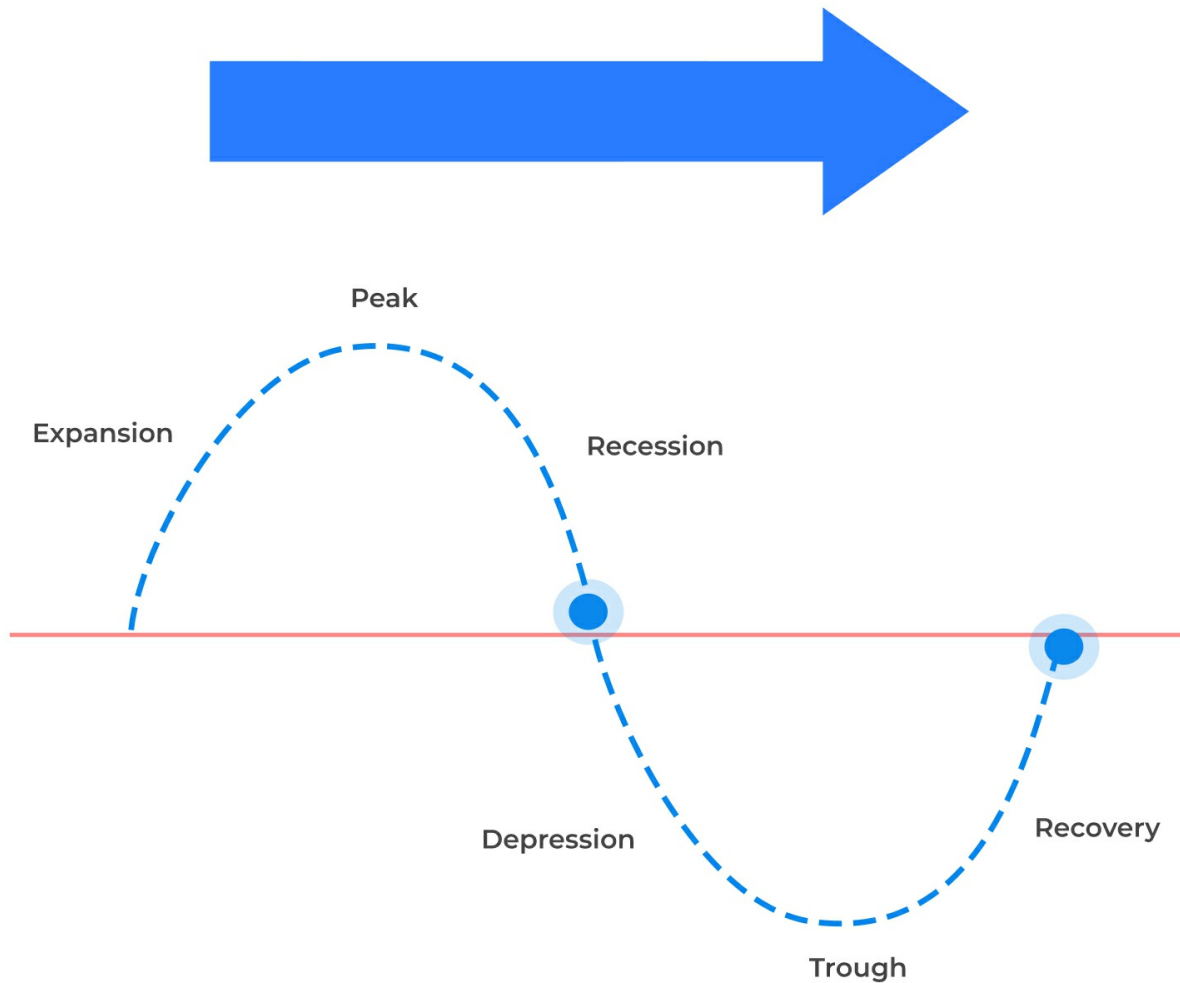
This formula states that when actual output exceeds maximum output, a positive output gap exists since the economy is outperforming, i.e., overheating. A negative output gap is the opposite, the actual output below the maximum potential output.

Phases of the Business Cycle

Despite varying length and intensity, business cycles tend to follow a pattern. This pattern is encapsulated in the graphic below.



