
The following is a review of the Private Wealth Management principles designed to address the learning outcome statements set forth by CFA Institute. This topic is also covered in:

MANAGING INDIVIDUAL INVESTOR PORTFOLIOS¹

Study Session 4

EXAM FOCUS

In the past, the morning session of the exam has been heavily weighted towards portfolio management questions. It will typically be 9–14 questions. However, the questions have had multiple parts. Each question part will display the number of minutes it is allocated, and those minutes will be the maximum point score you can earn. There will likely be one or two questions devoted directly to the investment policy statement (IPS) and they could total an hour or more. There may be IPS questions for both an individual and an institution. There is likely to be a strategic asset allocation (SAA) question tied into that IPS question. Many of the other questions may also tie into the IPS. That makes the next two Study Sessions extremely important to the Level III exam.

To answer IPS questions successfully, you must:

1. Be familiar with and understand a large number of potential issues that might apply in a given situation. These are covered in the SchweserNotes and in the CFA readings for Study Sessions 4 and 5. There is no substitute for reading the material.
2. Carefully read and understand the facts of the case to determine which issues from #1 above are relevant. Because each case is unique, you cannot expect to pass just by repeating what you saw as the answer to a previous question. CFA Institute says that the Level III exam is unique in requiring a high level of judgment and it is these questions where that most comes into play. You will have the opportunity to practice this as you go forward in the Schweser material.
3. Recognize that there is a process at work in constructing an IPS and doing a strategic asset allocation (SAA). The CFA material provides examples of the output from this process and discusses the inputs but does not focus on the construction process. However, the exam has required candidates to construct an IPS and then use it. We have extensive “For the Exam” boxes throughout our material to help you understand the process.

1. The terminology used throughout this topic review is industry convention as presented in Reading Assignment 10 of the 2013 CFA Level III exam curriculum.

4. The last stage is to construct a written answer that reflects #1, #2, and #3. This has not been required on other levels of the exam. The morning session is generally referred to as *essay*; however, the more precise term is *constructed response*. The key points that should appear in your answer have been decided, and your answer is evaluated strictly in terms of how well it makes and supports those points in coherent fashion. Practice writing an effective constructed response answer many times before the exam.
5. You must also deal with frustration. A significant percentage of Level III candidates find this section extremely frustrating because it does not meet their personal sense of consistency. Past answers are quite consistent on the main, important issues (with a few exceptions, we will discuss these). But they also include a range of random, not particularly significant, comments. The random comments do no harm but are frustrating to candidates who try to just repeat what they have seen in past answers. Try to move past that and learn what is expected. The exam process has well tested the ability to learn technical and rather precise techniques and math. The Level III material will continue to draw on those skills. However, this exam will likely test your ability to find what another trained professional would have been expected to find and write, when confronted with sometimes contradictory issues.

The next pages will lay out a variety of issues with which you are expected to be familiar. They may or may not be relevant to a given portfolio question. The exam will likely test the ability to determine what is relevant to a particular case and then apply it.

INVESTOR PROFILING AND RISK TOLERANCE

LOS 10.a: Discuss how source of wealth, measure of wealth, and stage of life affect an individual investors' risk tolerance.

LOS 10.b: Explain the role of situational and psychological profiling in understanding an individual investor.

CFA® Program Curriculum, Volume 2, page 157

Due to the variety of individual circumstances, the adviser may utilize *situational profiling* as a starting point in understanding the client and his needs. Situational profiling begins with determining the investor's source of wealth, measure of perceived wealth versus needs, and stage of life. These can provide insight into the individual's risk tolerance and return objectives.

Source of Wealth

Generally, wealth is created either *actively* through entrepreneurial activities or *passively*. *Passive wealth might come from inheritance, windfall, or through long, secure employment and conservative investment.* The manner in which an individual has accumulated wealth provides clues about his psychological makeup and his *willingness to take risk*.

Active wealth creation. Wealth that has been accumulated through *entrepreneurial activity* may be the result of considerable risk taking. Thus, an individual classified as an entrepreneur could exhibit a significant willingness to take risk. Keep in mind, however, that entrepreneurs might be willing to accept *business risk* because they feel in control of the firm and their futures. The method of wealth acquisition can lead to different attitudes toward *investment risk*.

The bottom line is that when someone is classified as an entrepreneur, it may indicate an above-average willingness to tolerate risk. You must, however, be careful to look for statements and/or actions that confirm the assumption or might indicate otherwise. Willingness can be indicated by both statements and actions.

Passive wealth creation. Wealth acquired through windfall or inheritance could indicate a lack of knowledge related to and discomfort with making investment decisions. These individuals may have below-average *willingness* to tolerate risk. Due to their lack of investment experience, these investors generally have little confidence in their abilities to regain their wealth should they experience significant losses and thus can have a strong desire to protect it.

An individual who has accumulated wealth through conservative consumption and savings over a lifetime of secure employment has probably demonstrated a policy of delayed consumption and careful, low-risk investments. This individual has demonstrated a desire for long-term financial security and would be classified as having below-average willingness to take risk.

Measure of Wealth

Generally, there is a positive correlation between a client's *perception* of wealth and his willingness to take investment risk. If an investor perceives his wealth as small, he will have low risk tolerance and wish to hold only low-volatility investments. The opposite is of course true for an individual who perceives his wealth as large.

Stage of Life

According to conventional wisdom, investors in the earlier stages of life have the ability to add to their portfolios through employment-related income and have time to recover from short-term market downturns. They are able to tolerate greater portfolio volatility and take risk.

Life stages are a progression and the normal progression is:

- *Foundation* phase when individuals are seeking to accumulate wealth through a job and savings, seeking education, or building a business. Their long time horizon can allow considerable risk taking. However, they often have little financial wealth to risk, and this may reduce ability to take risk. On the other hand, those who inherit wealth can often assume high risk given their long time horizon. The conclusion will depend on the specifics of the investor's circumstances.

- *Accumulation* phase when earnings or business success rise and financial assets can be accumulated. Financial demands, such as buying a house or educating children, may also rise. This could be a time of maximum savings and wealth accumulation with a higher ability to bear risk.
- *Maintenance* phase, which often means retirement. Preserving wealth and living off the portfolio return often become important. The ability to bear risk will be declining but is probably not low. Life expectancy can be long, with a need to maintain purchasing power. Being too conservative could lead to a decline in standard of living.
- *Distribution* stage means assets exceed any reasonable level of need for the individual and a process of distributing assets to others can begin. This might involve gifts now or making plans for distribution at death. For the wealthy, financial objectives may extend beyond their death so that the time horizon remains long and ability to bear risk could remain high, depending on the overall situation.

This progression is not always linear. Setbacks or windfalls along the way could move someone ahead or back, regardless of the simple passage of time.

Professor's Note: Individual client characteristics can dramatically alter the generalities previously described. A retired individual with very low needs relative to wealth can have high ability to take risk. An elderly client with significant wealth and goals to pass this on to future generations may choose a significantly more aggressive portfolio allocation than would be implied by naively considering stage of life.

TRADITIONAL FINANCE VS. BEHAVIORAL FINANCE

LOS 10.c: Compare the traditional finance and behavioral finance models of investor decision making.

CFA® Program Curriculum, Volume 2, page 159

Traditional finance (i.e., modern portfolio theory) assumes investors exhibit three characteristics:

1. *Risk aversion.* Investors minimize risk for a given level of return or maximize return for a given level of risk and measure risk as volatility.
2. *Rational expectations.* Investors' forecasts are unbiased and accurately reflect all relevant information pertaining to asset valuation.
3. *Asset integration.* Investors consider the correlation of a potential investment with their existing portfolios. They focus on the impact of adding a new asset on the return and risk of the total portfolio.

Based on these assumptions, it can be expected asset prices will reflect economic factors, and portfolios can be constructed holistically—this means by looking at weighted average returns and risk calculations that rely on covariance (and correlation).

In contrast, **behavioral finance** assumes other factors may also be relevant. Decision models also need to consider:



Professor's Note: Consider this a cursory review of terms that are better covered in other Study Sessions. We suggest you focus on the difference between the lists for traditional and behavioral finance.

1. *Loss aversion* occurs when the framing of a decision as a gain or loss affects the decision. For example, given a choice between (1) a small known loss of \$800 and (2) a 50/50 chance of losing \$1,600 or \$0 (which is, on average, losing \$800), individuals choose uncertainty and choose the 50/50. But rephrase this as gains and they choose certainty. For example (1) a small known gain of \$800 or (2) a 50/50 chance of gaining \$1,600 or \$0 (which is, on average, gaining \$800), individuals choose certainty and take the sure \$800. Phrased as a gain, they take certainty, which is consistent with traditional finance. Phrased as a loss, they take uncertainty, hoping to avoid a loss, hence the term *loss aversion*.
2. *Biased expectations* are a cognitive error that can occur from overconfidence in predicting the future. Some examples include assuming the results of the average manager will be those of a particular manager, excessively focusing on outlier events, and mistakenly letting one asset represent another asset.
3. *Asset segregation* occurs when investors view assets in isolation and do not consider the effect of correlation with other assets. As a result:
 - Asset prices will reflect both underlying economics and the investor's subjective feelings.
 - Portfolio construction will be segmented by layers with each layer reflecting the priority of its goals to that investor. Assets will be selected by layer.

INVESTOR PSYCHOLOGY AND PERSONALITY TYPES

LOS 10.d: Explain the influence of investor psychology on risk tolerance and investment choices.

CFA® Program Curriculum, Volume 2, page 160

LOS 10.e: Explain the use of a personality typing questionnaire for identifying an investor's personality type.

CFA® Program Curriculum, Volume 2, page 161

LOS 10.f: Compare risk attitudes and decision-making styles among distinct investor personality types, including cautious, methodical, spontaneous, and individualistic investors.

CFA® Program Curriculum, Volume 2, page 163

Behavioral models indicate that the investment valuation and decision process incorporates more than the traditional fundamental financial variables seen in portfolio theory. Behavioral finance assumes investors also include individual preferences based on personal tastes and experiences. That is, individuals value personal and investment characteristics that may or may not be considered in traditional finance valuation processes.

Additionally, individuals tend to construct portfolios one asset at a time rather than using a diversified portfolio (i.e., asset integration) approach. Wealth creation is determined not from an overall portfolio perspective but by making investment decisions that relate to specific goals (e.g., pyramiding).

Investor attitudes are affected by numerous personal factors, including socioeconomic background, experiences, wealth, and even frame of mind. Through the use of questionnaires that focus on non-investment-related questions concerning personal attitudes and decision making, investors can be categorized within broad *personality types*.

The personality typing questionnaire should be considered only a first step. The results of the questionnaire should be used as a starting point in determining the client's risk tolerance and attitude toward and understanding of investment decision making. Having a better understanding of the client helps the manager anticipate the client's concerns, structure a discussion of the client's investment program in terms the client will understand, and construct a relevant IPS.

Personality Types

Four very general categories of attitude and style result from this type of questionnaire and may provide indications into investment-related behavior. Through the

questionnaire process, investors can be classified as *cautious, methodical, individualistic, or spontaneous.*

Cautious investors exhibit a strong desire for financial security. They prefer safe, low-volatility investments with little potential for loss. They do not like making their own investment decisions but are difficult to advise and will sometimes even avoid professional help. Their inability to make decisions can lead to missed investment opportunities. Once they have made investment decisions, their portfolios exhibit low turnover. Look for individuals who minimize risk and have trouble making decisions.

Methodical investors diligently research markets, industries, and firms to gather investment information. Their investment decisions tend to be conservative and, because they base decisions on facts, they rarely form emotional attachments to investments. They continually seek confirmation of their investment decisions, so they are constantly on the lookout for better information. Look for individuals who are conservative, gather lots of data, and look for more information.

Individualistic investors do their own research and are very confident in their ability to make investment decisions. When faced with seemingly contradictory information, they will devote the time needed to reconcile the differences. Individualistic investors tend to have confidence in their ability to achieve their long-term investment objectives. Look for individuals who are confident and make their own decisions.

Spontaneous investors constantly adjust their portfolios in response to changing market conditions. They fear that failing to respond to changing market conditions will negatively impact their portfolios. They acknowledge their lack of investment expertise but at the same time tend to doubt investment advice. Their reactions to changing investment trends combined with a tendency to over-manage their portfolios leads to high turnover. Portfolio performance is diminished by high trading costs. Look for individuals who have high portfolio turnover, chase fads, and continue to want to do something.

THE INVESTMENT POLICY STATEMENT

LOS 10.g: Explain the potential benefits, for both clients and investment advisers, of having a formal investment policy statement.

CFA® Program Curriculum, Volume 2, page 165

For the Exam: We now turn to the construction process for an investment policy statement (IPS). An IPS can range from a simple 1-page document prepared by the investment manager to a large book prepared by other experts retained by the client. For purposes of the exam, the IPS focus is on the Objectives and Constraints (O&C) section. For the exam, the terms *IPS* and *O&C* may be used interchangeably, though technically O&C is just part of IPS. Strategic asset allocation (SAA) may or may not be a part of the IPS. Some authors suggest it is, others do not include it in the IPS itself but treat it as a separate step. The exam generally treats it as a separate step.

The investment policy statement (IPS), in fact the entire process of developing the IPS, is valuable for both the client and the investment adviser. Ultimately the IPS must be internally consistent with the return and risk objectives, reasonable given the prevailing capital market conditions, and consistent with the client's constraints. However, it is more reasonable to approach the construction in parts. The IPS will include the financial objectives of the client (the O in O&C) as well as the constraints (the C).

For the *client*, the benefits of the IPS include:

- The IPS identifies and documents investment objectives and constraints.
- The IPS is dynamic, allowing changes in objectives and/or constraints in response to changing client circumstances or capital market conditions.
- The IPS is easily understood, providing the client with the ability to bring in new managers or change managers without disruption of the investment process.
- Developing the IPS should be an educational experience for the client.
 - Clients learn more about themselves and investment decision making.
 - They are better able to understand the manager's investment recommendations.

For the *adviser*, the benefits include:

- Greater knowledge of the client.
- Guidance for investment decision making.
- Guidance for resolution of disputes.
 - Signed documentation that can be used to support the manager's investment decisions as well as the manager's denials of client investment requests.

LOS 10.h: Explain the process involved in creating an investment policy statement.

CFA® Program Curriculum, Volume 2, page 166

For the Exam: Expect one or more questions requiring you to construct an IPS and then use it in follow-on questions, such as selecting the optimal SAA. A typical IPS will start with two objectives: return, then risk. Next it will discuss the five constraints: time horizon, taxes, liquidity, legal, and unique. An easy way to remember this is RRTTLLU (Return, Risk, Time horizon, Taxes, Liquidity, Legal, Unique).

However, the order of presentation is not the same as the way you think about creating the IPS. The exam question may ask for RRTTLLU or it may ask for the constraints (TTLLU) and then R and R, or for only some of the items. To construct the IPS, you should think through the facts presented, the material from the reading assignments, and how they affect the constraints (TTLLU). This will largely lead you to the correct assessment of the risk and return objective. Ultimately, the risk and return have to be compatible. However, if you think in terms of appropriate risk setting the appropriate return, you will make fewer mistakes.

- As you determine the client's objectives and constraints, be sure to address each separately using the information in the case. *Objectives:* required return and risk tolerance. *Constraints:* time horizon, tax considerations, liquidity needs, legal and regulatory concerns, and unique circumstances.

- If a follow-on question asks for the SAA, it is important that you check the consistency of the asset classes and overall SAA with the objectives and constraints of the IPS.

The wrong approach to answering exam questions can lead to wasted time and costly mistakes. When approaching an essay question:

- Pay attention to the minutes assigned to the question. The minutes are part of the instructions. If a question is assigned 2 minutes you should give a brief answer. But if the same question were given 8 minutes, the answer starts the same but you should go into considerably more detail, as it is worth 4 times the points. This falls under the heading of showing good judgment.
- Then read over the question *before* you start reading the story to know what you need to address. As you read, underline anything you were taught would be relevant. In an IPS question, almost everything will be relevant and the story can run for a page or more. All of the wordy parts matter, including modifiers like “a lot” or “very,” as well as notes like “I’m surprised,” et cetera.
- Practice making small notes in the margin that you can understand so you do not forget to work all the relevant information into your answer, such as which specific facts are going to affect each R, each T, each L, and U.
- Think before you write, reread the actual question, and then start to answer it, being sure to answer each specific item requested.

The overall process for creating an IPS is much the same for individual and institutional clients. You will see some differences as you move along in the material. The most prominent is that willingness to bear risk is generally not an issue in institutional portfolios. It is presumed such portfolios can focus on the objective issue of ability to bear risk.

CLIENT OBJECTIVES

LOS 10.i: Distinguish between required return and desired return and explain the impact these have on the individual investor’s investment policy.

LOS 10.j: Explain how to set risk and return objectives for individual investor portfolios and discuss the impact that ability and willingness to take risk have on risk tolerance.

CFA® Program Curriculum, Volume 2, page 166

The Return Objective

Ultimately, the return and risk objective have to be consistent with reasonable capital market expectations as well as the client constraints. If there are inconsistencies, they must be resolved by working with the client.

For the Exam: Major inconsistencies, such as unrealistic return objectives, are not common in exam questions. If there were issues in the question data that were inconsistent, you should clearly point them out in your answer. These would have to be based on data from the question and not your own personal opinions. For example in the typical IPS question, you are not given capital market data, so you would not use your own opinions on capital market expectations to answer the question. Despite this, you are expected to be familiar with the recent exam questions. If a client makes very extreme statements like wanting a 15% per year return with low risk, you would point out that this is not reasonable.

This leads some candidates to demand the exact numeric division point between reasonable and unreasonable. Unless such divisions are provided in the reading assignments, they do not exist. You need to be able to recognize highly unreasonable return objectives even if there is no specific division point provided. It is pointless to demand things that are not covered in the curriculum.

Often the return can be divided into a required and desired component. The division depends on what is important to that client and the facts presented. Required return is what is necessary to meet high-priority or critical goals to that client. They might include living expenses, children's education, health care, et cetera. Desired return goals will likewise depend on the client but might be things like buying a second home, world travel, et cetera.

Some managers distinguish return between income and growth sources. This is considered in the CFA material to be suboptimal to a total return approach. Total return does not distinguish return from dividends, interest, or realized or unrealized price change. As long as a sufficient return is earned over the long run, funds can be available to meet the return needs.

The return objective will also specify whether it is nominal (including inflation) or real and pretax or after-tax.

For the Exam: The treatment of inflation and taxes in the current reading assignments and past exam questions is not consistent and has caused considerable confusion.

To illustrate, consider a client in a 30% tax bracket with \$1,000,000, needing a \$30,000 distribution at the end of the year with that amount growing at an estimated 2% inflation rate in perpetuity.

- Approach 1: After-tax real return is $30 / 1,000 = 3\%$. Pretax real return is $3\% / (1 - 0.30) = 4.29\%$. Nominal pretax return is $4.29\% + 2.00\% = 6.29\%$.

This approach has been used in past questions and is consistent with the Peter and Hilda Inger example in the current reading assignments. The Inger example then includes a small note that this is not proper treatment of inflation. Implicit in this calculation is that the 4.29% is taxed but the 2% is not. There is no particular reason this would be true.

- Approach 2: Nominal after-tax return is $3\% + 2\% = 5\%$. Nominal pretax return is $5 / (1 - 0.30) = 7.14\%$.

This approach has also been used in past exam answers. It is consistent with current readings on full accrual tax accounting and is the most conservative (highest) required return number. It reflects 100% of the return being taxed each year. It is also not inherently logical because most countries include provisions in their tax code that allow the effective tax rate to be reduced through deferral or other means. It also produces a return objective that would have made some past SAA questions unsolvable.

This issue is going to fall under the heading of not allowing yourself to get frustrated. Simply studying old answers is not sufficient.

- The current reading assignments in a later Study Session on tax implications make it clear this is ultimately an issue that must be resolved in discussions between client and manager, and an assumption should be made of what is the most relevant effective tax rate to apply to the analysis. It is likely to be less than the statutory tax rate.
- Expect current questions to provide direction on what effective tax rate to apply to any calculations.
- If you are truly convinced there is no direction in the current questions, you are probably wrong. Reread the story and question. If you are still convinced, then state the assumption you are going to make. We would recommend Approach 2 is the most consistent with current readings. (Two years ago, we would have given different advice, but the readings have evolved.)
- The question can also be worded to make the whole issue irrelevant. For example, all the data and the question could be done as an after-tax required return.

