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Level III Book 1

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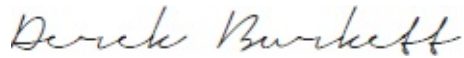
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Derek Burkett, CFA, FRM, CAIA
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Book 1: Asset Allocation

SchweserNotes™ 2027

Level III CFA®



SCHWESERNOTES™ 2027 LEVEL III CFA® BOOK 1: ASSET ALLOCATION

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Learning Outcome Statements (LOS)

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

The candidate should be able to:

- a. discuss the role of, and a framework for, capital market expectations in the portfolio management process.
- b. discuss challenges in developing capital market forecasts.
- c. explain how exogenous shocks may affect economic growth trends.
- d. discuss the application of economic growth trend analysis to the formulation of capital market expectations.
- e. compare major approaches to economic forecasting.
- f. discuss how business cycles affect short- and long-term expectations.
- g. explain the relationship of inflation to the business cycle and the implications of inflation for cash, bonds, equity, and real estate returns.
- h. discuss the effects of monetary and fiscal policy on business cycles.
- i. interpret the shape of the yield curve as an economic predictor and discuss the relationship between the yield curve and fiscal and monetary policy.
- j. identify and interpret macroeconomic, interest rate, and exchange rate linkages between economies.

2. Capital Market Expectations, Part 2: Forecasting Asset Class Returns

The candidate should be able to:

- a. discuss approaches to setting expectations for fixed-income returns.
- b. discuss risks faced by investors in emerging market fixed-income securities and the country risk analysis techniques used to evaluate emerging market economies.
- c. discuss approaches to setting expectations for equity investment market returns.
- d. discuss risks faced by investors in emerging market equity securities.
- e. explain how economic and competitive factors can affect expectations for real estate investment markets and sector returns.
- f. discuss major approaches to forecasting exchange rates.
- g. discuss methods of forecasting volatility.
- h. recommend and justify changes in the component weights of a global investment portfolio based on trends and expected changes in macroeconomic factors.

3. Overview of Asset Allocation

The candidate should be able to:

- a. describe elements of effective investment governance and investment governance considerations in asset allocation.
- b. formulate an economic balance sheet for a client and interpret its implications for asset allocation.
- c. compare the investment objectives of asset-only, liability-relative, and goals-based asset allocation approaches.
- d. contrast concepts of risk relevant to asset-only, liability-relative, and goals-based asset allocation approaches.
- e. explain how asset classes are used to represent exposures to systematic risk and discuss criteria for asset class specification.
- f. explain the use of risk factors in asset allocation and their relation to traditional asset class-based approaches.
- g. recommend and justify an asset allocation based on an investor's objectives and constraints.
- h. describe the use of the global market portfolio as a baseline portfolio in asset allocation.
- i. discuss strategic implementation choices in asset allocation, including passive/active choices and vehicles for implementing passive and active mandates.

- j. discuss strategic considerations in rebalancing asset allocations.

4. Principles of Asset Allocation

The candidate should be able to:

- a. describe and evaluate the use of mean–variance optimization in asset allocation.
- b. recommend and justify an asset allocation using mean–variance optimization.
- c. interpret and evaluate an asset allocation in relation to an investor’s economic balance sheet.
- d. recommend and justify an asset allocation based on the global market portfolio.
- e. discuss the use of Monte Carlo simulation and scenario analysis to evaluate the robustness of an asset allocation.
- f. discuss asset class liquidity considerations in asset allocation.
- g. explain absolute and relative risk budgets and their use in determining and implementing an asset allocation.
- h. describe how client needs and preferences regarding investment risks can be incorporated into asset allocation.
- i. describe the use of investment factors in constructing and analyzing an asset allocation.
- j. describe and evaluate characteristics of liabilities that are relevant to asset allocation.
- k. discuss approaches to liability-relative asset allocation.
- l. recommend and justify a liability-relative asset allocation.
- m. recommend and justify an asset allocation using a goals-based approach.
- n. describe and evaluate heuristic and other approaches to asset allocation.
- o. discuss factors affecting rebalancing policy.

5. Asset Allocation with Real-World Constraints

The candidate should be able to:

- a. discuss asset size, liquidity needs, time horizon, and regulatory or other considerations as constraints on asset allocation.
- b. discuss tax considerations in asset allocation and rebalancing.
- c. recommend and justify revisions to an asset allocation given change(s) in investment objectives and/or constraints.
- d. discuss the use of short-term shifts in asset allocation.
- e. identify behavioral biases that arise in asset allocation and recommend methods to overcome them.