The Business Cycle



- I. **Initial recovery:** This phase begins an uptick in economic activity, usually coinciding at the bottom of the trough. While the economy has been slow and weak, the initial recovery marks a turning point.
- II. **Early expansion:** The economy continues to gain momentum in this stage. In addition, unemployment starts to decline, but the output gap remains negative.
- III. **Late expansion:** This signifies that the output gap has closed, and the economy is increasingly in danger of overheating. A boom mentality is in the air; unemployment is

low, business profits are strong, and wages and inflation are rising.

- IV. **Slow down:** During this stage, the economy approaches an eventual peak, usually in response to rising interest rates and inflation, availability of fewer viable investment projects, and debt accumulation. The economy is especially vulnerable to shock at this juncture as business confidence waivers.
- V. **Contraction:** The last stage of the business cycle. A contraction is characterized by a steepening yield curve, firms cutting production, the central bank easing monetary policy, and profits dropping sharply. Recessions are often punctuated by major bankruptcies, incidents of uncovered fraud related to aggressive accounting practices, and/or a financial crisis. Unemployment can rise quickly, impairing household financial positions.

The Business Cycle and Market Expectations

The formulation of capital market expectations seems straightforward under the previous descriptions. If this is true, then making a few forecasts and earning abnormal returns should be easy. The truth is that it is quite a bit more complex than that. Evidence has shown that the business cycle exhibits the highest predictive power of one to three years.

Question

A situation in which actual output is below maximum potential output *most likely* reflects a:

- A. Budget deficit.
- B. Positive output gap.
- C. Negative output gap.

Solution

The correct answer is C.

Use the following formula:

$$\text{Actual output} - \text{Maximum potential output} = (+/-) \text{ Output gap}$$

This formula states that when actual output exceeds maximum output, a positive output gap exists as the economy is outperforming, i.e., overheating. A negative output gap is the opposite. The actual output is below the maximum potential output.

A is incorrect. A budget deficit occurs when government expenses exceed revenue, and it is not directly related to the actual output of an economy being below its maximum potential output.

B is incorrect. A positive output gap occurs when actual output exceeds potential output, meaning growth is inflationary and above the trend rate. In contrast, a situation where actual output is below maximum potential output reflects a negative output gap, with an economic downturn with unemployment and spare capacity.

LOS LOS 1g: Explain the relationship of inflation to the business cycle and the implications of inflation for cash, bonds, equity, and real estate returns;

Until the early 20th century, the money supply was primarily dictated by the supply of gold and silver backing up bank deposits. This made periods of both deflation and inflation expected. Now that fiat currencies are backed by the faith and credit of central governments only, inflation is the norm. The US Federal Reserve, for example, sets a target inflation rate of around 2%. Why 2% and not 0%? Because a 2% percent buffer keeps inflation from turning into deflation. Persistent deflation is damaging because it undermines the following:

- ***Debt finance investments:*** Future repayments are less valuable in today's dollars.
- ***The power of the central bank:*** The Federal Reserve's power to make changes is undermined when rates are near zero.

Moderate inflation is preferable to deflation; therefore, central banks are more willing to tolerate a little inflation to avoid deflation altogether. Inflation is procyclical, meaning it picks up steam in an expansion and cools off in an economic contraction.

Inflation Effects by Asset Classes

While the effects of inflation among varying asset classes can be somewhat distinctive, specific patterns emerge, leading investors to favor various asset classes in times of rising or falling inflation. It should also be noted that rising interest rates tend to be procyclical just as inflation does, meaning that they often rise and fall together. This will form the basis of the logic for the following paragraphs.

Inflation Effects on Cash

In this context, cash means short-term interest-bearing instruments, not currency or zero-interest deposits. It is expected that the rate of return earned on cash should be positively correlated with inflation seen in the economic environment. This makes cash essentially a

floating rate instrument with zero duration.

Returns should improve in rising interest rate environments and worsen in lowering interest rate environments. Deflation can make cash particularly attractive; however, it encourages hoarding, not use.

Cash is also known as currency and can only do its job when circulating. Therefore, the fact that the prices of goods will be lower tomorrow encourages hoarding and discourages circulation.

Inflation Effects on (Nominal Fixed-Rate) Bonds

Bond prices and interest rates share an inverse relationship. When interest rates rise, bondholders experience depreciation of the current market value of their instruments. When rates fall, bondholders experience capital gains. This makes bonds favorable to other asset classes in times of falling interest rates.

Inflation Effects on Stocks

Equities tend to outperform their fixed-income counterparts in periods of rising interest rates. Higher-than-expected inflation can be a headwind for equity, although some firms can more easily pass on the higher costs to consumers than others. From a valuation standpoint, both the expected future earnings and dividends of a company and these cash flows' associated discount rates should rise and fall in line with inflation expectations, netting each other out.