Spreadsheet modeling can be a desirable way to analyze return needs over multiple years if the necessary computer tools are available. (They are not available on exam day, but the output could be used.)

Example: Use of spreadsheet output on the exam

Client #107 has a portfolio valued at \$1,100,000 and wants to increase the value to \$1,200,000 in 5 years. An analysis of the client's non-portfolio inflows and outflows shows the client will need \$15,000 from the portfolio in one year and this amount is estimated to rise by 3% inflation per year. What is the client's calculated return need?

Answer:

<i>Required Distribution in</i>	<i>Nominal Distribution</i>
1 year	\$15,000
2 years	$\$15,000 \times 1.03 = \$15,450$
3 years	$\$15,000 \times 1.032 = \$15,914$
4 years	$\$15,000 \times 1.033 = \$16,391$
5 years	$\$15,000 \times 1.034 = \$16,883$ $\$16,883 + \$1,200,000 = \$1,216,883$ year 5 distribution

With a \$1,100,000 beginning value, the IRR required return is 3.15%.

Note: If you do not remember how to do an IRR calculation given multiple year cash flows, you could review your SchweserNotes from Level I or your calculator instruction manual. Such skill is presumed for the exam.

For the Exam: You should approach answering the return objective in stages:

The first step would be to list the objectives the client wants the portfolio to achieve. These could be primary goals like maintain standard of living at the current level of \$100,000, grow the portfolio to some projected value, et cetera. If there are desired but less critical goals, list those as well. It will be easier not to try and make any calculations yet.

Second, quantify the investable asset base and the numeric need. For example, the question might ask for the return target next year. The investable base will be the current value of the portfolio and the need is the amount that needs to be generated this year. Questions can also be more complicated and test your time value of money skills. If the question asks for the return in the first year of retirement and retirement will start in three years, you will have to project what the portfolio will be worth in three years and what the return need will be three years from now using the information provided in the question. Hint: If you think you need to make up a number as an assumption to make a calculation, reread the information carefully. There will be information to guide you. Anything is possible but there has not been a question where you had to make up your own assumption for a calculation. It would be very hard for such a question to be graded.

Ownership of a personal residence is something that will be noted in the IPS, usually under unique. But it is not part of investable assets and should not be included in that number.

Last, calculate a percentage return by dividing the return need by investable base.

While this may sound simple, you must be careful to include all relevant facts in the calculation and answer the question as it was asked. The question might specify pretax or after-tax, nominal or real. Generally, the exam is asking for the return for the next year, and you should assume this unless directed otherwise. However the exam has asked questions that specified a future year or over a multiyear time period.

The Risk Objective

This objective should address both the client's *ability* and *willingness* to take risk. The client's ability to take risk is determined objectively, while willingness to take risk is a far more subjective, emotional matter.

Ability to take risk. When we talk about ability to take risk, we are talking about the ability of the portfolio to sustain losses without putting the client's goals in jeopardy; we are talking about how much volatility the portfolio can withstand and still meet the client's required expenditures. Ability to take risk is significantly affected by the investor's time horizon and the size of the expenditures relative to the portfolio.

Generally, if expenditures are small relative to the client's portfolio, the client has an increased ability to take risk. The portfolio can experience significant losses and continue to meet the expenditures. Likewise, if the time horizon is considered long, conventional wisdom states that the portfolio has more time to recover from poor short-term performance. All else equal, as the time horizon increases, the client's ability to take risk increases.

If the expenditures are large relative to the size of the portfolio, the loss the portfolio can sustain and still continue to meet required expenditures is significantly reduced. The client has reduced ability to take risk.

Another consideration is the importance of goals. To determine the importance of a goal, consider the consequences of not meeting it. For example, goals related to maintaining the client's current lifestyle, achieving a desired future lifestyle, providing for loved ones, et cetera are usually classified as *critical*. Those related to acquiring luxury items, taking lavish vacations, et cetera might be important but they are usually considered secondary.

The importance of required expenditures and the ability to take risk are inversely related. All else equal, as the importance of an expense increases, the more we have to ensure it is met. We have to protect against portfolio losses that could place it in jeopardy. Our ability to take risk is thus reduced, and we have to structure the portfolio with low expected risk.

If a spending goal or amount can be changed, the client has *flexibility*. For example, assume we have built a lavish retirement lifestyle into the client's planning. If the annual retirement spending can be safely reduced without causing much concern to the client, this flexibility provides the client with an increased ability to take risk. In determining flexibility, look for the ability to eliminate or reduce spending, eliminate or change the amounts of bequests or charitable donations, add to or increase annual income, et cetera.

If the client is still working or has other assets, then this would increase the ability to take risk, as asset value that is lost can potentially be replaced. Liquidity needs could also be a factor that reduces ability if they require large amounts of the portfolio to be distributed and significantly reduce the available assets.

Willingness to take risk. The client's willingness to take risk is subjective and determined through an analysis of her *psychological* profile. There is no hard-and-fast rule for judging willingness to tolerate risk, so you have to look for statements or evidence in the client's actions.

Clients sometimes indicate their *willingness* to take risk in their statements. These statements usually take the form of disallowing risky investments or specific statements about risk itself. Either type of statement could indicate that the client focuses on risk and has a reduced willingness to take risk.

You could see misleading statements about risk, however, especially when the client assesses his own risk tolerance. Rather than accept the client's statement, you should always look for confirming or contradicting evidence. On one past exam, for example, a client stated that he had *average* risk tolerance. Reading further, we found that the client had a very large investment portfolio, considerable annual income, and a long time horizon. He also regularly invested in what we would consider high-risk investments. From his point of view, he had average risk tolerance but he was average only when compared to his peer group of wealthy investors. He actually had above-average ability and willingness to take risk.

For the Exam: Structure your answer by addressing ability, willingness, and conclusion. Label your steps in the analysis.

Ability to bear risk is decreased by:

- Shorter time horizon.
- Large critical goals in relation to the size of the portfolio.
- High liquidity needs.
- Goals that cannot be deferred.
- Situations where the portfolio is the sole source of support or an inability to replace losses in value.

Willingness to bear risk is determined by statements the client makes or by actions or by life experiences.

Your conclusion should generally go with the more conservative of the two. If there is a conflict between the two, it should definitely be pointed out. Occasionally, a past answer has taken an average of the two if there was not a serious conflict in them. Going with the more conservative is generally best and be sure to state that you have done this.

Like the return objective, the risk objective should be as specific, relevant to the client, and as measurable as possible. Past questions have often specified a maximum shortfall risk, usually defined as $E(R) - 2$ standard deviations. In such cases, you must list this in your answer. It has been listed both under willingness or the overall risk tolerance conclusion so either should be acceptable. Watch for a question that includes a statement like max shortfall of losing 15% defined as $E(R) - 3$ standard deviations. Go with what is in the question and not what you saw in an old question.

INDIVIDUAL INVESTOR CONSTRAINTS

LOS 10.k: Discuss each of the major constraint categories included in an individual investor's investment policy statement.

CFA® Program Curriculum, Volume 2, page 170

For the Exam: Constraints are important because they generally have a significant effect on the risk and return objectives. Conceptually you should think through the constraints before doing the objectives. For the most part, the constraints require you to organize and record the information given in the story in a relevant fashion. If you feel the need to make lengthy calculations in the constraints, it is probably more appropriate to wait and do so in the return objective.

A typical question might require you to address all five constraints in ten minutes. You should give a brief factual answer, listing each constraint and support your statement with relevant facts from the story. If there are no issues on a particular constraint, list the constraint and say so. Leaving it blank is wrong.

Alternatively, a question may only ask you to address specific constraints and might assign more minutes. In this case, only address what was requested and be sure to provide more detail in your answer.

There are five constraints: (1) time horizon, (2) tax considerations, (3) liquidity, (4) legal and regulatory factors, and (5) unique circumstances.

Time Horizon

Time horizon is often important because it affects ability to bear risk. In the most basic terms, an individual's time horizon is the expected remaining years of life. It is the total number of years the portfolio will be managed to meet the investor's objectives and constraints. While there are no precise definitions in the reading assignments, 15 years or more is typically considered long term and short term usually three years or less. In addition, many time horizons are *multistage*.

A stage in the time horizon is indicated any time the individual experiences or expects to experience a change in circumstances or objectives significant enough to require evaluating the IPS and reallocating the portfolio. Consider the following time horizon statement for a 50-year-old individual planning to retire at age 60:

The individual has a long-term time horizon with two stages: 10 years to retirement and retirement of 20–25 years.

In this case, as in most, retirement means a significant change in circumstances for the individual. Prior to retirement, the individual likely met most if not all living and other expenses with her salary, maybe even managing to save (add to the portfolio).

At retirement and with the subsequent loss of salary, the individual will have to rely solely on the portfolio to meet any liquidity needs, including living expenses, travel and entertainment expenses, gifts to family or charity, et cetera. Changes in the client's circumstances are significant enough to warrant reallocating the portfolio according to a new set of objectives and constraints.

For the Exam: When completing the time horizon section of the IPS, remember the following:

- State the number of stages in the time horizon, the main objective of each stage, and the number of years in each stage, if identifiable.
- Look for stages defined by people other than the client. For example, a client may be entitled to a large future inheritance or retirement plan payout that will significantly change her circumstances.
- You could see a client with significant wealth whose concern has been refocused from meeting living expenses to maximizing bequests to heirs (i.e., maximizing the value of the portfolio). Because the focus includes a time period after the client's expected life, the time horizon could be stated as multi-generational.
- The time horizon you see on the exam is often long term. Note: there is no reason there could not be a client who is of advanced age or is terminally ill and has a short-term, single-stage horizon.

Tax Considerations

Taxation is a global issue and must be taken into account when formulating an investment policy for an individual. Some general classifications of taxes are as follows:

- *Income tax.* Taxes paid, usually annually, on any form of income (e.g., wage, rental, dividend, interest).
- *Capital gains tax.* Taxes incurred on the appreciation at the sale of an asset that has increased in value.
- *Wealth transfer tax.* Taxes paid on the total value of assets transferred to another individual through inheritance, gifts, et cetera.
- *Personal property tax.* Taxes paid on value of an asset (e.g., automobiles, real estate).

The effects of taxes must be considered when determining the investment strategy for any taxable investor. Capital gains taxes, for example, affect the realized selling price of an asset regardless of when it is sold. Annual taxes reduce the value of the portfolio every year and thus affect the final multi-period value of the portfolio through a reduction in annual compounding.

The following strategies are used to reduce the adverse impact of taxes:

- **Tax deferral.** Minimize the potentially compounding effect of taxes by paying them at the end of the investment holding period. Strategies that fall under this category focus on long-term capital gains, low turnover, and *loss harvesting* (i.e., reduce net taxable gains by recognizing portfolio gains and losses simultaneously).
- **Tax avoidance.** Invest in tax-free securities. Special savings accounts and tax-free municipal bonds are examples of investment securities that generate tax-free returns.

- **Tax reduction.** Invest in securities that require less direct tax payment. Capital gains may be taxed at a lower rate than income, so securities that generate returns mainly as price appreciation offer the investor a lower effective tax rate. Annual taxes should be reduced through loss harvesting, when available.
- **Wealth transfer taxes.** The client can minimize transfer taxes by planning the transfer of wealth to others without utilizing a sale. Often these strategies are quite specific to the jurisdiction in which the investor resides. Considering the timing of the transfers is also important. For example, if wealth is transferred at death, taxes will have been deferred as long as possible. On the other hand, transferring wealth prior to death (i.e., an early transfer) might be optimal if the recipient's tax rate is lower than the tax rate of the donor. This is discussed in detail in Reading Assignments 15 and 16.

For the Exam: A charterholder is not considered to be a tax expert. You will most typically need to just state the relevant tax situation and rates as given in the question data. You are expected to be able to make calculations to convert between pre- and after-tax as needed and other items specifically covered in the curriculum. Generally any detailed calculations related to taxes should be done in the return objective section. Maximizing after-tax return is the typical objective of most taxable investors. If there are complex tax issues, point out the need to seek qualified advice.

Liquidity

Liquidity can be important in affecting ability to bear risk and in details of the return calculation or SAA. Depending on the situation, liquidity can have a number of meanings and interpretations. In a portfolio context, it means the ability to meet anticipated and unanticipated cash needs.

The liquidity of assets and of a resulting portfolio is a function of the transaction costs to liquidate and price volatility of the assets. High costs and a lengthy time to complete the sale make for lower liquidity. Higher price volatility makes for less liquidity as it increases the probability the asset would be sold for a low value.

Clients' needs for liquidity include:

- Ongoing, anticipated needs for distributions such as living expenses.
- Emergency reserves for unanticipated distributions could be appropriate if client specific and agreed to in advance. Otherwise they create a "cash drag" on portfolio return by continually holding assets in lower return cash equivalents. Holding three months to one year of the annual distribution in cash reserves could be reasonable if agreed to in advance.
- One-time or infrequent negative liquidity events requiring irregular distributions should be noted. Be as specific as possible as to when and how much is needed.
- Positive liquidity inflows not due to the portfolio assets should also be noted.
- Illiquid assets, such as those restricted from sale or those on which a large tax bill would be due on sale, should be noted.
- The client's ownership of a home is generally an illiquid asset and could be noted here. Alternatively it is often recorded under unique.

For the Exam:

- The need for ongoing distributions is generally not listed under liquidity. It must be disclosed and analyzed in calculating the return objective, which makes it superfluous to also list it under liquidity. A few past answers have also listed it under liquidity (after thoroughly analyzing it as part of the return objective) so it appears to be harmless if you also mention it here.
- A one-time or a couple of times liquidity distribution event should be listed here, specifying how much and when to the extent possible. If it will occur immediately or soon (say in the next year), it should also be deducted from the investable base of assets before calculating the necessary return. Alternatively, something like a specified annual distribution to meet college for four years would be treated as a time horizon stage with the distribution as part of the return need during that stage.
- Emergency cash reserves should not be listed unless given specific reason in the question data. They create unnecessary cash drag. They should be listed here if specifically requested and then provided for by holding the appropriate cash equivalent asset in the SAA. Occasionally a past exam answer has, for no reason, included a small emergency reserve, such as three months' living expenses, even if not specifically requested. This is probably okay as long as it is small. It is better not to do so unless specifics of the question make it appropriate.
- Holdings of illiquid assets that are restricted from sale should be noted here. Alternatively, they could be noted under unique. Assets with a low cost basis where the sale would trigger a large tax bill could be listed here as less liquid due to the large bill that would be incurred on the sale. The tax constraint is probably the more logical place to record them or under unique.

Legal and Regulatory Factors

The legal and regulatory constraints that apply to individuals typically relate to tax relief and wealth transfer. The specific constraints vary greatly across jurisdictions and typically call for legal advice.

The most common legal constraints facing individual clients on previous Level III exams have related to personal trusts and foundations. Trusts are formed as legal devices for transferring personal wealth to future generations. In forming a trust, the grantor files documents and transfers assets to the trust. When the trust is *revocable*, the grantor retains ownership and control over the trust assets and is responsible for taxes on any income or capital gains. The grantor often remains as trustee and either manages the trust assets personally or hires a manager.

In an *irrevocable* trust, the grantor confers ownership of the assets to the trust, which is managed by a professional trustee. The assets are considered immediately transferred to future generations and thus can be subject to wealth transfer taxes, such as gift taxes. The trust is a taxable entity, much like an individual, so it will file tax returns and pay any taxes related to the trust assets. The individual who originally funded the trust no longer has control of the assets and is not taxed on them.

Family foundations are another vehicle, similar to the irrevocable trust, used to transfer family assets to future generations. Family members frequently remain as managers of the foundation's assets. Several forms of foundations are discussed in Study Session 5, Portfolio Management for Institutional Investors.

For the Exam: Much like taxes, you are not presumed to be a legal or regulatory expert beyond what is specifically taught in the curriculum. When completing the legal and regulatory constraint section of the IPS, remember the following:

- If there are no noticeable legal concerns, state there are none beyond your normal ethical responsibilities under the Code and Standards.
- If the client has or desires a trust, mention that the manager must follow the trust document. Some types of trusts specify paying all income to the income beneficiaries during their lifetimes and then distributing assets to remaindermen at the death of the income beneficiaries. This can require the manager to balance the competing interests (income versus capital appreciation) of the two groups. You should mention this if it comes up.
- Mention any other legal or regulatory issues brought up in the story.
- If any complex legal issues associated with trusts or other matters are brought up, only answer based on what is taught and state that you will seek qualified expert advice.

Unique Circumstances

This is a catch-all category for anything that can affect the management of the client's assets and not covered in the other constraints. Items that have appeared on past exams and should be mentioned in this section of the constraints include the following:

- Special investment concerns (e.g., socially responsible investing).
- Special instructions (e.g., gradually liquidate a holding over a period of time).
- Restrictions on the sale of assets (e.g., a large holding of a single stock).
- Asset classes the client specifically forbids or limits based on past experience (i.e., position limits on asset classes or totally disallowed asset classes).
- Assets held outside the investable portfolio (e.g., a primary or secondary residence).
- Desired bequests (e.g., the client intends to leave his home or a given amount of wealth to children, other individuals, or charity).
- Desired objectives not attainable due to time horizon or current wealth.

For the Exam: When completing the client's unique circumstances constraint, remember the following:

- Don't leave it blank. Say none or list anything important that did not fit in the above constraints.
- On some past exams, the client's portfolio included a large amount of stock in a company founded by the client or relatives. This could be listed under unique circumstances.
- Other common unique circumstances to mention are investor-imposed limits on asset classes or even a total disallowance of some investment classes.
- Home ownership can be covered by listing it under unique. If the client has indicated what happens to the home at the client's death, write it down.

THE INVESTMENT POLICY STATEMENT (IPS)

LOS 10.1: Formulate and justify an investment policy statement for an individual investor.

CFA® Program Curriculum, Volume 2, page 179

Four examples are provided to illustrate these concepts in exam like questions. The nature of constructed response questions makes it impossible to ever define the exact wording of what is acceptable. You will be graded on whether you answer the question asked in a way consistent with what is taught in the curriculum. These examples illustrate a range of how questions can be asked and how they can be answered in acceptable fashion in the time allotted. You should begin to adjust your thinking process to align with them.

Example 1:

William Elam recently inherited \$750,000 in cash from his father's estate and has come to Alan Schneider, CFA, for investment advice. Both William and his wife Elizabeth are 30 years old. William is employed as a factory worker and has an annual salary of \$50,000. Although he receives total health care coverage for himself and his family, he makes no contributions to his firm's defined benefit pension plan and is not yet vested in any of the company's other retirement benefits. Elizabeth is an early childhood teacher with a salary of \$38,000. She has only very recently opened a tax-deferred 403(b) retirement savings account. Their four children are ages six, five, four, and three. They have a small savings account, no investments other than Elizabeth's meager retirement account, and credit card debt of \$20,000.

When interviewed, William made the following statements to Schneider:

- With a family of six, our combined salaries just meet our living expenses. It would be safe to assume that both our salaries and expenses will grow only at the rate of inflation.
- We do not intend to use our new wealth to improve our current lifestyle, but we may want to consider setting up a trust fund in the future for our children.
- We would like the portfolio to at least earn enough each year to maintain its current value in real terms and then to help fund our retirement.
- We also want to use our portfolio to send our kids to college and maybe pay for future luxuries, like a new home and travel.
- I would like to trade securities like my friend, Keith, who is an experienced and successful investor. He told me that he holds stocks for no more than a month. After that, if he hasn't made a profit, he sells them.
- Everyone I know is buying technology stocks, so I feel we should also.
- My mother has the same portfolio she had a year ago. I can't imagine how you can make any real money that way. Besides, she hasn't taken advantage of any of the latest hot stocks.

A. Evaluate the Elams' situational profile according to the following:

- i. Source of wealth.
- ii. Measure of wealth.
- iii. Stage of life.

6 minutes

Answer:

- i. Source of wealth. The Elams have gained wealth passively through inheritance. This is associated with lower risk tolerance as they have no experience with risk taking. 2 points
- ii. Measure of wealth. William seems to perceive his wealth as considerable. He compares himself to a friend who he sees as rich, which leads William to see himself taking considerable risk. 2 points
- iii. Stage of life. Elam and his wife are both 30 years old and in the foundation phase. This gives them a long time horizon which increases ability to take risk. 2 points

Note: The answers given are specific in making appropriate references to the story and reasonable for the point value. They may even go slightly beyond what was asked by pointing out the implications for the risk objective.