READING 1

CAPITAL MARKET EXPECTATIONS, PART 1: FRAMEWORK AND MACRO CONSIDERATIONS

EXAM FOCUS

Combining capital market expectations with the investor's objectives and constraints leads to the portfolio's strategic asset allocation. Various economic tools and techniques are useful in forming capital market expectations for return, risk, and correlation by asset class. Unfortunately, no one technique works consistently, so be prepared for any technique and its issues as covered here.

MODULE 1.1: FORMULATING CAPITAL MARKET EXPECTATIONS

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

Capital market expectations are risk and return expectations regarding classes of assets. Investors should establish long-term expectations for each allowable asset class specified in the investment policy statement. They can also create short-term expectations for making active investment decisions. Using a disciplined approach to set short- and long-term expectations leads to more effective security selection, asset allocation, and risk management.

Achieving long-term investment objectives is largely dependent on constructing proper asset allocations. Although projecting asset class returns may be subject to forecasting errors, investors should ensure that portfolios are internally consistent. **Cross-sectional consistency** refers to consistency across asset classes regarding portfolio risk and return characteristics. **Intertemporal consistency** refers to consistency over various investment horizons regarding portfolio decisions over time.

To formulate capital market expectations, an analyst should use the following seven-step process:

- Step 1:* Determine the specific capital market expectations needed according to the investor's allowable asset classes and investment horizon(s). Time horizon is particularly important in determining the set of capital market expectations needed.
- Step 2:* Investigate assets' historical performance to determine the drivers that have affected past performance and to establish some range for plausible future performance. With the drivers of past performance established, the analyst can use these to forecast expected future performance as well as compare the forecast to past results to see if it appears reasonable.
- Step 3:* Identify the valuation model to be used and its requirements. For example, a comparables-based, relative value approach used in the United States may be difficult to apply in an emerging market analysis.
- Step 4:* Collect the best data possible. Faulty data will lead to faulty conclusions. Financial publications and commercial databases are likely the best sources for reliable information on asset classes.
- Step 5:* Use experience and judgment to interpret current investment conditions and decide what values to assign to the required inputs. Verify that the inputs used for the various asset classes are consistent across classes.
- Step 6:* Formulate capital market expectations. Any assumptions and rationales used in the analysis should be recorded.
- Step 7:* Monitor performance and use it to refine the process for setting expectations. If actual performance varies significantly from forecasts, the process and model should be refined.

There is information needed to support the investment process:

Geography. These include individual countries, economic blocks (e.g., EU), nondomestic versus domestic, regional, and global.

Major asset classes. These include fixed income, equity, and real assets.

Sub-asset classes. These include equity (e.g., industries, sectors, size, style), fixed income (e.g., nominal vs. TIPS, floating vs. fixed, credit quality, maturities), and real assets (e.g., commodities, real estate, timber).

Good forecasts are unbiased, objective, well researched, efficient (small forecasting error), and internally consistent. A general guideline is that at least 30 observations are needed to test a hypothesis.

Problems in Forecasting

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

Poor forecasts can result in inappropriate asset allocations. Analysts should be aware of potential problems in data, models, and the resulting capital market

expectations. Nine problems encountered in producing forecasts are (1) limitations to using economic data, (2) data measurement error and bias, (3) limitations of historical estimates, (4) the use of ex post risk and return measures, (5) nonrepeating data patterns, (6) failing to account for conditioning information, (7) misinterpretation of correlations, (8) psychological bias, and (9) model uncertainty.

. There are several **limitations to using economic data**:

- The time lag between collection and distribution is often quite long. The International Monetary Fund, for example, reports data with a lag of as much as two years.
- Data are often revised, and the revisions are not made at the same time as the publication. Additionally, data definitions and methodology change over time. For example, the basket of goods in the Consumer Price Index (CPI) is updated every few years.
- Data indexes are often rebased over time (i.e., the base upon which they are calculated is changed). Although a rebasing is not a substantial change in the data itself, the unaware analyst could calculate changes in the value of the indexes incorrectly if she does not make an appropriate adjustment.

. There are numerous possible **data measurement errors and biases**.

Transcription errors are the misreporting or incorrect recording of information and are most serious if they are biased. *Survivorship bias* commonly occurs if a manager or a security return series is deleted from the historical performance record of managers or firms. Deletions are often tied to poor performance and bias the historical return upward. *Appraisal data* for illiquid and infrequently priced assets makes the path of returns appear smoother than it actually is. This biases downward the calculated standard deviation and makes the returns seem less correlated (closer to 0) with more liquid priced assets. This is a particular problem for some types of alternative assets such as real estate.