Inflation Effects on Real Estate

Short to intermediate-term nominal cash flows are generally dictated by existing leases that are unlikely to adjust to inflation expectations. Since leases are renewed, they may be increased in line with inflation, allowing real estate investors to increase returns.

Unexpectedly low inflation exerts downward pressure on expected rental income and property value, especially for less-than-prime properties. Landlords may have to cut rents sharply to avoid rising vacancies.

Question

Which asset class is most likely to outperform based on stronger-than-expected deflation?

- A. Equities.
- B. Real estate.
- C. Fixed-income instruments.

Solution

The correct answer is C.

Fixed nominal income means that cash flows are not set on a floating rate, so essentially, they are level and flat in deflation. This means that the cash flows coming in the future will be worth more when they arrive than they are if received today. If deflation persists, fixed-income instruments will outperform.

A is incorrect. The effect of inflation on equities is mixed and somewhat neutral, depending on the firm in this situation. Inflation may be good or bad for certain companies.

B is incorrect. Stronger-than-expected deflation would likely suppress rent prices, which are a direct input into the valuation of real estate holdings. Therefore, real estate should not be expected to outperform other asset classes during times of deflation.

LOS LOS 1h: Discuss the effects of monetary and fiscal policy on business cycles;

Monetary Policy

To smooth out extreme inflation or deflation, central banks act as mediators. It is generally accepted that expansionary policies are less effective than those that are restrictive. In other words, it's easier for governmental authorities to cool down a hot economy than to spark the growth of a cold economy. The Taylor rule models the relationships between GDP, inflation, and interest rates.

The Taylor Rule

$$i^* = r_{\text{neutral}} + \pi_e + 0.5[y_e - y_{\text{trend}}] + 0.5[\pi_e - \pi_{\text{target}}]$$

Where:

i^* = Target nominal short-term interest rate.

r_{neutral} = Neutral real short term interest rate.

y_e = Expected GDP growth rate.

y_{trend} = Long-term trend in the GDP growth rate.

π_e = Expected inflation rate.

π_{target} = Target inflation rate.

The Taylor rule serves as a guide to many central banks in setting appropriate policy rates. The target rate—or rate the bank should set—equals the neutral rate, scaled by the differences in expected versus trend inflation and GDP. For example, if GDP is expected to be higher than its trend rate, this would call for higher interest rates. This is intuitive as higher-than-normal GDP indicates an over-heating economy, and rising interest rates are a lever the central bank can use to cool the economy down. The same logic goes for inflation.

Zero or Negative Interest Rates

Before 2008, it was believed that negative interest rates would not work to stimulate the economy. The logic was that upon discovering that bank deposits were earning a negative interest rate, depositors would withdraw all their funds and move into cash, which could not be 'taxed' by a negative interest rate.

It turns out that several European banks could sustain negative interest rates over reasonably long periods. The reason that this worked is that a modern economy cannot be entirely operated in cash. Bank deposits facilitate millions of daily transactions, which would be slow, if not impossible, to achieve with pure cash. As long as there is a need for these transactions, depositors are not entirely free to switch to cash-only.

Negative Interest Rate Implications

Negative policy rates are expected to produce asset class returns like those in the contraction and early recovery phases of a "more normal" business/policy cycle. Although such historical periods may provide a reasonable starting point in formulating appropriate scenarios, it is essential to note that negative rate periods may indicate severe economic distress and thus involve more significant uncertainty regarding the timing and strength of the recovery. Key considerations to keep in mind when forecasting in a negative or zero interest rate environment include:

- Historical data may not be reliable.
 - Limited valuable data may be available.
 - Since this data was generated, significant structural changes in markets and the economy may have occurred.
 - Quantitative models may have discrepancies in cases that differ from those on which they were estimated/calibrated.
 - Forecasting must explain the differences between the current environment

and historical averages.

- The effects of other monetary policy measures occurring simultaneously, e.g., quantitative easing).
 - These may interfere with market relationships, including, e.g., the shape of the yield curve.

Fiscal Policy

Fiscal policy is a tool the government uses to manage the economy. A government can implement a loose fiscal policy to stimulate the economy. This is done by decreasing taxes or increasing spending, which increases the budget deficit. A tight fiscal policy can be implemented to slow down the economy.