B. Classify William as one of the following investor types. Justify your classification.

- i. Cautious investor.
- ii. Methodical investor.
- iii. Spontaneous investor.
- iv. Individualistic investor.

2 minutes

Answer:

William is spontaneous. His statements related to holding technology stocks (and not missing a good investment), frequent trading, and his mother's trading inactivity support this.

**C. In the following template, formulate the objectives and constraints for the Elams.
No calculations are required.**

20 minutes

<i>Investment Objectives and Constraints for the Elams</i>										
Return	The objectives are: • Maintain the real value of the portfolio. • Provide for retirement. • Pay for the children's college (ages six, five, four, and three). • If possible, buy a new home and travel. With only \$750,000, it may be difficult to do all this.	5 points								
Objectives	Ability: Higher due to long time horizon at age 30 but lower as their needs look high versus wealth; they have minimal other wealth; they have debts and are unable to save. Willingness: William's statements indicate an above-average willingness to tolerate risk though he appears unsophisticated and not very knowledgeable regarding risk taking. Overall: Average risk tolerance or lower is most appropriate given their ability factors.									
Risk	5 points	Note: This was an open-ended question to cover the O&C. Nevertheless, a predetermined point value will be applied by section. Label your answer by section and use specific facts to support your answer as possible. The amount of detail in the answer is reasonable for the facts and point value. Often there will be conflicting issues in the question and you will be graded for properly enumerating and recognizing them.								
Time horizon	Overall long and multistage, as they are both 30. • The first stage is until the children enter college. Their ages are six, five, four, and three. • The second stage is while the children are in college. • The third stage is up until retirement. • The fourth stage is during retirement.									
Constraints	<table border="0"> <tr> <td>Taxes</td><td>The Elams are taxable investors. We need their tax rate.</td></tr> <tr> <td>Liquidity</td><td>\$20,000 is needed to pay off credit card debt. A small emergency cash fund would be appropriate, as they have no savings.</td></tr> <tr> <td>Legal and regulatory</td><td>None beyond normal duties to client. If they wish to pursue a trust for the children, qualified advice will be needed.</td></tr> <tr> <td>Unique circumstances</td><td>Their wealth is sudden and inherited and William at least seems to have simplistic ideas of risk and return.</td></tr> </table>	Taxes	The Elams are taxable investors. We need their tax rate.	Liquidity	\$20,000 is needed to pay off credit card debt. A small emergency cash fund would be appropriate, as they have no savings.	Legal and regulatory	None beyond normal duties to client. If they wish to pursue a trust for the children, qualified advice will be needed.	Unique circumstances	Their wealth is sudden and inherited and William at least seems to have simplistic ideas of risk and return.	
Taxes	The Elams are taxable investors. We need their tax rate.									
Liquidity	\$20,000 is needed to pay off credit card debt. A small emergency cash fund would be appropriate, as they have no savings.									
Legal and regulatory	None beyond normal duties to client. If they wish to pursue a trust for the children, qualified advice will be needed.									
Unique circumstances	Their wealth is sudden and inherited and William at least seems to have simplistic ideas of risk and return.									

Professor's Note: The details throughout the answer are reasonable. If you knew what you were doing it could be easily written in 40–50% of the allotted time, which gives you sufficient time to read the story and plan your answer.



Another trained professional reading this O&C would have a good understanding of the client's situation. That makes it a good answer.

Example 2: Single-year required return calculation

Bonnie DuBois, a 60-year-old U.S. citizen, has just retired after a 35-year career in the fashion industry. Through a modest lifestyle, disciplined saving, and the help of a financial adviser, she has accumulated a \$2,000,000 diversified portfolio. Over the last several years, the portfolio allocation has been gradually adjusted to only domestic large-cap stocks and bonds. She holds only investments she has thoroughly researched and continually looks for better, more definitive information.

DuBois's house has been paid off for several years and she does not intend to purchase another house. She has always led a modest lifestyle and intends to continue doing so. During her retirement, she will help support her son Barry, his wife Betty, and their three children (ages 14, 12, and 10). Barry's and Betty's combined salaries barely meet their living expenses.

DuBois estimates she will need \$60,000 her first year of retirement and likes to keep 6 months of her living expenses on hand. She plans to continue supporting her son and his family by providing them with \$30,000 next year. Both figures are before tax and are expected to increase each year at the general rate of inflation of 3%. She has informed Barry that at her death her portfolio will be gifted to a local museum with instructions to pay Barry and Betty a lifetime \$20,000 annuity. In addition to meeting spending needs, she wishes to maintain the real value of her portfolio. DuBois is in the 25% marginal tax bracket.

A. Evaluate DuBois's *situational profile* according to the following:

- i. Source of wealth.
- ii. Measure of wealth.
- iii. Stage of life.

6 minutes

Answer:

- i. Source of wealth. Gradually accumulating wealth over a long career is indicative of a client with a conservative nature and average to below-average willingness to take risk. 2 points
- ii. Measure of wealth. DuBois has made no specific indication of her view on her wealth, but the decision to retire and maintain a moderate lifestyle plus patient accumulation of assets, suggests she sees her wealth as adequate but not excessive, indicative of moderate risk tolerance. 2 points
- iii. Stage of life. She is in the maintenance (retirement) phase of living off her portfolio and thinking ahead to the distribution in annual gifts to her son's family and then disposition at death. This long-term view suggests moderate risk. 2 points

- B. Classify DuBois as one of the following investor types. Justify your classification.
- i. Cautious investor.
 - ii. Methodical investor.
 - iii. Spontaneous investor.

2 minutes

Answer:

DuBois is a methodical investor. She has a conservative nature, researches investments carefully, and is constantly on the lookout for new and better information. 2 points

- C. In the following template, formulate DuBois's:

- i. Return objective and calculate the required before-tax return over the coming year.

4 minutes

- ii. Risk objective (willingness, ability, and overall).

4 minutes

- iii. Constraints.

10 minutes

For the Exam: Before you read the story, you should have looked at the questions and looked ahead at the template to be thinking about the time and space you will use for your answer. These are part of the instructions. While the answer is presented as requested, you could have filled in the constraints, then risk then return. In many ways that better reflects the logic of constructing the answer.

<i>Investment Objectives and Constraints for DuBois</i>	
Return	Maintain her real standard of living (\$60,000) and support her son and his family (\$30,000). Both are pretax real numbers. Beyond her death the estate goes to a local museum with a lifetime annuity for the son and family of \$20,000.
	Need pretax $\$60,000 + \$30,000 = \$90,000$ Investable base is \$2,000,000 Required real pretax is $90 / 2,000 = 4.5\%$ Required nominal pretax is $4.5\% + 3\% = 7.5\%$
	4 points
Objectives	Overall, her risk objective is average. Ability to tolerate risk is average, as she just retired with assets to support herself. It is her sole source of support. She needs inflation protection. Her time horizon is rather long, as she is only 60 and she is thinking of gifts beyond her lifetime.
Risk	Willingness is not specifically addressed but is also average, as she has been a long-term investor, gradually accumulating assets. She has been moving toward only domestic large-cap stocks and bonds. Note: It would have been reasonable to suggest somewhat below average but it would not be reasonable, given her time horizon and need for inflation protection, to say very low risk.
Time horizon	DuBois has a long-term, single-stage time horizon of 20–25 years or more given her age of 60. Note: You could mention the goals at her death but they are not particularly relevant and she has not asked for advice on those issues.
Taxes	She is in a 25% marginal tax bracket.
Liquidity	None beyond a 6-month cash reserve. We should clarify if this is $60,000 / 2$ or $90,000 / 2$.
Constraints	We have our general responsibilities to the client. Expert legal and tax advice regarding her annual gifts to son and plans after death are appropriate.
Legal and regulatory	The annual payment to DuBois's son's family and the desire to leave the portfolio to a museum could be listed here.
Unique circumstances	or None, if these were covered elsewhere.
	10 points total, 2 per constraint

Example 3:

It is now five years later. DuBois's son and his wife have both received significant promotions so that they no longer require annual support from DuBois. DuBois is meeting with her financial adviser, Begren Knutsen, to determine if and how her IPS should be altered. Because she no longer needs to provide the annual financial help to her son, DuBois will instead plan bequests.

DuBois's portfolio has remained at \$2,000,000. She and Knutsen estimate her time horizon at 20 years, at which time she plans to leave a bequest of \$1,200,000 in today's dollars to her son and to the museum (\$2,400,000 total). She also plans to withdraw \$75,000 per year, before taxes, to cover her living expenses. She has already paid this year's expenses, so the first of the 20 \$75,000 withdrawals will be in one year.

- A. Has her portfolio met the previous objectives?

2 minutes

- B. How have the following items changed?

- i. Risk Objective
- ii. Liquidity
- iii. Time Horizon

9 minutes

- C. Calculate her new return objective.

4 minutes

In the following template, determine the objectives and constraints for DuBois's IPS. Assume there will be no tax consequences associated with the bequests and inflation remains at 3%.

Answer:

- A. The \$2,000,000 nominal value has not changed. She has not kept up with inflation, so the original objectives were not met. Presumably the distributions requested have been made.

2 points

- B. i. There is no indication of change in willingness but ability has been affected. Her time horizon is shorter, as she is five years older, but ability is higher as she is thinking even more about after-death bequests, a longer horizon. She still needs inflation protection during her life and total annual need is down, as she is no longer supporting her son. Lower need versus wealth raises ability. A conclusion of no net change is appropriate.

Note: This is one of the outlier questions where the amount to say is a bit excessive for the point value. That does happen on occasion. Just go through the items you were taught to look for, and in this case acknowledge they have moved in conflicting directions. Only mentioning she is older would be an incomplete answer.

- ii. No significant change. A 6-month reserve is now \$75,000 / 2.
- iii. Her time horizon is shorter, as five years have passed, and a 20-year planning horizon has been decided.

3 points per item for a total of 9 points

- C. Her return target is 20 payments of \$75,000 in real terms starting in 1 year and a terminal real value of \$2.4 million.

$20 \text{ n}; 75,000 \text{ PMT}; 2,400,000 \text{ FV}; -2,000,000 \text{ PV}; \text{IRR} = 4.39\%$

In nominal terms she must earn $4.39\% + 3\%$ estimated inflation for 7.39%

4 points

STRATEGIC ASSET ALLOCATION

LOS 10.m: Determine the strategic asset allocation that is most appropriate for an individual investor's specific investment objectives and constraints.

CFA® Program Curriculum, Volume 2, page 181

A strategic asset allocation is the mix of portfolio asset classes that could meet the portfolio objectives of return and risk while being consistent with the constraints. For a taxable investor, the returns should be after-tax and consider all current and future tax implications. These will be further discussed in a subsequent reading assignment.

When given a choice of several portfolios, a process of elimination can be used to discard unacceptable portfolios.

For the Exam: This topic will be covered in multiple Study Sessions and is regularly tested as part of a broader IPS question. It is an example of heuristic rules and could be referred to as process of elimination, rules-of-thumb, or experience-based approach. It is a taught process and not a random collection of ideas. In particular the use of risk/return analysis is used as a last step and only if needed. Often you never get to that step and if used too early, it can lead to the wrong answer.

Summarizing the various points you should commonly consider, you should eliminate portfolios that:

- Violate constraints such as:
 - Excess cash equivalents (cash drag).
 - Insufficient cash equivalents to meet appropriate liquidity needs.
 - Hold or fail to hold assets specified in the constraints. For example, retain at least 10% in tech stocks.
- Violate the specified risk objective, such as max shortfall risk or standard deviation.
- Generate insufficient return. Note if you rely on this one and calculated return incorrectly, you are in trouble. In addition, there have been questions where you were instructed not to consider return. Also be sure to use after-tax return if appropriate.
- Have inappropriate asset classes or weightings even if not an outright constraint violation.
 - The taught rule of thumb is 60/40 for the average investor. This means 60% in equity like assets that offer appreciation over time and 40% in income-producing assets that lack that long-term appreciation (i.e., bonds and cash equivalents). High- (low-) risk investors should scale up (or down) the equity type asset weight.
 - Ignoring home ownership. The home is not per se a portfolio asset but it should not be ignored. If a home of substantial value is owned, it does create real estate exposure and makes additional real estate allocations less appropriate.
- Fail to address a concentration issue, such as stock of a former employer or low basis inherited stock. The SAA should indicate the desired allocation. Whether it would actually be sold is a separate issue to be addressed later when considering cost versus benefit.
- At this point, a return to risk ranking, such as Sharpe ratio, could be appropriate if needed for the final selection.

To answer these types of questions, first review the client's O&C. Next, carefully review any specific directions in the question and quickly eliminate portfolios that have clear violations of the O&C. Then make any necessary calculations if needed, such as after-tax return, shortfall risk, Sharpe ratio, et cetera. Be careful with the calculations; you generally have no reason to get to all of them. You would have already been down to one portfolio and should have already stopped.

Example 4:

Possible portfolio asset allocations for DuBois are shown in Exhibit 1. Based solely on the objectives and constraints from DuBois's IPS in Example 2, select the *most appropriate asset allocation* for DuBois and *justify your selection with three reasons* in the following template. For each allocation not selected, *state one reason why it was rejected*.

Exhibit 1: Alternative Portfolio Allocations

Asset Class	Asset Class Weights (%)			
	A	B	C	D
Cash	20	5	5	10
Domestic large-cap equities	35	40	15	10
Domestic small-cap equities	25	10	15	10
Domestic government bonds	5	20	15	10
Domestic corporate bonds	0	20	15	10
Direct real estate	0	0	20	10
Global bond fund	0	5	0	10
Global equity fund	15	0	0	10
Private equity fund	0	0	10	10
Fund of funds hedge fund	0	0	5	10
Total	100	100	100	100
Expected before-tax return (%)	8.0	7.7	8.4	8.1
Expected standard deviation (%)	12.5	10.1	13.0	12.7

Template for Example 4

	<i>Most Appropriate</i>	<i>Three Justifications</i>
B		<ul style="list-style-type: none"> 1. Meets return requirement. 2. Sufficient cash for emergencies. 3. No non-domestic stock per client interest. <p>Additional justifications:</p> <ul style="list-style-type: none"> 4. Sufficient diversification. 5. Conservative allocation to equities.
	<i>Inappropriate</i>	<i>One Justification</i>
A		<ul style="list-style-type: none"> 1. Too much cash. <p>Additional justification:</p> <ul style="list-style-type: none"> 2. 75% allocation to equity is high for moderate risk.
C		<ul style="list-style-type: none"> 1. Private equity and fund of hedge funds too risky. <p>Additional justifications:</p> <ul style="list-style-type: none"> 2. 30% illiquid assets (direct real estate; private equity). 3. Already owns a home making more real estate excessive.
D		<ul style="list-style-type: none"> 1. Appears to be naive diversification; no consideration of appropriate asset weighting. <p>Additional justifications:</p> <ul style="list-style-type: none"> 2. Additional 10% in real estate is excessive. 3. Excess cash holdings.

For the Exam: All the answers provided in the template are correct, but had this been an actual exam question, you should provide no more than the required number of answers. In justifying Allocation B, for example, had you listed all five justifications shown in the template, the grader would have graded only the first three. He would have totally ignored the last two, but you would have wasted valuable time by writing them. Only B was an acceptable choice.

THE MONTE CARLO APPROACH TO RETIREMENT PLANNING

LOS 10.n: Compare Monte Carlo and traditional deterministic approaches to retirement planning and explain the advantages of a Monte Carlo approach.

CFA® Program Curriculum, Volume 2, page 190

The previous Example 3 for DuBois is a good illustration of traditional, deterministic, steady-state, linear return analysis. But that single required return number is not representative of the actual volatile returns of markets and provides no insight into risk. Even when a standard deviation for the selected portfolio is included, it means little to the typical investor.

The development of inexpensive computers and commercially available software provide access to more powerful tools, such as Monte Carlo simulation. Both traditional and Monte Carlo analysis starts with inputs such as:

- Time horizon to retirement and length of retirement.
- Investors' income and savings, assets, and tax status.
- Interest rates, asset returns, inflation, et cetera.

The traditional approach then calculates a single, constant, required return. In Monte Carlo simulation, each of the variables is also given a probability distribution to allow for real world uncertainty. A single timeline path is then generated, showing what could happen over time to the portfolio. This is repeated to generate perhaps 10,000 path outcomes consistent with the assumed probability distributions.

Monte Carlo simulation is very flexible and the advantages include the following:

- It considers path dependency. A simple path dependency was considered at Level II in analyzing a mortgage-backed security (MBS), specifically, that the level of prepayments and cash flow at any future point depend on both the level of rates at that point and the prior history of rates, prepayments, and cash flow up to that point. Simulations of portfolio performance can be more complex. For example, consider an investor requiring a GBP25,000 per year withdrawal for living from a portfolio of GBP500,000. But suppose very poor markets lead to a decline in the portfolio of 50%. The fixed withdrawal need now becomes a much larger portion of the portfolio. Even if the markets recover, the diminished portfolio is smaller if the withdrawal comes at a low point. This could permanently diminish the living standard of the investor due to the random decline in the market. Path dependency could also consider issues, such as the interaction of changing inflation on the portfolio values and on the investor's withdrawal needs.
- It can more clearly display tradeoffs of risk and return. The 10,000 paths can be ranked from best to worst to assess the probability of any given outcome as well as how much better or worse it could get.
- Properly modeled tax analysis, which considers the actual tax rates of the investor as well as tax location of the assets (held in taxable or tax-deferred locations), can be assessed. How the tax burden changes with market returns and withdrawals could be considered.
- A clearer understanding of short-term and long-term risk can be gained. For example, reducing the holdings of risky stock would reduce the short-term variability of the portfolio but increase the long-term risk of not having sufficient assets.
- It is superior in assessing multi-period effects. Traditional analysis projects portfolio return as a simple weighted average of the asset returns, geometrically compounded. Risk (variance) is the traditional formula taught in the CFA curriculum. Monte Carlo simulation can better model the real stochastic process where return over time depends not only on the starting value of the period but also on the additions or withdrawals to the portfolio at each future period.
- Points along the timeline can be considered to answer questions, such as, "Do savings need to be increased?" "Can I retire earlier?" "Must I retire later?"

Like any complex model, it is only as good as the inputs. Poor or simplistic inputs or modeling can create poor results. Disadvantages include:

- Simplistic use of historical data, such as expected returns, for the inputs. Returns change and have a major effect on projected future values of the portfolio.
- Models that simulate the return of asset classes but not the actual assets held. Simulating the return of the Wilshire 5000 when a fund with fees will be held could significantly overstate the future value or time period over which distributions can be sustained. Real assets have expenses.
- Tax modeling that is simplistic and not tailored to the investor's situation.

Like any complex model, there are pros and cons, but it is superior to the traditional single-return analysis.

For the Exam: There will be several other readings that also discuss Monte Carlo simulation. You do not know how to actually do it, so the likely questions would focus on the pros and cons or a simple overview of how it works. The above material covers those well.

A later reading will show you the output of such models and how to utilize the output—another reasonable question.

KEY CONCEPTS

LOS 10.a

Sources of Wealth

The manner in which an investor acquired wealth is likely to affect the investor's stance on risk. Wealth created through entrepreneurial activity was actively created and probably indicates investor knowledge and experience with risk-taking decisions.

Wealth acquired through inheritance or 1-time windfalls or wealth accumulated over a long period of secure employment may indicate an individual who has less familiarity with risk-taking activity.

Measures of Wealth

In general, a positive correlation exists between the perception of portfolio size and the level of risk tolerance (i.e., willingness to take risk). If the portfolio generates a substantial amount of funds relative to those needed to support lifestyle activities, a higher level of risk may be tolerated.

Stage of Life

In general, an inverse relationship exists between age and risk tolerance. Younger investors (foundation phase) can typically tolerate higher levels of risk, and their portfolios should reflect aggressive growth characteristics. (But remember having few assets could reduce risk ability.)

Investors in mid-career (accumulation phase) still have a long time horizon. They can tolerate risk, but their portfolios may become less aggressive and exhibit somewhat more conservative characteristics.

Investors approaching retirement age (Maintenance or distribution phases) will probably exhibit a lower tolerance to risk.