. The **limitations of historical estimates** can also hamper the formation of capital market expectations. Values from historical data must often be adjusted going forward as economic, political, regulatory, and technological environments change. This is particularly true for volatile assets such as equity. These changes are known as *regime changes* and result in *nonstationary* data. For example, the global financial crisis in 2007–2009 resulted in returns data that were markedly different than those from the previous five years. Nonstationarity would mean different periods in the time series have different statistical properties. With this, nonstationarity is a statistical problem that could create issues with standard statistical testing methods.

Two questions can be used to help resolve the issue of which time period to select:

- Is there a reason to believe the entire (longer) time period is not appropriate?
- If the answer to the first question is yes, does a statistical test confirm there is a regime change and the point in the time series where it occurs?

If both answers are yes, the analyst must use judgment to select the relevant subperiod.

Historical data is a starting point for estimating expected returns, standard deviations, and correlations. A long time period is preferable for several reasons:

- It may be statistically required. To calculate historical covariance (and correlation), the number of data points must exceed the number of covariances to be calculated.
- A larger data set (time period) provides more precise statistical estimates with smaller variance to the estimates.
- Using a short time period creates a temptation to use more frequent data, such as weekly data, rather than monthly data points to have a larger sample size. Unfortunately, more frequent data points are often more likely to have missing or outdated values (called *asynchronous* data) and can result in distorted correlation calculations. Also, it has been found that more frequent data will not improve the precision of expected returns.

However, long time periods also create the potential problem of including regime changes, which are shifts in underlying fundamentals. Each regime change creates a subperiod with distinctly different characteristics.

In addition to selecting time periods, caution should be exercised when data is assumed to be normally distributed. Asset returns have historically exhibited “fat tails” and skewness, which adds complexity to statistical tests. In some cases, the benefits of accounting for nonnormality might not outweigh the costs of introducing complexity to a model.

- Using **ex post data** (after the fact) to determine **ex ante** (before the fact) risk and return can be problematic. For example, suppose that several years ago, investors were fearful that the Federal Reserve was going to have to raise interest rates to combat inflation. This situation would cause depressed stock prices. If inflation abated without the Fed’s intervention, then stock returns would increase once the inflation scenario passed. The analyst would then conclude that stock returns were high while being blind to the prior risk that investors had faced, and that future (ex ante) returns for stocks will be high. In sum, the analyst would underestimate the risks that equity investors face and overestimate their potential returns.

This issue could also lead to an overestimation of risk when sample data include rare negative events. Using a data subset that includes outliers will likely distort the estimation of value at risk (VaR). This would suggest that rare

negative events are expected with more frequency than would be observed in practice.

- . Using historical data, analysts can also uncover patterns in security returns that are unlikely to occur in the future and can produce **data biases**. One such bias is *data mining*. Just by random chance, some variables will appear to have a relationship with security returns—when, in fact, these relationships are unlikely to persist. For example, if the analyst uses a 5% significance level and examines the relationship between stock returns and 40 randomly selected variables, two (5%) of the variables are expected to show a statistically significant relationship with stock returns just by random chance. Another potential bias results from the time span of data chosen (*time period bias*). For example, small-cap US stocks are widely thought to outperform large-cap stocks, but their advantage disappears when data from 2000 to 2010 are excluded.

To avoid these biases, an analyst should first ask if there is any economic basis for the variables found to be related to stock returns. Second, he should scrutinize the modeling process for susceptibility to bias. Third, he should test the discovered relationship with out-of-sample data to determine if the relationship is persistent. This would be done by estimating the relationship with one portion of the historical data and then reexamining it with another portion.

- . Analysts' forecasts may also fail to account for **conditioning information**. The relationship between security returns and economic variables is not constant over time. Historical data reflect performance over many different business cycles and economic conditions. Thus, analysts should account for current conditions in their forecasts. As an example, suppose a firm's beta is estimated at 1.2 using historical data. If, however, the original data is separated into two ranges by economic expansion or recession, the beta might be 1.0 in expansions and 1.4 in recessions. Going forward, the analyst's estimate of the firm's beta should reflect whether an expansion is expected (i.e., the expected beta is 1.0) or a recession is expected (i.e., the expected beta is 1.4).
- . Another problem in forming capital market expectations is the **misinterpretation of correlations** (i.e., causality). Suppose the analyst finds that corn prices were correlated with rainfall in the Midwestern United States during the previous quarter. It would be reasonable to conclude that rainfall influences corn prices, but not that corn prices influence rainfall. Rainfall is an

exogenous variable (i.e., it arises outside the model), whereas the price of corn is an endogenous variable (i.e., it arises within the model).