LOS 10.b

Situational profiling places individuals into categories according to stage of life or economic circumstances. Due to an almost infinite number of individual circumstances, caution should be applied when categorizing individual investors within broad situational profiles. Situational profiling should be considered only a first step in understanding an individual's preferences, economic situation, goals, and desires. The starting points for situational profiling include investigating an investor's sources of wealth, measures of wealth, and stage of life.

Psychological profiling assumes investors exhibit psychological characteristics such as loss aversion, biased expectations, and asset segregation.

LOS 10.c

Traditional finance assumes all investors exhibit three major characteristics:

1. *Risk aversion.* Investors minimize risk for a given level of return.
2. *Rational expectations.* Investors' forecasts properly reflect all relevant information pertaining to security valuation.
3. *Asset integration.* Investors focus not only on an individual asset's risk/return characteristics but also the correlation of the asset with the assets in the portfolio.

In contrast to traditional finance, behavioral finance assumes investors exhibit three psychological characteristics:

1. *Loss aversion.* This means investors prefer larger uncertain losses to smaller certain losses.
2. *Biased expectations.* This means investors have too much confidence in their ability to forecast the future.
3. *Asset segregation.* Instead of evaluating an investment's impact on the overall portfolio position, investors focus on individual assets.

LOS 10.d

Behavioral models indicate that the asset valuation process no longer incorporates only fundamental financial and economic variables. Behavioral finance assumes investors also include individual preferences based upon personal tastes. That is, individuals value investment characteristics that may or may not be validated by traditional finance concepts.

Additionally, individuals construct portfolios one asset at a time rather than using a portfolio/diversification (asset integration) approach. Wealth creation is determined not from an overall portfolio perspective but by making investment decisions that relate to specific goals.

LOS 10.e

A personality typing questionnaire provides the investment manager and the client with some general classifications for the client's propensity to take risk. One such questionnaire may ask the client to respond to non-investment-related questions and attempt to assign the client along two dimensions: (1) risk attitudes and (2) decision-making style.

LOS 10.f

Cautious investors focus on minimizing risk. They have difficulty making investment decisions and exhibit low portfolio turnover.

Methodical investors have a conservative nature combined with a focus on gathering as much data as possible. They are constantly on the lookout for new and better information.

Individualistic investors have confidence in their investment decision making and are willing to do investment research. They are self-assured investors.

Spontaneous investors exhibit high portfolio turnover with associated high trading costs. They fear not reacting to changing market conditions, including the latest investment fads.

LOS 10.g

Benefits to the Client

- Objectives and constraints are considered in formulating investment decisions that benefit the client.
- The process is dynamic and allows changes in circumstances to be incorporated.
- A well-written IPS represents the long-term objectives of the investor.
- Subsequent managers should be able to implement decisions congruent with the individual's goals.

Benefits to the Adviser

- The IPS can be consulted for clarification as to the appropriateness of specific investment decisions.
- Most IPSs contain a stated review process, indicate dispute resolutions, and identify potential problems.

LOS 10.h

- Determine and evaluate the investor's risk and return objectives. Planning return expectations should take place concurrently with risk tolerance discussions.
- Determine portfolio constraints.
- Define the appropriate investment strategy based upon an analysis of objectives, constraints, and market expectations.
- Determine the proper asset allocation to meet the investor's objectives and constraints. An SAA is sometimes included.

LOS 10.i

Required expenditures are mandatory objectives and, along with the value of the investable portfolio, are used to calculate the client's required return. Desired expenditures are non-primary goals, such as buying a vacation home, taking lavish vacations, and the like, that are not considered when calculating the total investable portfolio or required return.

LOS 10.j

All else equal, portfolio size versus needs, time horizon, and ability to take risk are positively related. Goal importance, level of spending needs, and ability to take risk are negatively related. Flexibility can increase the ability to take risk. Willingness to take risk is subjective. Explicit statements, client actions, and situational profiling are used to indicate the client's willingness to take risk.

LOS 10.k

Client constraints include time horizon, taxes, liquidity needs, legal and regulatory considerations, and unique circumstances.

Time horizon: The total time period over which the portfolio will be managed to meet the investor's objectives and constraints. A stage in the time horizon is indicated any time the individual experiences or expects to experience a change in circumstances significant enough to require evaluating the IPS and reallocating the portfolio. This can include retirement and major expenses such as college costs, expected inheritance, et cetera. The most common time horizon is as follows:

Long-term time horizon with two stages: “x” years to retirement and retirement of 20–25 years.

Tax considerations: General classifications of taxes include income tax, capital gains tax, transfer tax, and wealth or personal property tax. Strategies used to reduce the adverse impact of taxes include tax deferral, tax avoidance, tax reduction, and transferring wealth to others without utilizing a sale.

Liquidity: Spending needs that will be met by the investment portfolio (i.e., do not consider spending needs that will be met by salary or other income sources). Assume the client will use current income from the portfolio and/or liquidate assets as necessary to meet spending needs.

Legal and regulatory factors: Typically relate to tax relief and wealth transfer. The specific constraints vary greatly across jurisdictions and usually call for legal advice.

Unique circumstances: Special investment concerns; special instructions; restrictions on the sale of assets; asset classes the client specifically forbids or limits based on past experience; and assets held outside the investable portfolio, such as a primary or secondary residence, bequests, and desired objectives not attainable due to time horizon or current wealth.

LOS 10.1

The investment policy statement (IPS) is a document that is developed as the result of a client interview to determine their risk (ability and willingness) and return objectives and the five constraints, which consist of the time horizon, unique circumstances, taxes, legal and regulatory, and liquidity constraints. An asset allocation for the client's portfolio is then determined and implemented, monitored, and subsequently revised as needed depending on changes in the client's circumstances as reflected in a periodic review of the client's IPS.

LOS 10.m

The key is selecting the allocation that best matches the objectives and constraints of the investor, but that's easier said than done. A process of elimination can help by removing allocations that have a slim chance of satisfying all the objectives and constraints.

The process of elimination begins by selecting those allocations generating returns that meet the return objective of the investor. Next, the manager should choose those

allocations that do not violate statements relating to risk or safety-first rules (i.e., worst case returns). This second step may require calculations (e.g., subtracting two standard deviations from the expected return).

LOS 10.n

Deterministic planning techniques use single values for economic and financial variables. For instance, expected rates of return, inflation, and interest rates are assigned single point estimates and then used in a modeling framework to estimate assets available for the retirement period. Although useful in formulating expected investment outcome at the retirement stage of life, the deterministic estimation process generates only a single number. Investors do not have the capability of evaluating probabilities of that expected value occurring.

Monte Carlo techniques take into account distributions and associated probabilities for input variables and generate a probabilistic forecast of retirement period values. Instead of seeing one single outcome, the investor can see a range of possibilities for the future.

- Probabilistic forecasts give both the client and manager a better indication of the risk/return tradeoff in investment decisions.
- Monte Carlo simulations explicitly show the tradeoffs of short-term risks and the risks of not meeting goals.
- Monte Carlo is better able to incorporate tax nuances.
- Monte Carlo can better model the complications associated with future returns by more effectively incorporating the compounding effect of reinvestment.

CONCEPT CHECKERS

1. Situational profiling is a first step at determining investor attitudes towards risk. **Describe** a situational profile according to:
 - i. Source of wealth.
 - ii. Measure of wealth.
 - iii. Stage of life.

2. **Describe** investor characteristics often associated with the following personality types:
 - i. Cautious investor.
 - ii. Methodical investor.
 - iii. Spontaneous investor.
 - iv. Individualistic investor.

3. Explain differences between *required returns* and *desired returns*. Discuss how each relates to an individual investor's risk tolerance.

4. **Describe** ability and willingness to take risk. Explain how an investor might resolve inconsistencies between the two.

5. **Describe the process of elimination when determining an appropriate asset allocation for an individual investor.**

6. According to principles of the behavioral finance investment framework, loss aversion would *most likely* lead an investor to:
 - A. fully adjust expectations to new information as it arrives.
 - B. prefer to take a small loss rather than take a risk with a potential but not certain larger loss.
 - C. prefer to take a risk with a potential but not certain larger loss than take a certain small loss.

7. With respect to benefits of an IPS, which of the following statements is *most accurate*?
 - A. An adviser can benefit because the IPS is dynamic and can accommodate changing conditions.
 - B. A client can benefit because the IPS can clarify points for decision making and for resolving disputes.
 - C. An adviser can benefit because the IPS can clarify points for decision making and for resolving disputes.

ANSWERS – CONCEPT CHECKERS

1. i. Information related to source of wealth describes how an investor accumulated wealth. At one end of the spectrum is wealth acquired through active means (e.g., entrepreneurial activities). This indicates knowledge and experience with risk-taking activities. The other end of the spectrum is wealth acquired through passive means (e.g., inheritance or long-term employment in a stable corporation). The latter may indicate an investor with less knowledge and experience of risk-taking activities.
ii. The key to understanding measures of wealth relates to how an investor perceives his level of wealth. The perception of wealth may be in relation to funds required to sustain lifestyle activities. If a portfolio is perceived as small, risk tolerance may be low. If a portfolio is perceived as large, risk tolerance may be high.
iii. Stage of life descriptions indicate where an investor is in relation to the life cycle. Life expectancy is a large factor in connecting stage of life to risk tolerance. Due to a long time horizon, young investors often have a high tolerance for risk. Older investors, however, may have a diminished risk tolerance.
2. i. Cautious investors are the most risk averse. They tend to take long periods of time to make decisions and often invest in only the safest securities.
ii. Methodical investors spend long periods of time evaluating security characteristics. They expend a large amount of effort on their analytical capabilities but are confident when making investment decisions. Portfolios tend to be somewhat conservative.
iii. Spontaneous investors pay little attention to valuation issues. They are more concerned with creating a portfolio that holds the latest “hot” investment idea. Due to their nature, spontaneous investors’ portfolios exhibit high turnover and volatility.
iv. Individualistic investors are very confident in making independent investment decisions. They are less risk averse than methodical investors.
3. Required returns are those returns associated with critical or primary investor goals. Desired returns are associated with secondary goals. Both must be consistent with the risk tolerance exhibited by the investor.
4. Ability to take risk is associated with time horizon, size of investment portfolio, and investor goals. If time horizon is short, size of portfolio is small, and goals are critical, ability to take risk is low. Willingness to take risk is a much more subjective measure. Personal knowledge and experiences affect an investor’s willingness to take risk. Often the financial services professional will need to educate the client on the basics of risk and return in order to reconcile any difference between the client’s willingness and ability to accept risk.
5. The process of elimination begins by choosing only those allocations that meet or exceed stated return objectives. Then choices are made based on risk, whether that is related to an overall risk measure or some worst case scenario. If there is more than one choice left, additional statements regarding allocation appropriateness need to be taken into account.
6. C Loss aversion means investors prefer uncertain losses to smaller certain losses. Rather than give up and take a small loss, investors would rather take their chances with a larger loss, as long as there is still the possibility of a gain. These investors will tend to hold losing investments too long.

7. C Advisers benefit from an IPS because it serves as the document formally stating an understanding and agreement with clients. If questions arise regarding specific investment decisions, the IPS can be consulted for clarification as to the appropriateness of such decisions. Because most IPSs contain a stated review process, the document should indicate, or at least provide, direction for dispute resolution. The document should identify issues that could eventually become problems.

The following is a review of the Private Wealth Management principles designed to address the learning outcome statements set forth by CFA Institute®. This topic is also covered in:

TAXES AND PRIVATE WEALTH MANAGEMENT IN A GLOBAL CONTEXT¹

Study Session 4

EXAM FOCUS

Any of the calculations in this topic assignment are reasonable for the exam. Understanding the terminology is also required. For example, what are accrual equivalent after-tax returns, accrual equivalent taxes, TEA, and TDA? In addition, recognize when a given tax regime favors a particular investment strategy. In other words, what maximizes after-tax value under various tax rules? In addition to making calculations, there may be questions where the facts are sufficient to indicate what the best strategy will be even though insufficient details are provided to perform a calculation.

GLOBAL TAXATION REGIMES

LOS 11.a: Compare basic global taxation regimes as they relate to the taxation of dividend income, interest income, realized capital gains, and unrealized capital gains.

CFA® Program Curriculum, Volume 2, page 219

There are three primary categories of taxes:

1. *Taxes on income:*
 - Paid by individuals, corporations, and other legal entities on various types of income including wages, interest, dividends, and capital gains.
2. *Wealth-based taxes:*
 - Paid on the value of assets held and on wealth transfers.
3. *Taxes on consumption:*
 - Sales taxes: Paid by the consumer.
 - Value-added taxes: Paid at each intermediate production step according to the amount of value added at the step; ultimately borne by the consumer (added into the purchase price).

Governments use taxes as a source of funding for operations and to encourage or discourage certain actions. For example, to encourage savings many governments provide favorable tax treatment on retirement accounts. Tax regimes are generally classified as flat or progressive. In a flat system the same tax rate is paid, regardless of the amount of income. In a progressive tax system the tax rate increases as the level of income increases.

¹ The terminology used throughout this topic review is industry convention as presented in Reading 11 of the 2013 CFA Level III exam curriculum.

In 2009 in the United States, for example, single individuals pay 10% of income up to \$8,350. On income above \$8,350 up to \$33,950, they pay at a rate of 15%.

The tax rate paid on the very last (highest) dollar of income is referred to as the *marginal tax rate*. A single (unmarried) taxpayer in the United States with a total taxable income of \$20,000, for example, would have a marginal tax rate of 15% because that is the highest rate at which taxes are assessed. Using those rates, the individual's tax bill on \$20,000 of taxable income is $(0.10)(\$8,350) + (0.15)(\$20,000 - \$8,350) = \$2,582.50$. The individual's *average tax rate* is $\$2,582.50 / \$20,000 = 0.1291 \cong 12.9\%$. In other words, had the individual paid taxes at a rate of 12.91% on all income earned, he would have paid \$2,582.50.

Example: Total taxes, marginal tax rate, and average tax rate

Assume ordinary income of \$173,000. Tax rates in Table 1 apply:

Table 1: 2009 Tax Rates for a U.S. Individual Filing as a Single

<i>Taxable Income</i>		<i>Bracket Amount</i> (Col 2 – Col 1)	<i>Tax Rate %</i>	<i>Plus</i>
<i>(1) Over</i>	<i>(2) Up to</i>			
0	\$8,350	\$8,350	10	
\$8,350	33,950	25,600	15	\$835
33,950	82,250	48,300	25	4,675
82,250	171,550	89,300	28	16,750
171,550	372,950	201,400	33	41,754
372,950			35	108,216

Before we perform any calculations, let's discuss the "Plus" column in the table. That column saves you the trouble of calculating accumulated taxes at rates lower than the marginal rate. For example, according to the first tax bracket the individual pays 10% on income up to \$8,350. If an individual has taxable income of exactly \$8,350, she will pay $(0.10)(\$8,350) = \835 . If the individual has income of \$9,000, however, she will pay taxes at 10% on the first \$8,350 and 15% on income between \$8,350 and \$9,000. The tax bill will be $(0.10)(\$8,350) + (0.15)(\$650) = \$932.50$. Notice that instead of calculating the taxes on the first \$8,350, we could simply have calculated the taxes on the amount over \$8,350 and added \$835. Likewise, an individual with income falling in the highest tax bracket would pay \$108,216 plus 35% on all income over \$372,950.

Now let's return to the example.

A. Calculate the individual's *total tax bill*.

The individual's taxable income (all taxed as ordinary income) is \$173,000, so she falls in the second highest tax bracket. She will pay \$41,754 (shaded in the table) plus 33% of all income above \$171,550 and her tax bill will be:

$$\$41,754 + (0.33)(\$173,000 - \$171,550) = \$42,232.50$$

Let's calculate the tax bill the *long way* (without using the "Plus" column) by multiplying each successive amount of income by its respective tax rate:

$$\begin{aligned}\text{taxes due} &= (0.10)(\$8,350) + (0.15)(\$25,600) + (0.25)(\$48,300) \\ &\quad + (0.28)(\$89,300) + (0.33)(\$173,000 - \$171,550) \\ &= \$835 + \$3,840 + \$12,075 + \$25,004 + \$478.50 = \underline{\underline{\$42,232.50}}\end{aligned}$$

Notice that we arrive at exactly the same number.* That's because the Plus column at each bracket sums up the total taxes due on all lower brackets. Because our individual fell in the second highest (fifth) tax bracket, the Plus column contained the taxes due on all income in the first four brackets (up to \$171,550).

B. Determine the individual's *marginal tax rate*.

The individual's marginal tax rate is simply the highest tax rate applied. In this case, that is 33%.

C. Calculate the individual's *average tax rate*.

The individual's average tax rate is calculated as total taxes paid divided by total taxable income and indicates the average rate paid on each dollar of taxable income.

$$\text{average tax rate} = \frac{\text{total taxes paid}}{\text{total taxable income}} = \frac{\$42,232.50}{\$173,000} = 0.244118 \cong 24.4\%$$

$$\text{Check: } 0.244118(\$173,000) = \underline{\underline{\$42,232.50}}$$

* The typical tax table does not include column 3, which shows the total taxable income in each bracket. You would have had to calculate those numbers to determine taxes the "long way."

For the Exam: Consider these necessary warm-up calculations needed for later material. Be able to perform them.

In addition to imposing progressive tax rates on *ordinary income*,² many countries tax investment returns differently depending on whether they are in the form of interest, dividends, or capital gains. For example, interest and dividends might be taxed at a reduced rate or taxed at ordinary rates after they exceed some amount. Long-term capital gains are often taxed at a lower rate than short-term capital gains, with long-term definitions varying from one to five years or so. In most countries, capital gains taxes are paid only when capital gains are realized (i.e., when the investment is sold).

² The \$173,000 taxable income in our example was assumed to be ordinary income, which consists of salary, wages, commissions, et cetera, and is subject to taxation at standard rates. If a tax regime does not provide special treatment for income from investments, then dividends, interest, and capital gains would be added to income from salary, et cetera and taxed as ordinary income.

Table 2 shows seven global tax regimes delineated by whether the ordinary income tax rate is progressive or flat and by the treatment of investment income (i.e., interest, dividends, and capital gains).

Table 2: Seven Global Tax Regimes

Tax Regime	Ordinary Income Tax Structure	Favorable Treatment for Interest Income?	Favorable Treatment for Dividend Income?	Favorable Treatment for Capital Gains?
Common Progressive	Progressive	Yes	Yes	Yes
Heavy Dividend Tax	Progressive	Yes	No	Yes
Heavy Capital Gain Tax	Progressive	Yes	Yes	No
Heavy Interest Tax	Progressive	No	Yes	Yes
Light Capital Gain Tax	Progressive	No	No	Yes
Flat and Light	Flat	Yes	Yes	Yes
Flat and Heavy	Flat	Yes	No	No

The first regime, **Common Progressive**, is the most frequent regime observed globally. There is, however, considerable variation in the special treatment of investment income, with some countries providing exemption for only part of investment income and other countries providing exemption for all investment income. The United States, United Kingdom, China, France, Italy, Japan, and many other countries fall under this category. The **Light Capital Gain Tax** regime is the second most common regime, while only one country, Colombia, fell under the **Heavy Capital Gain Tax** regime.

TAX REGIMES

LOS 11.b: Determine the impact of different types of taxes and tax regimes on future wealth accumulation.

CFA® Program Curriculum, Volume 2, page 221

The effect of taxes on investment returns is substantial. The effect will vary depending on the tax rate, the return on the investment, and the frequency at which taxes are paid. We'll begin our discussion with **accrual taxes**, which are paid periodically...usually annually.

If T_I is the annual tax rate on investment income, R is the before-tax investment return, and N is the number of investment periods, the *future value interest factor after investment income tax* ($FVIF_{IT}$) is:

$$FVIF_{IT} = [1 + R(1 - T_I)]^N$$

$FVIF_{IT}$ is nothing more than a time-value-of-money factor, which shows the future, after-tax value of each unit of currency invested for N periods and earning a return of R . You will note that with accrual taxes the effective return earned each period [$R(1-T)$] is the nominal return reduced by the tax rate.

Example: Account subject to accrual (annual) taxes only

\$1,000 is invested for 20 years and earns a before-tax return of 10%. Assuming the accrual tax rate is 30%, calculate the after-tax value of the account in 20 years.