It is also possible that the correlation between two variables is spurious, or that a third variable influences both variables. In addition, two variables may have a nonlinear relationship that is missed by the correlation statistic, which measures linear relationships.

. Analysts are susceptible to **psychological biases**:

- In the **anchoring bias** (cognitive), the first information received is overweighted. If, during a debate on the future of the economy, the first speaker forecasts a recession, that forecast is given greater credence.
- In the **status quo bias** (emotional), predictions are highly influenced by the recent past. If inflation is currently 4%, that becomes the forecast, rather than choosing to be different and potentially making an active error of commission.
- In the **confirmation bias** (cognitive), only information supporting the existing belief is considered, and such evidence may be actively sought while other evidence is ignored. To counter these tendencies, analysts should give all evidence equal scrutiny and seek out contrary opinions.
- In the **overconfidence bias** (emotional), past mistakes are ignored, the lack of comments from others is taken as agreement, and the accuracy of forecasts is overestimated. To counter this bias, consider a range of potential outcomes.
- In the **prudence bias** (cognitive), forecasts are overly conservative to avoid the regret from making extreme forecasts that could end up being incorrect. This bias can also be mitigated by considering a range of potential outcomes.
- In the **availability bias** (cognitive), what is easiest to remember (often an extreme event) is overweighted. Many believe that the US stock market crash of 1929 may have depressed equity values in the subsequent 30 years. To counter this bias, base predictions on objective data rather than emotions or recollections of the past.

- . **Model uncertainty** refers to selecting the correct model. An analyst may be unsure whether to use a discounted cash flow (DCF) model or a relative value model to evaluate an expected stock return. *Parameter uncertainty* refers to estimation errors in model parameters. *Input uncertainty* refers to knowing the correct input values for the model. For example, even if the analyst knew that the DCF model was appropriate, the correct growth and discount rates are still needed. Among the three types of uncertainty, model uncertainty is the most serious given that an incorrect model will likely lead to invalid conclusions.



MODULE QUIZ 1.1

1. An analyst uses various valuation approaches for different asset classes and collects the necessary data from multiple sources. The analyst does not make any effort to systematically compare the data used. As a result, the analyst uses relatively low discount rates for equity analysis (overestimating theoretical value) and high discount rates for fixed income (underestimating theoretical value). **Discuss** the likely effect on the analyst's asset allocation recommendations.

2. An analyst would like to forecast US equity returns. He is considering using either the last 3 years of historical annual returns or the last 50 years of historical annual returns.
Formulate an argument for and against each selection of data length.
3. **Explain** why smoothed data may be present for some types of alternative investments and the consequences for their risk and correlation with other assets from using such data.

MODULE 1.2: THE TREND RATE OF GROWTH

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

Identifying problems in developing forecasts is important when setting capital market expectations. However, a far greater concern is the connection between investment outcomes and economic output. In general, economic growth can be partitioned into cyclical variations and growth trends. The former is more short-term focused; the latter is more relevant for determining long-term return expectations. Later we will discuss how the business cycle influences short- and long-term expectations. In this section, we will discuss the application of growth trends when formulating expectations.

Economic growth trends are subject to unexpected surprises or shocks that are exogenous to the economy. Many shocks and their impact on capital markets cannot be predicted. For example, turmoil in the Middle East may change the long-term trend for oil prices, inflation, and economic growth in the developed world. Shocks may also arise through the banking system. An extreme example is the US banking crisis of the 1930s, when a severe slowdown in bank lending paralyzed the economy.

Exogenous shocks are unanticipated events that occur outside the normal course of an economy. Because the events are unanticipated, they are not already built into current market prices—whereas normal trends in an economy, which would be considered endogenous, are built into market prices. Note that the impact of these events will likely produce statistical regime changes. Exogenous shocks can be caused by several factors:

Changes in government policies. Government policies that can encourage long-term growth include sound fiscal policy, minimal government interference with free markets, facilitating competition in the private sector, developing infrastructure and human capital, and sound tax policies.

Political events. Geopolitical tensions that divert resources to less productive uses may lead to decreases in growth. Conversely, cuts in defense spending due to higher levels of world peace may lead to increases in growth.