Answer:

$$\begin{aligned} FV_{AT} &= \text{after-tax future value (accrual taxes paid annually)} \\ &= \$1,000[1 + 0.10(1 - 0.30)]^{20} \\ &= \$3,869.68 \end{aligned}$$

Note that if the tax rate were zero, the investment would have been worth:

$$\begin{aligned} FV_{T=0} &= \text{future value assuming no taxes} \\ &= \$1,000[1 + 0.10(1 - 0)]^{20} \\ &= \$6,727.50 \end{aligned}$$

$$\begin{aligned} \text{gain}_{AT} &= \text{total gain after accrual taxes} \\ &= \$3,869.68 - \$1,000 = \$2,869.68 \end{aligned}$$

$$\begin{aligned} \text{gain}_{T=0} &= \text{total gain with no taxes} \\ &= \$6,727.50 - \$1,000 = \$5,727.50 \end{aligned}$$

$$\text{gain lost to taxes} = \$5,727.50 - \$2,869.68 = \$2,857.82$$

These calculations help illustrate three fundamental relationships:

1. Compounding of accrual (annual) taxes makes their effect stated as a percentage of total gain **greater than the tax rate**. The gain lost to taxes, stated as a currency or as a percentage, is referred to as **tax drag**.

$$\text{gain lost to taxes (\$)} = \$5,727.50 - \$2,869.68 = \$2,857.82 = \text{tax drag \$}$$

$$\text{gain lost to taxes (\%)} = \frac{\$2,857.82}{\$5,727.50} = 49.9\% = \text{tax drag \%}$$

2. Increasing investment horizon increases tax drag in both currency and percentage terms. Tax drag \$ and tax drag % are \$2,857.82 and 49.9% for a 20-year investment. The figures are \$9,837.14 and 59.8%, if the investment is held for 30 years:

$$\begin{aligned} FV_{T=0} &= \text{value in 30 years with no taxes} \\ &= \$1,000[1 + 0.10(1 - 0)]^{30} \\ &= \$17,449.40 \\ \text{gain}_{T=0} &= \$16,449.40 \end{aligned}$$

$$\begin{aligned} FV_{AT} &= \text{after-tax value in 30 years} \\ &= \$1,000[1 + 0.10(1 - 0.30)]^{30} \\ &= \$7,612.26 \\ \text{gain}_{AT} &= \$6,612.26 \end{aligned}$$

$$\begin{aligned} \text{tax drag \$}_{30 \text{ years}} &= \$16,449.40 - \$6,612.26 = \$9,837.14 \\ \text{tax drag \%}_{30 \text{ years}} &= \frac{\text{gain lost to taxes}}{\text{total gain with no taxes}} = \frac{\$9,837.14}{\$16,449.40} = 59.8\% \end{aligned}$$

Because the difference in ending values is caused by taxes, *gain lost to taxes* can also be calculated directly from the difference in total ending account values (i.e., with taxes compared to no taxes):

$$\text{tax drag \$} = \$17,449.40 - \$7,612.26 = \$9,837.14$$

3. Increasing return on investment increases tax drag in both currency and percentage terms. Assuming the original 20-year period, increasing the return from 10% to 15% increases tax drag \$ and tax drag % to \$9,000 and 58.6%, respectively.

$$\begin{aligned} FV_{T=0} &= \$1,000[1 + 0.15(1 - 0)]^{20} \\ &= \$16,366.54 \end{aligned}$$

$$\begin{aligned} FV_{AT} &= \text{after-tax future value} \\ &= \$1,000[1 + 0.15(1 - 0.30)]^{20} \\ &= \$7,366.23 \end{aligned}$$

20-year investment; R = 15%:

$$\begin{aligned} \text{tax drag \$}_{15\%} &= \$16,366.54 - \$7,366.23 = \$9,000.31 \\ \text{tax drag \%}_{15\%} &= \frac{\$9,000.31}{\$16,366.54} = 58.6\% \end{aligned}$$

20-year investment; R = 10% (from before):

$$\begin{aligned} \text{tax drag \$}_{10\%} &= \$2,857.82 \\ \text{tax drag \%}_{10\%} &= 49.9\% \end{aligned}$$

RETURN, INVESTMENT HORIZON, AND TAX IMPACT

LOS 11.d: Explain how investment return and investment horizon affect the tax impact associated with an investment.

CFA® Program Curriculum, Volume 2, page 224



Professor's Note: Material discussed in LOS 11.d is required for LOS 11.c.

As we saw previously, assuming a positive tax rate and the periodic payment of accrual taxes, there are three important relationships:

1. Tax drag % > tax rate.
2. As investment horizon increases \Rightarrow tax drag \$ and tax drag % increase.
3. As investment return increases \Rightarrow tax drag \$ and tax drag % increase.

Deferred Capital Gains Taxes

Unlike accrual taxes, which are paid periodically, capital gains taxes can often be deferred until the asset is sold and the gain is realized. In most countries, taxes are not paid on unrealized gains (i.e., the asset has increased in value but is still held).

Using T_{CG} as the tax rate on capital gains, the after-tax future value interest factor for deferred capital gains ($FVIF_{CGT}$) is:

$$FVIF_{CGT} = [(1 + R)^N (1 - T_{CG}) + T_{CG}]$$

The first term in brackets, $(1 + R)^N (1 - T_{CG})$, calculates the after-tax future value of the investment account, including the initial investment. Assuming the initial investment is made from after-tax dollars and is thus not subject to further taxation, we add T_{CG} to add back that tax.

Example: Account subject to deferred capital gains taxes only

\$1,000 is invested for 20 years and earns a pre-tax return of 10%. Assuming a capital gains tax rate of 30%, calculate the after-tax value of the account in 20 years.

Answer:

$$\begin{aligned} FV_{CGT} &= \$1,000[(1 + 0.10)^{20} (1 - 0.30) + 0.30] \\ &= \$1,000[(6.7275)(0.70)] + \$1,000(0.30) \\ &= \$4,709.25 + \$300 \\ &= \$5,009.25 \end{aligned}$$

In our calculation, \$4,709.25 is the final value assuming the total account is subject to taxation. Because the initial investment of \$1,000 is not subject to taxation, however, we add back \$300 ($= 0.30 \times \$1,000$). Note also that the terminal value of \$5,009.25 is greater than the \$3,869.68 terminal value calculated when accrual taxes were applied. This demonstrates the value of *tax deferral*.

The before-tax ($T = 0$) gain on the investment is \$5,727.50 ($= \$6,727.50 - \$1,000$). The \$4,009.25 after-tax gain ($\$5,009.25 - \$1,000 = \$4,009.25$) can be calculated directly by multiplying the before-tax gain of \$5,727.50 by $1 - T$. In fact, because capital gains are typically deferred until realized, the after-tax return can always be calculated as the before-tax return multiplied by $1 - \text{tax rate}$.

This demonstrates that the loss to *deferred taxes* (i.e., tax drag %) is a constant rate (here 30%), regardless of the investment horizon or investment return. Note that the tax drag of 30% is less than the 49.9% calculated when accrual taxes were paid because there is no compounding of the tax effect over time.

Recall that with accrual taxes, tax drag, both \$ and %, increases with the investment horizon and investment return. Because tax drag % is constant when taxes are deferred, the value of the tax deferral increases with time and the return on the investment.

LOS 11.d: Explain how investment return and investment horizon affect the tax impact associated with an investment. (Cont.)

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Summarizing the same three relationships we examined for accrual taxes, we see that they are quite different when capital gains taxes are applied on a *deferred basis*:

1. Tax drag % = tax rate.
2. As the investment horizon increases \Rightarrow tax drag is unchanged.
3. As the investment return increases \Rightarrow tax drag is unchanged.

In addition, when taxes are deferred:

4. As investment horizon increases \Rightarrow the value of the tax deferral increases.
5. As investment return increases \Rightarrow the value of the tax deferral increases.

COST BASIS

Thus far we have assumed that the cost basis for computing taxes is the investment's current value (\$1,000), as if we invested after-tax dollars. However, the cost basis is often different from the investment's current value. For example, the cost basis could be the original purchase price, and the current value of \$1,000 represents the original cost plus *unrealized capital gains*.

All else equal, a lower cost basis on an asset sold would increase the realized capital gain, increase the amount of capital gains taxes due, and reduce the net selling price. Thus we modify our deferred capital gains tax formula to account for the basis using the term B , the ratio of cost basis to the current market value:

$$FVIF_{CGT,MV \neq \text{basis}} = [(1 + R)^N (1 - T_{CG})] + T_{CG} B$$

Note that the only difference between this formula and the previous is the last term. If the basis is the same as the current investment value, then B equals 1 and the two formulas are the same. As B falls in value (i.e., as the current value of the account contains an increasing amount of unrealized capital gains), the future after-tax value of the account also falls.

Example: The effect of cost basis on capital gains taxes

\$1,000 is invested for 20 years at a return of 10%. Assuming a capital gains tax of 30% and a cost basis of \$750, calculate the after-tax value of the account in 20 years.

Answer:

Cost basis, B , stated as a percentage of account value: $\$750 / \$1,000 = 75\%$

$$\begin{aligned} FV_{CGT} &= \$1,000[(1 + 0.10)^{20} (1 - 0.30) + 0.30(0.75)] \\ &= \$4,934.25 \end{aligned}$$

Note that the terminal value of \$4,934.25 is less than the \$5,009.25 terminal value when the basis was equal to the current investment value. This is due to the tax on the difference between the \$1,000 account value and the \$750 cost basis:

$$\text{pretax value in 20 years} = \$1,000(1.10)^{20} = \$6,727.50$$

$$\text{tax on gain} = (\$6,727.50 - 750.00) \times 0.30 = \$1,793.25$$

$$\text{after-tax value in 20 years} = \$6,727.50 - 1,793.25 = \$4,934.25$$

Wealth-Based Taxes

In some countries, wealth-based taxes are assessed annually (similar to accrual income taxes) on the value of assets held. Unlike accrual taxes and capital gains taxes, which are paid on just the investment return, wealth-based taxes are applied to both the principal and return. They are most often applied to real estate, as in the U.K. Fortunately, the wealth-based tax rate is usually lower in percentage terms than accrual and capital gains tax rates.

Continuing the notation from before except that T_W is the wealth-based tax rate, the future value interest factor after the wealth-based tax ($FVIF_{WT}$) is:

$$FVIF_{WT} = [(1 + R)(1 - T_W)]^N$$

Notice that the formula differs from the previous formulas because the tax is applied to both the principal and investment return (i.e., total account value).

Example: Account subject to wealth-based taxes

Continuing, assume \$1,000 is invested for 20 years and earns a return of 10%. Assuming the account is subject only to a wealth-based tax of 2%, calculate the after-tax value of the account in 20 years.

Answer:

$$\begin{aligned} FV_{T=0} &= \text{future value assuming no taxes} \\ &= \$1,000[1 + 0.10]^{20} \\ &= \$6,727.50 \\ FV_{WT} &= \$1,000[(1 + 0.10)(1 - 0.02)]^{20} \\ &= \$4,491.33 \end{aligned}$$

Because the wealth tax is applied to the entire account (both principal and returns), this future value is not directly comparable to those when accrual or capital gains taxes are applied. Note, however, that the terminal value of \$4,491.33 is considerably less than the \$6,727.50 before-tax terminal value. When 2% wealth taxes are paid annually:

$$\text{tax drag \$} = \$6,727.50 - \$4,491.33 = \$2,236.17$$

$$\text{tax drag \%} = \frac{\$2,236.17}{(\$6,727.50 - \$1,000)} = 39.0\%$$

When the account is held for 30 years:

$$\begin{aligned} FV_{T=0} &= \text{future value assuming no taxes} \\ &= \$1,000[1 + 0.10]^{30} \\ &= \$17,449.40 \end{aligned}$$

$$\begin{aligned} FV_{WT} &= \$1,000[(1 + 0.10)(1 - 0.02)]^{30} \\ &= \$9,518.38 \end{aligned}$$

$$\text{tax drag \$} = \$17,449.40 - \$9,518.38 = \$7,931.02$$

$$\text{tax drag \%} = \frac{\$7,931.02}{\$17,449.40} = 48.2\%$$

Wealth-Based Taxes vs. Accrual Taxes

- As with accrual taxes, *tax drag \$* and *tax drag %* increase with investment horizon.
- Unlike accrual taxes, when *investment return increases*, *tax drag %* decreases.

Example: Wealth-based taxes and account returns

Assume a \$1,000 account and a wealth-based tax of 2%. Calculate the expected after-tax value of the account in 20 years with a pre-tax return of 6%, 8%, 12%, and 14%.

Table 3 below shows that *tax drag \$ increases* (column 5) as the return increases, but *tax drag % decreases* (column 6) as the return increases (calculations below):

**Table 3: Tax Drag with Increasing Returns and 2% Wealth Taxes Only;
\$1,000 Invested for 20 Years**

(1) Account Return (%)	(2) Before-Tax Value in 20 Years (\$)	(3) Total Return (\$) (2) - \$1,000	(4) After-Tax Value in 20 Years (\$)	(5) Tax Drag (\$) (2) - (4)	(6) Tax Drag (%) (5) / (3)
6	3,207.14	2,207.14	2,141.10	1,066.04	48.3
8	4,660.96	3,660.96	3,111.69	1,549.27	42.3
10*	6,727.50	5,727.50	4,491.33	2,236.17	39.0
12	9,646.29	8,646.29	6,439.94	3,206.35	37.1
14	13,743.49	12,743.49	9,175.26	4,568.23	35.8

*Calculated previously.

Answer:

Answer: R = 6%

$$FV_{T=0} = \$1,000(1.06)^{20} = \$3,207.14$$

$$\begin{aligned} FV_{WT} &= \$1,000[(1+0.06)(1-0.02)]^{20} \\ &= \$1,000 \times 2.1411 = \$2,141.10 \end{aligned}$$

$$\begin{aligned} \text{tax drag \%} &= \frac{\$3,207.14 - \$2,141.10}{\$3,207.14 - \$1,000} \\ &= \frac{\$1,066.04}{\$2,207.14} = 48.3\% \end{aligned}$$

Answer: R = 8%

$$FV_{T=0} = \$1,000(1.08)^{20} = \$4,660.96$$

$$\begin{aligned} FV_{WT} &= \$1,000[(1 + 0.08)(1 - 0.02)]^{20} \\ &= \$1,000 \times 3.11169 = \$3,111.69 \end{aligned}$$

$$\begin{aligned} \text{tax drag \%} &= \frac{\$4,660.96 - \$3,111.69}{\$4,660.96 - \$1,000} \\ &= \frac{\$1,549.27}{\$3,660.96} = 42.3\% \end{aligned}$$

Answer: R = 12%

$$FV_{T=0} = \$1,000(1.12)^{20} = \$9,646.29$$

$$\begin{aligned} FV_{WT} &= \$1,000[(1 + 0.12)(1 - 0.02)]^{20} \\ &= \$1,000 \times 6.43994 = \$6,439.94 \end{aligned}$$

$$\begin{aligned} \text{tax drag \%} &= \frac{\$9,646.29 - \$6,439.94}{\$9,646.29 - \$1,000} \\ &= \frac{\$3,206.35}{\$8,646.29} = 37.1\% \end{aligned}$$

Answer: R = 14%

$$FV_{T=0} = \$1,000(1.14)^{20} = \$13,743.49$$

$$\begin{aligned} FV_{WT} &= \$1,000[(1 + 0.14)(1 - 0.02)]^{20} \\ &= \$1,000 \times 9.17526 = \$9,175.26 \end{aligned}$$

$$\begin{aligned} \text{tax drag \%} &= \frac{\$13,743.49 - \$9,175.26}{\$13,743.49 - \$1,000} \\ &= \frac{\$4,568.23}{\$12,743.49} = 35.8\% \end{aligned}$$

For wealth-based taxes, the three primary relationships can be summarized as:

1. Tax drag % > tax rate.
2. As investment horizon increases \Rightarrow tax drag % and tax drag \$ increase.
3. As investment return increases \Rightarrow tax drag \$ increases; tax drag % decreases.

THE CUMULATIVE EFFECT OF INVESTMENT TAXES

LOS 11.d: Explain how investment return and investment horizon affect the tax impact associated with an investment. (Cont.)

CFA® Program Curriculum, Volume 2, page 230

Until now we have applied only one type of tax at a time, when in reality investments can be subject to several types of taxes, resulting in a blended tax environment. To evaluate the various types of taxes in a single analysis, we first determine the percentage of an investment's return that can be attributed to its various components: interest, dividends, and/or capital gains (CGs). We will use the following notation in the analysis:

- P_I = the proportion of the total return from interest income, taxed at T_I .
- P_D = the proportion of the total return from dividends, taxed at T_D .
- P_{CG} = the proportion of the total return from *realized* capital gains, taxed at T_{CG} .

Example 1: The combined effect of multiple taxes

An account is worth \$100,000 at the beginning of the year and \$110,000 at the end of the year (assume no additional contributions or withdrawals). During the year dividends of \$4,000 and interest of \$300 were received and reinvested into the portfolio. There was also a \$2,200 *realized* capital gain, the proceeds from which were reinvested into the portfolio. Calculate the proportion of total return that can be attributed to interest, dividends, realized capital gains, and deferred capital gains.

Answer: Return proportions

The total gain on the portfolio was $\$110,000 - \$100,000 = \$10,000$. The gain was composed of 3% interest income, 40% dividend income, and 22% realized capital gains:

$$P_I = \$300 / \$10,000 = 3\% \text{ (proportion attributed to interest)}$$

$$P_D = \$4,000 / \$10,000 = 40\% \text{ (proportion attributed to dividends)}$$

$$P_{CG} = \$2,200 / \$10,000 = 22\% \text{ (proportion attributed to realized capital gains)}$$

The proportion of the account return attributed to **deferred (unrealized) capital gain** is the residual: $100\% - 3\% - 40\% - 22\% = 35\%$

Alternatively, we could have determined the **dollar unrealized capital gain** as:

$$\text{total increase in value} = \text{interest} + \text{dividends} + \text{realized CGs} + \text{unrealized CGs}$$

$$\$10,000 = \$300 + \$4,000 + \$2,200 + \text{unrealized CGs}$$

$$\text{unrealized CGs} = \$10,000 - \$300 - \$4,000 - \$2,200 = \$3,500$$

(Notice that $\$3,500 / \$10,000 = 35\%$)

To calculate the after-tax return on the account, we multiply the before-tax return (R) by 1 minus realized tax rate, which considers the proportion of each form of gain with its specific tax rate:

$$\text{realized tax rate} = (P_I T_I + P_D T_D + P_{CG} T_{CG})$$

 *Professor's Note: The realized tax rate is nothing more than the weighted-average tax rate paid by the investor. P is the weight (proportion) of each type of return, income, dividend, or realized capital gain, and T is the tax rate on each type of return. Multiplying each tax rate by the related proportion yields the weighted-average tax rate.*

Using the same subscripts for the tax rates, T , as for the proportions, P , the *annual return after realized taxes* on interest income, dividends, and realized capital gains (R_{ART}) is:

$$R_{ART} = R(1 - \text{realized tax rate}) = R[1 - (P_I T_I + P_D T_D + P_{CG} T_{CG})]$$

Example 2: Multiple taxes and the realized tax rate

Recall that the before-tax return on the account was 10% (\$10,000). Assuming tax rates on interest, dividends, and capital gains of 30%, 20%, and 20%, respectively, calculate the after realized tax return (R_{ART}) and the account balance after payment of taxes.

Answer: Realized tax rate and return after realized taxes

$$\begin{aligned} T_{\text{realized}} &= (P_I T_I + P_D T_D + P_{CG} T_{CG}) \\ &= [(0.03)(0.30) + (0.40)(0.20) + (0.22)(0.20)] = 0.133 \end{aligned}$$

$$\begin{aligned} R_{ART} &= R(1 - T_{\text{realized}}) \\ &= 0.10(1 - 0.133) = 0.0867 = 8.67\% \end{aligned}$$

Table 4: Taxes on Interest Income, Dividend Income, and Realized Capital Gains

	Amount	Tax Rate	Tax
Interest income	300	30%	90
Dividends	4,000	20%	800
Realized capital gains	2,200	20%	440
Total taxes paid	1,330		

Table 4 shows the component and total taxes that must be paid for the year. The balance in the account after paying these taxes is $\$110,000 - \$1,330 = \$108,670$, which indicates an after-tax return of 8.67%:

$$R_{ART} = \frac{\$108,670 - \$100,000}{\$100,000} = 0.0867 = 8.67\%$$

Notice that the after-tax account value can also be calculated using the annual after realized tax return and the beginning account value: $\$100,000 \times 1.0867 = \$108,670$.

Incorporating Deferred Taxes

The previous analyses ignore the impact of deferred taxes, which have to be paid at some point in the future. As we will see, deferred taxes will be greater (less) as less (more) accrual tax is paid annually.

To calculate the effective capital gains tax rate (T_{ECG}) that adjusts for the annual taxes already paid on interest, dividends, and realized capital gains, we use the following:

$$T_{ECG} = T_{CG} \left[\frac{1 - (P_I + P_D + P_{CG})}{1 - (P_I T_I + P_D T_D + P_{CG} T_{CG})} \right]$$

The numerator of the term in the brackets is 1 minus all the individual return proportions (interest, dividends, and realized capital gains). The denominator is 1 minus the realized tax rate as we calculated by multiplying the individual tax rates by their respective proportional returns.

Because $(P_I + P_D + P_{CG})$ must be greater than $(P_I T_I + P_D T_D + P_{CG} T_{CG})$, $1 - (P_I + P_D + P_{CG})$ must be less than $1 - (P_I T_I + P_D T_D + P_{CG} T_{CG})$, and the ratio of the two must be less than 1. This means that, when the portfolio contains components that have already been taxed, the resulting effective capital gains rate is less than the stated rate on capital gains.



Professor's Note: In the example, we assumed all dividends, interest, and realized capital gains were taxed and reinvested. This would have the effect of increasing the value of the account, but the increase is due to after-tax dollars that were reinvested and as such are not subject to future capital gains taxation.

Using return after realized taxes (R_{ART}) and the effective deferred capital gains tax rate (T_{ECG}), the future value interest factor considering all taxes as well as the cost basis of the account ($FVIF_T$) is:

$$FVIF_T = \left[(1 + R_{ART})^N (1 - T_{ECG}) + T_{ECG} - (1 - B) T_{CG} \right]$$

The best way to learn this equation is by applying it in an example.

Example: Return after realized taxes and deferred capital gains

In our previous example with a beginning value of \$100,000, the return after realized taxes was 8.67%. Assuming that the return proportions continue for eight years and that the cost basis is equal to \$75,000 for a $B = .75$, calculate the effective capital gains tax rate and the balance of the account in eight years after payment of all taxes.

Answer:

The effective capital gains tax rate is:

$$T_{ECG} = 0.20 \left[\frac{1 - 0.03 - 0.40 - 0.22}{1 - 0.03(0.30) - 0.40(0.20) - 0.22(0.20)} \right] = 0.0807 = 8.07\%$$

$$\text{percentage cost basis} = \frac{\$75,000}{\$100,000} = 0.75 = 75\%$$

The balance in the account after payment of all taxes in eight years uses the future value interest factor after all taxes ($FVIF_T$) and is:

$$\begin{aligned} \text{value}_{8 \text{ years}} &= \$100,000 \left[(1 + R_{ART})^N (1 - T_{ECG}) + T_{ECG} - (1 - B) T_{CG} \right] \\ &= \$100,000 \left[(1 + 0.0867)^8 (1 - 0.0807) + 0.0807 - (1 - 0.75)0.20 \right] \\ &= \$100,000 \left[(1.9448)(0.9193) + 0.0807 - 0.05 \right] = \$181,855 \end{aligned}$$

Notice that the first term inside the brackets, $(1 + 0.0867)^8(1 - 0.0807)$, calculates the capital gains tax on the 8.67% return after realized taxes and the principal, as if it were all capital gains (i.e., the cost basis is zero). Remember, however, that we paid capital gains on 20% of the portfolio return each year, so we have to add back the effective capital gains rate, 0.0807, on the principal. Also note that the basis was assumed to be \$75,000, so we have to pay full capital gains taxes on the difference between the market value of \$100,000 and the \$75,000 cost basis, and $FVIF_T$ is reduced accordingly.

ACCRUAL EQUIVALENT AFTER-TAX RETURNS**LOS 11.c: Calculate accrual equivalent tax rates and after-tax returns.**

CFA® Program Curriculum, Volume 2, page 234

Because the net effect of various taxes can be quite confusing, it helps to look at the terminal value of the account and compare it to the beginning value. An **accrual equivalent after-tax return** is the annual return that produces the same terminal value as the taxable portfolio. You can think of it as an *effective annual return* for the account.

Using the standard present value-future value formula, the accrual equivalent after-tax return is the interest rate, r , below:

$$FV = PV(1 + r)^N$$

Recognizing that the future value is the terminal value of the account after all taxes (FV_T) and using more specific notation for the accrual equivalent after-tax return (R_{AE}), we have:

$$FV_T = PV(1 + R_{AE})^N \Rightarrow (1 + R_{AE})^N = \frac{FV_T}{PV} \Rightarrow R_{AE} = \left(\frac{FV_T}{PV} \right)^{\frac{1}{N}} - 1$$

You will note that the solution to the calculation, R_{AE} , is nothing more than the geometric average return for the N periods.

Example: Accrual equivalent return

In the previous example, the account balance in eight years, after payment of all taxes, was \$181,855. Assuming an initial investment of \$100,000, calculate the accrual equivalent after-tax return.

Answer:

The accrual equivalent after-tax return, R_{AE} , is:

$$R_{AE} = \sqrt[8]{\frac{\$181,855}{\$100,000}} - 1 = 0.0776 = 7.76\%$$



*Professor's Note: In your TI BA-II Plus calculator, the inputs are
 $FV = 181,855$; $PV = -100,000$; $N = 8$; and $CPT \rightarrow I/Y = 7.762\%$.*

Notice that this return of 7.76% is less than the return after realized taxes of 8.67% we calculated previously. This is because the accrual equivalent after-tax return incorporates the effect of realized annual taxes as well as the deferred taxes that were paid at the end of the holding period.

In the previous example, the pre-tax return was 10%. The difference between the pre-tax return and the accrual equivalent after-tax return is a measure of the tax drag on the portfolio. The accrual equivalent after-tax return moves closer to the pre-tax return as the time horizon increases because the value of tax deferral increases with time. The accrual equivalent after-tax return also moves closer to the pre-tax return as more of the portfolio return is deferred because the portfolio earns compound interest tax-free.



Professor's Note: This is simple time value of money. The longer the bill can be deferred, the longer the funds can be used.

ACCUAL EQUIVALENT TAX RATES

LOS 11.c: Calculate accrual equivalent tax rates and after-tax returns. (Cont.)

CFA® Program Curriculum, Volume 2, page 234

Using the accrual equivalent after-tax return, we can calculate an **accrual equivalent tax rate**. The accrual equivalent tax rate (T_{AE}) is the tax rate that makes the pre-tax return (R) equal to the accrual equivalent after-tax return (R_{AE}). Think of it as the overall effective tax rate on the account, considering both accrual and deferred taxes:

$$R_{AE} = R(1 - T_{AE}) \Rightarrow T_{AE} = 1 - \frac{R_{AE}}{R}$$

Example: Accrual Equivalent Tax Rate

In our accrual equivalent return example, the accrual equivalent after-tax return is 7.76% and the pre-tax return is 10%. Calculate the accrual equivalent tax rate.

Answer:

The accrual equivalent tax rate is:

$$T_{AE} = 1 - \frac{0.0776}{0.10} = 0.224 = 22.4\%$$

The lower the accrual equivalent tax rate, the more *tax-efficient* the investment. Allocating more of your account to tax-efficient assets (e.g., growth assets) pushes a greater percentage of your total return further out into the future, making the account more tax-efficient and producing a lower accrual equivalent tax rate. Likewise, allocating heavily to *tax-inefficient* assets speeds up tax payments and increases the accrual equivalent tax rate.

Notice in the previous example that the 22.4% accrual equivalent tax rate is lower than the 30% tax rate applied to interest and only slightly higher than the 20% tax rate applied to dividends and capital gains. Had the entire return come in the form of deferred capital gains and the original cost basis remained at \$75,000, the accrual equivalent tax rate would have been 19%:

Basis = 75%, horizon = 8 years:

$$FVIF_{CGT} = \left[(1 + R)^N (1 - T_{CG}) + T_{CG}(B) \right]$$

$$= (1.10)^8 (1 - 0.20) + 0.20(0.75)$$

$$= 1.71487 + 0.15 = 1.86487$$

$$FV_8 = \$100,000(1.86487) = \$186,487$$

$$R_{AE} = \left(\frac{\$186,487}{\$100,000} \right)^{1/8} - 1 = 8.10\%$$

$$T_{AE} = 1 - \frac{0.0810}{0.10} = 0.190 = 19\%$$

In this example, all the gain came in the form of deferred capital gains, and the cost basis was 75% of the account value. This means that 75% of the original account value was not subject to tax. We see in the following that changing B , the ratio of cost basis to market value, changes the accrual equivalent tax rate.

$B = 0\%$, horizon = 8 years:

$$\begin{aligned} FVIF_{CGT} &= \left[(1+R)^N (1 - T_{CG}) + T_{CG}(B) \right] \\ &= (1.10)^8 (1 - 0.20) + 0.20(0) \\ &= 1.71487 \end{aligned}$$

$$FV_8 = \$100,000(1.71487) = \$171,487$$

$$R_{AE} = \left(\frac{\$171,487}{\$100,000} \right)^{1/8} - 1 = 0.069742$$

$$T_{AE} = 1 - \frac{0.069742}{0.10} = 30.25\%$$

$B = 25\%$, horizon = 8 years:

$$\begin{aligned} FVIF_{CGT} &= \left[(1+R)^N (1 - T_{CG}) + T_{CG}(B) \right] \\ &= (1.10)^8 (1 - 0.20) + 0.20(0.25) \\ &= 1.71487 + 0.05 = 1.76487 \end{aligned}$$

$$FV_8 = \$100,000(1.76487) = \$176,487$$

$$R_{AE} = \left(\frac{\$176,487}{\$100,000} \right)^{1/8} - 1 = 0.073592$$

$$T_{AE} = 1 - \frac{0.073592}{0.10} = 26.4\%$$

$B = 50\%$, horizon = 8 years:

$$\begin{aligned} FVIF_{CGT} &= \left[(1+R)^N (1 - T_{CG}) + T_{CG}(B) \right] \\ &= (1.10)^8 (1 - 0.20) + 0.20(0.50) \\ &= 1.714871 + 0.10 \end{aligned}$$

$$FV_8 = \$100,000(1.814871) = \$181,487$$

$$R_{AE} = \left(\frac{\$181,487}{\$100,000} \right)^{1/8} - 1 = 0.077347$$

$$T_{AE} = 1 - \frac{0.077347}{0.10} = 22.65\%$$

$B = 100\%$, horizon = 8 years:

$$FVIF_{CGT} = \left[(1 + R)^N (1 - T_{CG}) + T_{CG}(B) \right]$$

$$= (1.10)^8 (1 - 0.20) + 0.20(1)$$

$$= 1.714871 + 0.20 = 1.914871$$

$$FV_8 = \$100,000 (1.914871) = \$191,487$$

$$R_{AE} = \left(\frac{\$191,487}{\$100,000} \right)^{1/8} - 1 = 0.084595$$

$$T_{AE} = 1 - \frac{0.084595}{0.10} = 15.41\%$$

Table 5 shows that the accrual equivalent annual tax rate *decreases as B increases*:

Table 5: Cost Basis as Percent of Market Value (B) and Accrual Equivalent Tax Rates*

$B (\%)$	0.00	0.25	0.50	0.75	1.00
$TAE (\%)$	30.25	26.40	22.65	19.00	15.41

*Horizon = 8 years

We see clearly that as the cost basis and B increase, the accrual equivalent tax rate decreases, but what isn't intuitive is that as the cost basis decreases and approaches zero, the accrual equivalent tax rate actually surpasses the capital gains tax rate. This is due to taxation of the capital gain as well as the *principal*, rather than simply taxing the capital gain. As more of the original investment is taxable (i.e., as B decreases), the accrual equivalent tax rate increases beyond the tax rate.

The following calculations demonstrate the relationship between investment horizon and accrual equivalent tax rate (holding B constant):

$B = 75\%$, horizon = 4 years:

$$FVIF_{CGT} = \left[(1 + R)^4 (1 - T_{CG}) + T_{CG}(B) \right]$$

$$= (1.10)^4 (1 - 0.20) + 0.20(0.75)$$

$$= 1.17128 + 0.15 = 1.32128$$

$$FV_4 = \$100,000 (1.32128) = \$132,128$$

$$R_{AE} = \left(\frac{\$132,128}{\$100,000} \right)^{1/4} - 1 = 0.07213$$

$$T_{AE} = 1 - \frac{0.07213}{0.10} = 27.87\%$$

B = 75%, horizon = 6 years:

$$FVIF_{CGT} = \left[(1 + R)^6 (1 - T_{CG}) + T_{CG}(B) \right]$$

$$= (1.10)^6 (1 - 0.20) + 0.20(0.75)$$

$$= 1.41725 + 0.15 = 1.56725$$

$$FV_6 = \$100,000 (1.56725) = \$156,725$$

$$R_{AE} = \left(\frac{\$156,725}{\$100,000} \right)^{1/6} - 1 = 0.07776$$

$$T_{AE} = 1 - \frac{0.07776}{0.10} = 22.24\%$$

B = 75%, horizon = 10 years:

$$FVIF_{CGT} = \left[(1 + R)^{10} (1 - T_{CG}) + T_{CG}(B) \right]$$

$$= (1.10)^{10} (1 - 0.20) + 0.20(0.75)$$

$$= 2.07499 + 0.15 = 2.22499$$

$$FV_{10} = \$100,000 (2.22499) = \$222,499$$

$$R_{AE} = \left(\frac{\$222,499}{\$100,000} \right)^{1/10} - 1 = 0.08328$$

$$T_{AE} = 1 - \frac{0.08328}{0.10} = 16.74\%$$

B = 75%, horizon = 12 years:

$$FVIF_{CGT} = \left[(1 + R)^{12} (1 - T_{CG}) + T_{CG}(B) \right]$$

$$= (1.10)^{12} (1 - 0.20) + 0.20(0.75)$$

$$= 2.51074 + 0.15 = 2.66074$$

$$FV_{12} = \$100,000 (2.66074) = \$266,074$$

$$R_{AE} = \left(\frac{\$266,074}{\$100,000} \right)^{1/12} - 1 = 0.08497$$

$$T_{AE} = 1 - \frac{0.08497}{0.10} = 15.03\%$$

Summing up the results of the calculations, Table 6 shows that when the basis is held constant, the accrual equivalent annual tax rate *decreases* as the investment horizon *increases*:

Table 6: Investment Horizon and Annual Accrual Equivalent Tax Rates*

Horizon (years)	4	6	8	10	12
TAE (%)	27.87	22.24	18.99	16.74	15.03

*Cost basis to market value = 75%

ACCOUNT TAX PROFILES

LOS 11.e: Discuss the tax profiles of different types of investment accounts and explain their impact on after-tax returns and future accumulations.

CFA® Program Curriculum, Volume 2, page 236

Investors in most countries have tax-advantaged accounts available to them. The accounts are usually set up to encourage retirement savings. For example, a regular IRA account in the United States is a **tax-deferred account (TDA)**. Contributions to these accounts reduce the taxpayer's current taxes, and returns on the contributions accrue tax free. They are, however, taxed when withdrawn from the account in the future. These accounts are said to have *front-end loaded tax benefits*.

A second type of tax-advantaged account is the **tax-exempt account**. Contributions to these accounts are made with after-tax funds and thus do not reduce the investor's current tax bill. Funds are withdrawn tax-free in the future and thus these accounts are said to have *back-end loaded tax benefits*. Like a tax-deferred account, returns in a tax-exempt account accrue tax free. An example of a tax-exempt account in the United States is a Roth IRA.

Calculating Future Accumulations in Tax-Advantaged Accounts

The formula for the future value interest factor for a TDA ($FVIF_{TDA}$) is similar to the formula for capital gains when the basis is zero. The returns in a TDA accrue tax free and are taxed when withdrawn at the existing tax rate, T_N .

$$FVIF_{TDA} = (1 + R)^N (1 - T_N)$$

where:

R = before-tax return on the account

T_N = tax rate in effect at the time of withdrawal

Withdrawals from tax-exempt accounts are not subject to taxes, and returns accrue tax free. So the future value interest factor for a tax-exempt account ($FVIF_{TEA}$) requires no consideration of taxes:

$$FVIF_{TEA} = (1 + R)^N$$

Comparing the two formulas, we see that the only difference between the two is the taxation of the TDA. Assuming equivalent contributions, returns, and holding periods, the only difference in future values is that the government has a future tax claim on the TDA.

Example: Accounts subject to different tax treatments

Assume that \$100,000 is invested in each of four accounts:

1. An account taxed annually (accrual taxes; $FVIF_{AT}$).
2. A tax-deferred account ($FVIF_{TDA}$).
3. An account with deferred capital gains and an initial cost basis of \$100,000 ($FVIF_{CGBT}$).
4. A tax-exempt account ($FVIF_{TEA}$).

Calculate the after-tax value of each account in 30 years, if each account earns 9% annually and all investment income and returns are taxed at 35%.

Answer:

1. $FVIF_{AT} = [1 + R(1 - T_I)]^N$	$\Rightarrow \$100,000[1 + 0.09(1 - 0.35)]^{30}$ $= \$550,460$
2. $FVIF_{TDA} = (1 + R)^N (1 - T_N)$	$\Rightarrow \$100,000[(1 + 0.09)^{30} (1 - 0.35)]$ $= \$862,399$
3. $FVIF_{CGBT} = [(1 + R)^N (1 - T_{CG})] + T_{CG}B$	$\Rightarrow \$100,000[(1 + 0.09)^{30} (1 - 0.35) + 0.35(1.0)]$ $= \$897,399$
4. $FVIF_{TEA} = (1 + R)^N$	$\Rightarrow \$100,000(1 + 0.09)^{30}$ $= \$1,326,768$

As we would expect, the tax-exempt account results in the highest future accumulation and the account taxed annually provides the lowest accumulation. Although the TDA provides the second-lowest accumulation, it provides a tax advantage in the year of the contribution, as we will discuss later.

Tax-Advantaged Accounts and Asset Allocations

It is common to examine an investor's asset allocation on a pre-tax basis. For example, consider an investor with €1,000,000 in assets. If €600,000 is invested in equity in a TDA and €400,000 is invested in bonds in a tax-exempt account, the traditional view of the investor's asset allocation is 60% equity/40% bonds.

However, the equity in the TDA will be taxed upon withdrawal. If the tax rate is 30%, the investor actually has €420,000 [$\€600,000 \times (1 - 0.30)$] invested in equity on an after-tax basis. The bonds in the tax-exempt account are not subject to taxation.

Thus, on an after-tax basis, the investor actually has 51.2% in equity [$\text{€}420,000 / (\text{€}420,000 + \text{€}400,000)$] and the other 48.8% in bonds. However, this allocation will change over time, and the investor's time horizon may be uncertain, in which case it will be difficult to examine the asset allocation on an after-tax basis.

Tax-Deferred Accounts (TDAs) vs. Tax-Exempt Accounts (TEAs)

Both TDAs and TEAs are comparable in that both accounts provide a tax advantage while funds are in the account. No taxes are paid on returns while funds are in either account. However, they differ in an important way: TEA account deposits are done with after-tax funds and withdrawals are tax free while TDA deposits are made with pretax funds but withdrawals are taxed.

Tax-exempt accounts may seem to be the preferred tax-advantaged account because all withdrawals are tax free. However, this simplistic conclusion ignores the fact that contributions to a TDA provide the investor with an immediate savings in taxes whereas a tax-exempt account does not. Put another way, any contributions to a tax-exempt account are made with *after-tax* funds. That is, any funds contributed to a tax-exempt account are first subject to the current income tax, T_0 . On the other hand, funds contributed to a tax-deferred account are not taxed. In the United States, for example, individuals are permitted to deduct from taxable income an amount equal to the contribution to a tax-deferred account. That amount, therefore, is effectively exempt from current taxes.