Technological progress. The creation of new and innovative markets, products, and technologies has the potential to improve growth.

Natural disasters. Natural disasters likely reduce short-term growth, but may (arguably) encourage long-term growth if more efficient capacity replaces previous capacity.



PROFESSOR'S NOTE

The counterargument here is that the owners of capital already replace old facilities with newer and more efficient ones when the time is right.

Discovery of natural resources. Production of new natural resources or the introduction of new ways to recover existing resources can enhance growth. In addition, decreases in resource production costs will improve growth, while decreases in resource supply will restrict growth.

Financial crises. Shocks to the financial system will lead to a crisis of confidence among market participants. Financial crises may reduce the level of economic output in the short term and may also decrease the trend rate of growth.

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

The trend rate of growth is an important input when setting capital market expectations. Some of the key considerations of economic growth trend analysis are as follows:

Forecasting returns with DCF models incorporate the trend rate of growth. The need to keep these forecasts consistent with long-term economic growth imposes discipline on the models. The trend rate of growth acts as an anchor for long-term bond and equity returns.

Higher trend growth rates may lead to higher stock returns, assuming the growth is not already reflected in stock prices.

When we speak of higher trend growth rates, we mean the economy can grow at a faster pace before inflation becomes a major concern. This consideration influences monetary policy and the level of bond yields.

Higher trend growth rates tend to generate higher government bond yields.

Overall, the trend rate of growth is relatively stable in developed economies. In emerging economies, that growth rate can be less predictable and include longer periods of rapid growth as those economies catch up with developed economies.

A basic model for forecasting the economic growth rate focuses on the following:

Labor input, based on growth in the labor force and labor participation. Labor force growth depends on population growth and demographics. Labor participation refers to the percentage of the population working and is affected by real wages, work/leisure decisions, and social factors.

Capital per worker, which increases labor productivity.

Total factor productivity, which is reflected in technological progress and changes in government policies.

EXAMPLE: Forecasting the long-term economic growth rate

Assume that the population is expected to grow by 2% and that labor force participation is expected to grow by 0.25%. If spending on new capital inputs is projected to grow at 2.5% and total factor productivity will grow by 0.5%, what is the long-term projected growth rate?

Answer:

The sum of the components equals $2\% + 0.25\% + 2.5\% + 0.5\% = 5.25\%$, so the economy is projected to grow by this amount.

Asset Returns and the Trend Rate of Growth

The trend rate of growth can also provide an estimate for long-term equity returns. The market value of equity can be expressed as the product of three terms: nominal GDP, earnings/GDP (which is the share of profits in the economy), and the P/E ratio.

Over long periods, the share of profits in the economy (earnings/GDP) and the P/E ratio cannot continually increase or decrease. Thus, in the long term, the growth rate of the total value of equity in an economy is linked to the growth rate of GDP.

This applies to the capital appreciation component of equity returns but not the dividend yield. The dividend yield (annual dividends / market value) can be derived from the dividend payout ratio (dividends / profit) divided by the profit multiple (market value / profit).

EXAMPLE: Forecasting long-run equity return

Cindy Navaro is an equity analyst for Evergreen Asset Management. She has been asked to produce capital market expectations for asset classes in several different markets relevant to the company's renewable green energies fund. Navaro is aware that long-term GDP trend forecasting is considered the starting point to form capital market expectations. In order to make a forecast of trend GDP growth in the domestic economy, Navaro collects the following data displayed in Exhibit 1.

Exhibit 1: Domestic Economy Information

Annual labor input growth	0.4%
Annual labor productivity growth	1.4%
Annual inflation	3.8%
Dividend yield	2.6%
Long-term change in profits as a share of GDP	0%
Long-term change in PE multiples	0%

Based on the data in Exhibit 1, **calculate** the projected long-term domestic market equity return.

Answer:

The correct answer is 8.2%.

Real GDP growth = labor input growth + labor productivity growth = 0.4% + 1.4% = 1.8%.

Nominal GDP growth = real GDP growth + inflation = 1.8% + 3.8% = 5.6%.

Long-term capital gains in equity markets = %Δ nominal GDP + %Δ profits / GDP + %Δ PE = 5.6% + 0% + 0% = 5.6%.

Long-term total domestic market equity return = capital gains + dividend yield = 5.6% + 2.6% = 8.2%.

High growth rates in capital investment are associated with high growth rates in the economy. However, these rates are not necessarily linked to favorable equity returns. This may be the case because growth rates are already factored into