Viewed in this light, we can compare the future accumulations in each account as follows:

$$FVIF_{TDA} = (1 + R)^N (1 - T_N)$$

$$FVIF_{TEA} = (1 + R)^N (1 - T_0)$$

From these formulas, it is clear that the only potential difference between accumulations in the two accounts depends on whether the current and future tax rates are equal. With a TDA, no taxes are taken out of the contribution but the future value is taxed, while the contribution to the TEA is in after-tax dollars and the future value is untaxed. In other words, either the tax is taken out upfront or at the end of the investment, so whether the two accounts will have different future (spendable) amounts will depend on relative current and future tax rates.

Determining the account type that will produce the higher after-tax value is simple when returns in both accounts are equal. If today's tax rate is lower, pay the taxes now and put after-tax funds into a TEA. If the expected future tax rate is lower, wait to pay taxes by putting pretax funds into a TDA now and pay taxes later. If the two rates are equal, it will not matter which account is used.

Example: Tax-deferred vs. tax-exempt accounts

An investor pays current and future taxes at 25% and is willing to give up \$3,000 in consumption. The investor can contribute *\$3,000 in after-tax dollars* to a tax-exempt account or *\$4,000 to a tax-deferred account*.



Professor's Note: At a tax rate of 25%, the investor will have to earn \$4,000 and pay taxes of \$1,000 to contribute \$3,000 to a tax-exempt account. Alternatively, the investor can deposit the entire \$4,000 into a tax-deferred account.

Assuming an investment return of 8% for 20 years, calculate the future values of the following three account structures:

1. An account taxed annually (e.g., savings account).
2. A TDA (e.g., retirement account).
3. A TEA (e.g., tax-exempt bonds).

Answer:

The corresponding formulas and future value calculations, considering after-tax contributions:

$$\begin{aligned} FVIF_{AT} &= [1 + R(1 - T_I)]^N \Rightarrow \$3,000[1 + 0.08(1 - 0.25)]^{20} = \$9,621 \\ FVIF_{TDA} &= (1 + R)^N (1 - T_N) \Rightarrow \$4,000[(1 + 0.08)^{20}(1 - 0.25)] = \$13,983 \\ FVIF_{TEA} &= (1 + R)^N \Rightarrow \$3,000(1 + 0.08)^{20} = \$13,983 \end{aligned}$$

In this example, the future values of the TDA and the TEA are equal only because the current and future tax rates are assumed equal. If instead the current tax rate is greater than the expected future tax rate (e.g., after retiring the investor might have a lower marginal tax rate), the future value of the TDA will be greater than that of the tax-exempt account.

Example: Unequal current and future tax rates

Assume the investor in the previous example pays current taxes at 25% and expects a future tax rate of 20%. Determine which account will have the greater future value.

Answer:

In this case, the investor faces a lower future tax rate. The investor's current situation is unchanged. She will still have to earn \$4,000 to invest \$3,000 in the tax-exempt account and be able to invest the entire \$4,000 in the tax-deferred account:

$$\begin{aligned} FVIF_{TDA} &= (1+R)^N (1-T_N) \Rightarrow \$4,000 [(1+0.08)^{20} (1-0.20)] = \$14,915 \\ FVIF_{TEA} &= (1+R)^N \Rightarrow \$3,000 (1+0.08)^{20} = \$13,983 \end{aligned}$$

The future after-tax accumulation of the tax-exempt account is still \$13,983. Because the future rate is expected to be 20%, the TDA now produces a greater future value.

Equal Limits on Contributions

A different result can arise if regulations limit the amount of deposit and the limit is the same for both TDA and TEA accounts. Even if the current and future tax rates are equal, the TEA can be superior because it effectively lets more pretax funds go into a tax-advantaged account (and out of the investor's fully taxable holdings).

Returning to the previous example of current and future tax rates of 25% for pretax and after-tax returns of 8% and 6%, a \$4,000 pretax deposit into a TDA and a \$3,000 after-tax deposit into a TEA had the same ending value of \$13,983. Remember the \$3,000 after-tax contribution costs the investor \$4,000 in pretax funds. Now suppose regulations limit the contribution to either account to \$3,000 and the investor has the capacity to contribute \$3,000 of after-tax or \$4,000 of pretax funds. In the TDA, only \$3,000 of pretax funds can be contributed, but in the TEA, \$3,000 of after-tax (equivalent of \$4,000 pretax) can be contributed.

- The future value of the TEA is still \$13,983.
- The future value of the TDA and related effects is more complicated. Only \$3,000 can be contributed of pretax funds for a future value of \$11,186. However, the investor still has another \$1,000 pretax, which is \$750 after paying the taxes due on it. This can only be invested in the investor's fully taxable portfolio. Contributions into the sheltering vehicles have been maxed out already. The \$750 can be invested for the 20 years at 6% after tax return for \$2,405 of future value, $[\$750(1.06)^{20}]$. The investor's total wealth is $\$11,186 + \$2,405 = \$13,591$.

The cost to the investor in funds that are not available for current consumption is the same for both accounts, but the TEA is now superior to the TDA when the contribution limit for either account is the same.

Calculations used in the above analysis:

$$\begin{aligned} FVIF_{TDA} &= (1+R)^N (1-T_N) \Rightarrow \$3,000 [(1+0.08)^{20} (1-0.20)] = \$11,186 \\ FVIF_{TEA} &= (1+R)^N \Rightarrow \$3,000 (1+0.08)^{20} = \$13,983 \end{aligned}$$

Hint: Remember the calculations directly above overstate the advantage of the TEA. The real comparison must also consider the additional funds the investor has available if using the TDA when the limit is the same for either account. The TEA still wins but by less.

TAXES AND INVESTMENT RISK

LOS 11.f: Explain how taxes affect investment risk.

CFA® Program Curriculum, Volume 2, page 241

The effect of taxes on investment risk depends on the type of investment account. If an investment is held in an account that is taxed annually, the government (taxing authority) bears part of the investment risk. The government's share of the investment each year is T_I , the tax rate on investment income, multiplied by the annual value of returns. If returns are high, the government receives more in taxes than when returns are low. In other words, part of the total variability of the investment is absorbed by the government. The result is that, if investment returns are taxed solely as income at the rate of T_I and the pre-tax standard deviation of returns is σ , the investor's after-tax risk is $\sigma(1 - T_I)$.

If the investment is held in a tax-exempt account, such that the government has no stake in the investment, the investor bears all the investment risk. This is also true for TDAs prior to withdrawal because annual returns are not subject to taxes.

Example: Risk reduction with accrual taxes only

Suppose an investor has half her portfolio in stocks and half in bonds. The returns on the stock investment are taxed at an annual rate of 20% (dividends receive special treatment) and the bond returns are taxed at a rate of 30% (interest income is taxed as ordinary income). The pre-tax standard deviation of stock returns is 16% and the pre-tax standard deviation of bond returns is 6%.

Calculate the pre-tax and after-tax standard deviations of portfolio returns, assuming the correlation between stocks and bonds is 1.

Answer:

If the correlation between stocks and bonds is 1, the **pre-tax standard deviation** of portfolio returns is a simple weighted average of the individual standard deviations:

$$\sigma_{P,\text{before-tax}} = 0.5(16\%) + 0.5(6\%) = 11.0\%$$

Because taxes are paid annually on dividends and interest, the after-tax standard deviation of returns uses both *after-tax* asset standard deviations:

$$\sigma_{P,\text{after-tax}} = 0.5(16\%)(1 - 0.2) + 0.5(6\%)(1 - 0.3) = 8.5\%$$

In this example, the investor's portion of investment risk was reduced from 11.0% to 8.5% because the government absorbed part of the portfolio volatility by taxing all returns. If one (or both) of the investments was held in a TDA or tax-exempt account, the reduction in investment risk would not have been as great because the government would absorb less risk.

Example: Risk reduction with accrual and deferred taxes

Now assume the bonds are held in a *tax-exempt account*. Calculate the after-tax standard deviation of portfolio returns and compare it to the before-tax portfolio standard deviation and the portfolio standard deviation with accrual taxes only.

Answer:

The after-tax standard deviation of portfolio returns is:

$$\sigma_{P,\text{after-tax}} = 0.5(16\%)(1 - 0.2) + 0.5(6\%) = 9.4\%$$

In this case, the standard deviation of portfolio returns increases from 8.5% when the returns are fully taxable, to 9.4%. The increase in variability is because the government does not absorb part of the variability of the bond returns. Because the stock returns are taxed annually, however, there is still an amount of risk reduction.

THE TAX EFFECTS OF TRADING BEHAVIOR

LOS 11.g: Discuss the relation between after-tax returns and different types of investor trading behavior.

CFA® Program Curriculum, Volume 2, page 245

As we have seen previously, the accounts in which assets are held (i.e., the *asset location*) is important for tax management. From strictly a tax-management standpoint, an investor should locate heavily taxed assets in tax-advantaged accounts and hold lightly taxed assets in taxable accounts. The value created by the effective tax management of investments is referred to as the **tax alpha**.

In most countries, the strategy would be to place equity in taxable accounts because their current income is lower than that for bonds and capital gains can often be deferred. Bonds, with their higher current income, would be placed in a tax-protected account, such as a TDA. Although strictly speaking, municipal bonds could be held in taxable accounts; their yield already takes into consideration the exemption from taxes and thus is typically much lower than that of taxable bonds. As noted previously, however, the taxation of income, dividends, and capital gains varies by regime.

In addition to examining asset location as a source of tax minimization, we can also examine an investor's *trading behavior*. Specifically, we can delineate four types of **equity investors**:

1. **Traders**—due to frequent trading, traders forgo the tax advantages associated with equity. All gains are short term and are thus taxed on an annual basis.
2. **Active investors**—active investors trade less frequently than traders so that many of their gains are longer term in nature and taxed at lower rates.
3. **Passive investors**—passive investors buy and hold equity so that gains are deferred long term and taxed at preferential rates.
4. **Exempt investors**—exempt investors hold all their stock in tax-exempt accounts, thereby avoiding taxation altogether.

Example: The effects of trading behavior on taxes

Consider the case of four equity traders who invest \$1,000 for 30 years and earn 9% annually. They pay a tax of 30% on gains realized in less than a year and a tax of 20% on gains held a year or longer. What are the future accumulations, accrual equivalent returns, and accrual equivalent tax rates for each trader?

Answer:

In this example, we will assume that each trader's tax situation is as follows:

Trader—realizes all gains as short term and pays 30% tax annually:

$$FVIF_{IT} = [1 + R(1 - T_I)]^N$$

Active investor—simplifies by assuming realizes all gains as long term and pays 20% tax annually:

$$FVIF_{IT} = [1 + R(1 - T_I)]^N$$

Passive investor—defers all gains until the end of the investment horizon and pays a 20% tax at that time:

$$FVIF_{CGT} = [(1 + R)^N (1 - T_{CG}) + T_{CG}]$$

Exempt investor—does not pay taxes:

$$FVIF_{TEA} = (1 + R)^N$$

Table 7 contains the results of these calculations.

Table 7: Future Value, Accrual Equivalent Annual Return, and Accrual Equivalent Tax Rate Under Different Trading Style Assumptions

<i>Investor Type</i>	<i>Future Value</i>	<i>Accrual Equivalent Return¹</i>	<i>Accrual Equivalent Tax Rate²</i>
Trader	$\$1,000[1 + 0.09(1 - 0.30)]^{30} = \$6,252$	6.3%	30.0%
Active investor	$\$1,000[1 + 0.09(1 - 0.20)]^{30} = \$8,051$	7.2%	20.0%
Passive investor	$\$1,000[(1 + 0.09)^{30}(1 - 0.20) + 0.20(1)] = \$10,814$	8.3%	7.8%
Exempt investor	$\$1,000(1 + 0.09)^{30} = \$13,268$	9.0%	0.0%

$$^1 \text{AER} = \sqrt[n]{\frac{\text{FV}}{\text{PV}}} - 1$$

$$^2 \text{AET} = 1 - \frac{\text{AER}}{\text{R}}$$

As would be expected, due to a higher tax rate and income that is taxed frequently, the trader pays the most taxes and will thus have the lowest future accumulation. Active and passive investors have lower tax burdens than the trader, whereas exempt investors pay no taxes at all. Passive investors have higher returns than active investors because although they are both taxed at a 20% rate, the passive investor's gains are deferred to the end of the investment horizon.

To offset their higher taxation, active investment managers must generate higher pre-tax returns. This is also true for mutual funds, especially those with high turnover, because in many countries, long-term capital gains are taxed at a lower rate and accumulate tax free until the gains are realized.

To illustrate the burden that trader investors face, assume a 40% tax rate for short-term gains and a 20% tax rate for long-term gains. If an active investor is taxed at the 20% rate and can generate a pre-tax return of 12.5%, the after-tax return is $12.5\% \times (1 - 0.20) = 10\%$. For the trader to generate the same after-tax return, the before-tax return must be $10\% / (1 - 0.40) = 16.7\%$. The extra 4.2% return ($16.7\% - 12.5\%$) is quite difficult to achieve for most investors.

TAX LOSS HARVESTING AND HIFO TAX LOT ACCOUNTING

LOS 11.h: Explain the benefits of tax loss harvesting and highest-in/first-out (HIFO) tax lot accounting.

CFA® Program Curriculum, Volume 2, page 246

Tax Loss Harvesting

Tax loss harvesting is the practice of using investment losses to offset investment gains or income and thus avoid the associated taxes. It is sometimes the case that losses can be applied against past or future gains. Note, however, that governments may place limits on the amount of losses that can be recognized or the type of gains that can be offset.

Example: Tax loss harvesting

An investor has a realized capital gain of \$100,000 and pays a capital gains tax rate of 20%. The investor is considering selling Stock A to reduce his tax bill. Stock A has a cost basis of \$120,000 and has fallen to a current market value of \$80,000.

Calculate the investor's tax payment if Stock A is not sold, if it is sold, and the difference in tax payments.

Answer:

If Stock A is not sold, the investor will have to pay capital gains taxes on the full \$100,000 capital gain: $0.20 \times \$100,000 = \$20,000$.

If Stock A is sold, there is a capital loss: $\$80,000 - \$120,000 = -\$40,000$. This \$40,000 loss can be applied against the \$100,000 gain such that the net taxable gain is only \$60,000. The tax bill is $0.20 \times \$60,000 = \$12,000$, so the tax savings is $\$20,000 - \$12,000 = \$8,000$.

The tax loss harvesting saves \$8,000 in tax payments this year.

For the Exam: In a simple case like this, the immediate tax savings from the loss harvest can be calculated directly as the capital loss multiplied by the tax rate: $\$40,000 \times 0.20 = \$8,000$. This is the most likely question.

In practice, taxing authorities have many different ways of treating tax loss harvesting. In many cases, there are restrictions on the types of offsetting losses as well as amounts allowed. On the exam, always read the question and information carefully just in case the rules given are different.

Although tax loss harvesting saves current taxes, it generally does not save on cumulative taxes. The current-year effect is an overstatement of any benefit because the harvesting generally raises future tax bills. In general, proceeds for the sale are reinvested and the

cost basis of the new security is the selling price of the old security. This new lower cost basis implies higher tax bills on future sales. The more interesting issue is what is done with the initial tax savings.

Example: Loss harvest with purchase of a nearly identical stock

Continuing the previous example with an investor who holds Stock A with a market value, cost basis, and unrealized loss of \$80,000, \$120,000, and \$40,000 respectively. The investor also has \$100,000 of already realized gains.

Assume the investor can sell Stock A this year and reinvest in a stock with similar return expectations, Stock B. Assume both stocks then double in price and are liquidated next year. Calculate and show your calculations of the total tax bills this year and next for the investor if:

1. Stock A is sold next year.
2. Stock A is sold this year and the sale proceeds are reinvested in Stock B.
3. Stock A is sold this year and the sale proceeds plus year 1 tax savings are reinvested in Stock B.

Answer:**Option 1:**

Taxes year 1: \$100,000 already realized gain @ 20% = \$20,000

Taxes year 2: projected sale price is $\$80,000 \times 2 = \$160,000$

Less cost basis of \$120,000 for gain of \$40,000

Tax on sale is \$40,000 @ 20% = \$8,000

Cumulative tax bill of \$28,000.

Option 2:

Taxes year 1: \$40,000 tax loss harvest from selling A reduces gain to \$60,000 @ 20% = \$12,000

Taxes year 2: sale of Stock A in year 1 generates \$80,000 invested in Stock B; Stock B then doubles in value to \$160,000 for a taxable gain when Stock B is sold of \$80,000 @ 20% = \$16,000

Cumulative tax bill of \$28,000; \$8,000 less in year 1 but \$8,000 more in year 2 than Option 1.

Option 3:

Taxes year 1: \$40,000 tax loss harvest from selling Stock A reduces gain to \$60,000 @ 20% = \$12,000

Taxes year 2: sale of Stock A in year 1 generates \$80,000 and \$8,000 tax savings for \$88,000 invested in Stock B; Stock B then doubles in value to \$176,000 for a taxable gain when Stock B is sold of \$88,000 @ 20% = \$17,600

Cumulative tax bill of \$29,600; a higher tax bill than Option 2 because more funds were invested in the appreciating Stock B.

Despite paying more in taxes, the investor maximizes ending wealth with Option 3 because the tax savings were reinvested (in an asset with a positive return).

Highest-In/First-Out (HIFO) Tax Lot Accounting

Over time, investors often accumulate large positions in single securities by purchasing several lots (e.g., 1,000 shares at a time) at different prices. When taxing authorities allow **HIFO** accounting, investors can generate significant tax savings by first liquidating lots with the highest cost bases.

As with tax loss harvesting, the total taxes over time are unchanged with HIFO accounting, assuming a constant tax rate. But also like tax loss harvesting, HIFO allows the tax savings to be reinvested earlier, creating a *tax alpha* that compounds through time.

If tax rates are not expected to be constant, however, the value of tax lot accounting can vary. For example, if rates are high and expected to fall (e.g., a client nearing retirement), it could be beneficial to recognize the tax alpha today. If rates are expected to rise, however, it could be beneficial to wait and recognize a significantly larger tax alpha later. It could be beneficial for the investor to liquidate a lower cost basis stock and recognize the capital gain now. This is referred to as *LIFO* or *lowest-in/first-out* accounting.

Two points worth mentioning are (1) volatile security prices have the most potential for creating tax alpha (when prices are volatile, a large gain can be offset by a large loss) and (2) although we know excessive trading can create tax inefficiencies in a taxable portfolio, a limited amount of trading can be beneficial when capital losses can be harvested and applied against capital gains.

HOLDING PERIOD MANAGEMENT

Many countries (tax regimes) tax realized gains at different rates depending on the length of the holding period of the asset before sale. Typically, long-term holdings are taxed at a lower rate. This creates an advantage to less frequent trading that can be difficult for a frequent trader to overcome.

Example: Expected returns, tax classifications, and after-tax returns

Investor 1 is an extremely active trader whose returns are always taxed at the ordinary tax rate of 40%. Investor 2 follows a minimum trading strategy, only recognizing long-term capital gains taxes of 20% each year. Both recognize gains and pay taxes annually. Both investors earn a pretax return of 12%. Determine the after-tax value of a \$1.00 over a 1-year and 10-year holding period for both investors and the value ratio of the two investors.

Answer:

Over 1-year holding period:

Investor 1: after-tax annual return = $\{1 + [0.12(1 - 0.40)]\} \times \$1.00 = \$1.072$

Investor 2: after-tax annual return = $\{1 + [0.12(1 - 0.20)]\} \times \$1.00 = \$1.096$

A ratio favoring the patient trader (Investor 2) of $1.096 / 1.072 = 1.022$

Over 10-year holding period:

Investor 1: after-tax annual return = $\{1 + [0.12(1 - 0.40)]\}^{10} \times \$1.00 = \$2.004$

Investor 2: after-tax annual return = $\{1 + [0.12(1 - 0.20)]\}^{10} \times \$1.00 = \$2.501$

A ratio favoring the patient trader (Investor 2) of $2.501 / 2.004 = 1.247$

The advantage is growing with longer time periods.

The implications of a higher short-term versus lower long-term gains taxation rate are:

- The ratios of ending after-tax value of the patient and rapid trader (1.022 and 1.247 over 1- and 10-year investment horizons) increase in favor of the patient trader:
 - At higher rates of return (e.g., 2% versus 4%).
 - Over longer investment horizons (e.g., five years versus ten years).
- Rapid trading would require a much higher pretax return to break even on an after-tax basis. In the example, the active trader would have to earn 16% per year pretax to stay even with the more patient investor earning 12% pretax. The 16% is a 33% higher pretax return. Calculations to support this conclusion are shown below:

Rapid trader, $t = 40\%$; $16\% (1 - 0.40) = 9.6\%$ after-tax

Patient trader, $t = 20\%$; $12\% (1 - 0.20) = 9.6\%$ after-tax

Another dimension of holding period management is the timing of sales in relation to tax year end. If a sale is being considered near the tax year end, make the sale:

- Before year end if it is a loss in order to place the loss in the current tax year and offset gains this year. This will lower taxes this year but raise taxes next year.
- After year end if it is a gain. This will defer the gain and tax until next year's tax return.

If tax rates are going to change, the analysis could become more complicated. If, for example, tax rates will rise next year, it may become more advantageous to incur the gain now, at the lower rate, than wait.

TAXES AND MEAN-VARIANCE OPTIMIZATION

LOS 11.i: Demonstrate how taxes and asset location relate to mean–variance optimization.

CFA® Program Curriculum, Volume 2, page 251

In the previous sections, we discussed how taxes affect the after-tax returns and risk of investments. Ideally then, the efficient frontier of portfolios should be viewed on an after-tax basis. Furthermore, because the tax status of an investment depends on the type of account it is in (i.e., its asset location), the same asset could appear on the efficient frontier in both taxable and non-taxable forms.

For example, an investor holds stocks and bonds in taxable, tax-deferred, and tax-exempt accounts. In this case, there are effectively six different assets to consider. Of course, the optimization process would have to be constrained to account for limits on the amount of funds that can be placed in tax-advantaged accounts and the type of assets that can be allocated to them.

The mean-variance optimization should optimally allocate assets and determine the optimal asset location for each asset. Accrual equivalent after-tax returns would be substituted for before-tax returns, and risk on an after-tax basis would be substituted for before-tax risk.

KEY CONCEPTS

LOS 11.a

Regime	Ordinary Income Tax Structure	Favorable Treatment for:		
		Interest Income?	Dividend Income?	Capital Gains?
Common Progressive (most common)	Progressive	Yes	Yes	Yes
Heavy Dividend Tax	Progressive	Yes	No	Yes
Heavy Capital Gain Tax	Progressive	Yes	Yes	No
Heavy Interest Tax	Progressive	No	Yes	Yes
Light Capital Gain Tax (2nd most common)	Progressive	No	No	Yes
Flat and Light	Flat	Yes	Yes	Yes
Flat and Heavy	Flat	Yes	No	No

Source: 2013 CFA® Level III Curriculum, *Taxes and Private Wealth Management in a Global Context*, Stephen M. Horan and Thomas R. Robinson, Vol. 2, pp. 217–260.

LOS 11.b

$$\text{investment income tax (accrual taxes): } FVIF_{IT} = [1 + R(1 - T_1)]^N$$

$$\text{deferred capital gains tax (MV = cost basis): } FVIF_{CGT} = [(1 + R)^N(1 - T_{CG}) + T_{CG}]$$

$$\text{deferred capital gains tax (MV } \neq \text{ cost basis): } FVIF_{CGBT} = [(1 + R)^N(1 - T_{CG})] + T_{CG}B$$

$$\text{wealth-based tax: } FVIF_{WT} = [(1 + R)(1 - TW)]^N$$

$$\text{return after realized taxes: } R_{ART} = R[1 - (P_1 T_1 + P_D T_D + P_{CG} T_{CG})]$$

LOS 11.c

An **accrual equivalent after-tax return** (R_{AE}) is the annual return that produces the same terminal value as the taxable portfolio and is calculated as:

$$R_{AE} = \sqrt[N]{\frac{FV_T}{PV}} - 1$$

The accrual equivalent after-tax return moves closer to the pre-tax return as the time horizon increases and as more of the portfolio return is deferred.

The **accrual equivalent tax rate** (T_{AE}) is the tax rate that makes the pre-tax return (R) equal to the accrual equivalent after-tax return (R_{AE}):

$$R_{AE} = R(1 - T_{AE})$$

Backing the accrual equivalent tax rate out of this formula, we have:

$$T_{AE} = 1 - (R_{AE} / R)$$

The lower the accrual equivalent tax rate, the more tax efficient the investment is. Higher portfolio allocations to tax-disadvantaged assets will result in less tax efficiency and higher accrual equivalent tax rates.

LOS 11.d

Considering investment income tax independent of other types of taxation, the following relationships hold when tax drag is measured as a percent of the investment gain lost to taxes:

1. Tax drag > tax rate.
2. As the investment horizon increases \Rightarrow the tax drag increases.
3. As the investment return increases \Rightarrow the tax drag increases.

Considering deferred capital gains tax independent of other types of taxation:

1. Tax drag = tax rate.
2. As the investment horizon increases \Rightarrow the tax drag is unchanged.
3. As the investment return increases \Rightarrow the tax drag is unchanged.

Considering wealth-based taxes independent of other types of taxation:

1. Tax drag > tax rate.
2. As the investment horizon increases \Rightarrow the tax drag increases.
3. As the investment return increases \Rightarrow the tax drag decreases.

LOS 11.e

Tax-deferred account (TDA) contributions reduce the taxpayer's current taxes (front-end tax benefit); returns accrue tax free and are taxed when withdrawn.

$$FVIF_{TDA} = (1 + R)^N (1 - T_N)$$

Tax-exempt account contributions are made with after-tax funds. Returns accrue and are withdrawn tax free (back-end tax benefit).

$$FVIF_{TEA} = (1 + R)^N$$

Assuming equal returns and horizons, to determine which account will have the highest future value (*FV*), compare the current (T_0) and future (T_N) tax rates:

- If today's tax rate is lower, pay the taxes now and put after-tax funds into a TEA.
- If the expected future tax rate is lower, wait to pay taxes by putting pretax funds into a TDA now and pay taxes later.
- If the two rates are equal, it will not matter which account is used. (Unless the contribution amount to both is equal. TEA has an advantage in that special case.)

LOS 11.f

The effect of taxes on investment risk depends on the type of investment account. If an investment is held in an account that is taxed annually, the government bears part of the investment risk. More specifically, if investment returns are taxed solely as income at the rate of T_1 and the pre-tax standard deviation of returns is σ , then the investor's after-tax risk is $\sigma(1 - T_1)$.

If the investment is held in a tax-exempt account, then the investor bears all the investment risk. This is also true for TDAs because even though the government taxes the future accumulation, the variability of returns is not reduced by taxes levied at the time of withdrawal.

LOS 11.g

The accounts that assets are located in is important for tax management. From a tax management standpoint, an investor would locate heavily taxed assets in tax-advantaged accounts and hold lightly taxed assets in taxable accounts. The value created by the effective tax management of investment securities is referred to as the *tax alpha*.

In addition to examining location as a source of tax minimization, we can also examine an investor's trading behavior. Specifically, we can delineate four types of equity investors:

1. **Traders:** The sole source of a trader's gains are short-term gains that are taxed on an annual basis. Because of their frequent trading, traders forgo many of the tax advantages of equity.
2. **Active investors:** Trade less frequently than traders so that many of their gains are taxed at lower rates.
3. **Passive investors:** Buy and hold equity so that gains are deferred for the long term and taxed at preferential rates when they are realized.
4. **Exempt investors:** Hold all of their stock in tax-exempt accounts, thereby avoiding taxation altogether.

LOS 11.h

Tax loss harvesting uses investment losses to offset investment gains or income, resulting in a tax savings. Sometimes, these losses can be applied against past or future gains.

Note, however, that governments may place limits on the amount of losses that can be recognized or the type of gain it can offset. Although tax loss harvesting saves on current taxes, the apparent tax savings in a given year are misleading. This is because when the old security is sold, the cost basis for future taxes is reduced, thereby resulting in higher taxes in the future.

It is often the case that an investor has accumulated a security position through a series of trades, each occurring at different points in time and at different prices. When highest-in, first-out (HIFO) tax lot accounting is allowed by a government, an investor liquidates the portion of a position with the highest cost basis first, thereby minimizing current taxes. As with tax loss harvesting, the total taxes over time are unchanged with HIFO accounting, assuming a constant tax rate through time. But, like tax loss harvesting, HIFO allows tax savings to be reinvested earlier, creating a tax alpha that compounds through time.

LOS 11.i

Ideally, the efficient frontier of portfolios should be viewed on an after-tax basis. Furthermore, because the tax status of an investment depends on the type of account it is held in, the same asset could appear on the efficient frontier in both taxable and nontaxable forms.

For example, an investor holds both stocks and bonds in both taxable and tax-exempt accounts. In this case, there are four different assets that could appear on the efficient frontier. Of course, the optimization process would have to be constrained to account for limits on the amount of funds that can be placed in tax-advantaged accounts and the type of assets that can be allocated to them.

The mean-variance optimization should optimally allocate assets and determine the optimal asset location for each asset. Accrual equivalent after-tax returns would be substituted for before-tax returns, and after-tax risk would be substituted for before-tax risk.

CONCEPT CHECKERS

1. Of the seven primary global tax regimes, **determine** which of the following does *not* provide potentially favorable tax treatment of interest income.
 - A. The Flat and Heavy regime.
 - B. The Common Progressive regime.
 - C. The Light Capital Gain Tax regime.

2. An individual pays taxes as a single tax payer. During 2009 her taxable income totaled \$412,950. Applying the following rates, her tax bill and average tax rate for 2009 are *closest* to:

<i>Taxable Income</i>	<i>Bracket Amount</i>	<i>Tax Rate %</i>	<i>Plus</i>
<i>(1) Over</i>	<i>(2) Up to</i>	<i>(Col 2 – Col 1)</i>	
0	\$8,350	\$8,350	10
\$8,350	33,950	25,600	15
33,950	82,250	48,300	25
82,250	171,550	89,300	28
171,550	372,950	201,400	33
372,950			35
			108,216

- A. \$122,216; 30%.
- B. \$136,274; 33%.
- C. \$144,533; 35%.

3. An investor is evaluating various assets and strategies for her portfolio. Based solely on tax effects, **determine** which of the following investments would *most likely* be favored in a Heavy Interest Tax Regime.
 - A. Growth stocks with high turnover.
 - B. Bonds with periodic payment of interest.
 - C. Value stocks held for a long period of time.

4. An investment of \$1,000 earns annual interest of 5% (no capital gains). Assuming accrual taxes of 30%, the expected after-tax value of the investment in ten years is *closest* to:
 - A. \$1,035.
 - B. \$1,140.
 - C. \$1,411.

5. In Question 4, the tax drag in percentage terms is *closest* to:
 - A. 1.6%.
 - B. 34.7%.
 - C. 53.2%.

6. Consider the following statements about an account subject to accrual taxes and select the best answer:
- Statement 1: As the investment horizon *increases*, the tax drag *increases*.
Statement 2: As the investment return *increases*, the tax drag *decreases*.
- A. Both of the statements are correct.
B. Statement 1 is incorrect; the tax drag decreases as the investment horizon increases.
C. Statement 2 is incorrect; the tax drag increases as the investment return increases.
7. An investment of \$1,000 earns an annual return of 9%, all of which is deferred capital gains. At a capital gains tax rate of 20%, determine which of the following is *closest* to the after-tax value of the investment in ten years.
- A. \$1,894.
B. \$2,094.
C. \$2,367.
8. For Question 7, the tax drag in percentage terms is *closest* to:
- A. 20.0%.
B. 25.0%.
C. 34.6%.
9. Consider the following two statements about an account that produces only fully tax-deferred capital gains:
- Statement 1: As the investment horizon increases \Rightarrow the tax drag is constant.
Statement 2: As the investment return increases \Rightarrow the tax drag increases.
- A. Both of the statements are correct.
B. Only Statement 1 is correct.
C. Only Statement 2 is correct.
10. An investment of \$1,000 is expected to earn an annual return of 12% in fully deferred capital gains. If the capital gains tax rate is 20% and the cost basis is \$800, determine which of the following is *closest* to the expected value of the investment in ten years.
- A. \$2,485.
B. \$2,645.
C. \$3,106.
11. An investment of \$1,000 earns an annual return of 14%. If the wealth-based tax is 3% and no other taxes are paid on the account, determine which of the following is *closest* to the value of the investment in 15 years.
- A. \$4,520.
B. \$6,924.
C. \$7,138.

12. For Question 11, determine the approximate tax drag in percentage terms.
- 3.5%.
 - 42.6%.
 - 74.4%.

13. Consider the following two statements assuming only wealth taxes apply:

Statement 1: As the investment horizon increases \Rightarrow the tax drag \$ increases.
Statement 2: As the investment return increases \Rightarrow the tax drag % decreases.

- Both statements are correct.
- Only Statement 1 is correct.
- Only Statement 2 is correct.

14. A portfolio generates a total return of 15%. The tax rates on interest, dividends, and capital gains are 35%, 20%, and 20%, respectively. The proportions of the portfolio return from interest, dividends, and realized capital gains are 10%, 25%, and 35%, respectively. Using the data, the net return after all taxes is *closest* to:
- 11.25%.
 - 11.50%.
 - 12.68%.

15. In Question 14, the effective capital gains tax rate is *closest* to:
- 5.07%.
 - 7.10%.
 - 35.50%.

16. In Question 14, assume the return proportions continue for seven years and the account's cost basis is €100,000. The expected balance in the account in seven years after payment of all taxes is *closest* to:
- €184,260.
 - €221,361.
 - €224,013.

17. In Question 14, assume the account's basis is €80,000 instead of €100,000 and the investment's current value is €100,000. The expected balance in the account in seven years after payment of all taxes is *closest* to:
- €180,361.
 - €217,361.
 - €220,014.

18. In Question 16, the accrual equivalent after-tax return is *closest* to:
- 10.144%.
 - 12.021%.
 - 12.212%.

19. In Question 16, the accrual equivalent tax rate is *closest* to:
- 19.86%.
 - 30.01%.
 - 44.01%.

20. Assume €100,000 is invested in a tax-deferred account. The expected after-tax balance that can be withdrawn after 20 years, assuming a tax rate of 30% and a pre-tax return of 10%, is *closest* to:
 - A. €386,968.
 - B. €470,925.
 - C. €672,750.
21. Assume €100,000 is invested in a tax-exempt account. The expected balance in the account after 20 years, assuming a tax rate of 30% and pre-tax return of 10%, is *closest* to:
 - A. €386,968.
 - B. €500,925.
 - C. €672,750.
22. An investor has €800,000 equity in a tax-deferred account and €600,000 in bonds in a tax-exempt account. Assuming a tax rate of 40%, the after-tax asset allocation is *closest* to:
 - A. 44.4% stocks; 55.6% bonds.
 - B. 57.1% stocks; 42.9% bonds.
 - C. 31.0% stocks; 69.0% bonds.
23. An investor pays 20% current taxes but will pay future taxes at 30%. The investor is willing to give up \$2,000 in current consumption and expects to earn 12% in a tax-advantaged account for 30 years. Assuming no contribution limits, determine which account will have the highest future after-tax accumulation.
 - A. A tax-deferred account.
 - B. A tax-exempt account.
 - C. The accounts provide the same future accumulations.
24. Of the following assets, determine which one would be the *most* appropriate for a tax-deferred account rather than a taxable account in a Flat and Heavy Tax regime.
 - A. Tax-exempt bonds.
 - B. High-dividend stocks.
 - C. Corporate bonds.
25. All else equal, which of the following will usually have the lowest risk?
 - A. A tax-deferred account.
 - B. A taxable account.
 - C. A tax-exempt account.
26. All else equal, which of the following investors would have the lowest future accumulation?
 - A. A trader.
 - B. An active investor.
 - C. A passive investor.

27. An investor has a realized capital gain of £80,000 and pays a capital gains tax rate of 30%. The investor can sell another stock with a cost basis of £140,000 and a current market value of £90,000. The tax savings (tax alpha) from harvesting the loss is *closest* to:
- £9,000.
 - £10,000.
 - £15,000.
28. In the previous question, assume the investor can either:

Strategy 1: Sell the stock now and recognize the loss in the current year.

Strategy 2: Hold the stock and sell it at the end of the second year.

In either case, the old or new stock is sold at the end of the second year after earning a 10% return for that year. Any current tax savings (tax alpha) is immediately reinvested in very similar stock. **Determine** which of the strategies provides the highest future accumulation.

- Strategy 1.
 - Strategy 2.
 - The strategies provide the same future after-tax accumulation.
29. If performed correctly from a tax perspective, mean-variance optimization would incorporate:
- accrual equivalent after-tax returns and after-tax standard deviations.
 - accrual equivalent after-tax returns and before-tax standard deviations.
 - annual after-tax returns and after-tax standard deviations.

ANSWERS – CONCEPT CHECKERS

1. C The Light Capital Gain Tax regime provides potentially favorable treatment for capital gains but not for interest and dividend income. The Flat and Heavy regime provides potentially favorable treatment for interest income but not capital gains and dividend income. The Common Progressive regime provides potentially favorable treatment for interest income, dividend income, and capital gains.
2. A With total taxable income of \$412,950, the individual falls in the highest tax bracket (*marginal tax rate* = 35%). As such, she pays \$108,216 plus 35% of any amount above \$372,950. Her total tax bill is:

$$\$108,216 + (\$412,950 - \$372,950)(0.35) = \$122,216$$

Her average tax rate is the average rate paid on her entire taxable income, which is determined by dividing taxes paid by taxable income:

$$\frac{\$122,216}{\$412,950} = 29.6\%$$

3. C Bonds with periodic payment of interest would not be favored due to the high tax on interest in this environment. Low-turnover strategies are favored over high-turnover strategies because long-term capital gains are usually taxed less than short-term gains. Furthermore, in most countries, capital gains are paid only when realized (i.e., when the investment is sold).
4. C Expected future value after paying annual (accrual) taxes:

$$\begin{aligned} FV_{IT} &= V_p [1 + R(1 - T_I)]^N \\ &= \$1,000 [1 + 0.05(1 - 0.30)]^{10} \\ &= \$1,410.60 \end{aligned}$$

5. B If the tax rate were zero in the previous question, the expected value of the investment would have been:

$$\begin{aligned} FV_{IT} &= V_p [1 + R(1 - T_I)]^N \\ &= \$1,000 [1 + 0.05(1 - 0)]^{10} \\ &= \$1,628.89 \end{aligned}$$

The effect of taxes is a reduction of investment value of \$218.29 (= \$1,628.89 – \$1,410.60). On a percentage basis, the tax drag is 34.7% [= \$218.29 / (\$1,628.89 – \$1,000)].

6. C Statement 1 is correct. Statement 2 is incorrect.

A higher investment return results in a higher tax drag when considering tax on investment income. In the example above, if the return is changed from 5% to 10%, the tax drag increases from 34.7% to 39.3% (= \$626.59 / \$1,593.74).

7. B Expected future value after paying deferred capital gains taxes only:

$$\begin{aligned} FV_{CGT} &= V_p \left[(1+R)^N (1-T_{CG}) + T_{CG} \right] \\ &= \$1,000 \left[(1+0.09)^{10} (1-0.20) + 0.20 \right] \\ &= \$2,093.89 \end{aligned}$$

8. A When only deferred capital gains taxes are paid, tax drag % is the same as the tax rate, in this case 20%.

9. B Only Statement 1 is correct. Tax drag % is constant when capital gains taxes are fully deferred, regardless of the investment horizon or investment return.

10. B Expected future value when both deferred capital gains taxes and cost basis are considered:

$$\begin{aligned} FV_{CCBT} &= V_p [(1+R)^N (1-T_{CG})] + T_{CG} B \\ &= \$1,000 [(1+0.12)^{10} (1-0.20) + 0.20(0.80)] \\ &= \$2,644.68 \end{aligned}$$

11. A Expected future value with wealth taxes only:

$$\begin{aligned} FV_{WT} &= V_p [(1+R)(1-T_W)]^N \\ &= \$1,000 [(1+0.14)(1-0.03)]^{15} \\ &= \$4,520.11 \end{aligned}$$

12. B If the wealth tax rate in the previous question were zero, the expected future value of the investment would have been:

$$\begin{aligned} FV &= \$1,000 [(1+0.14)(1-0)]^{15} \\ &= \$7,137.94 \end{aligned}$$

The effect of taxes is a reduction of investment value of \$2,617.83 (\$7,137.94 – \$4,520.11). On a percentage basis, the tax drag is 42.65% [$\$2,617.83 / (\$7,137.94 - \$1,000)$].

13. A Both statements are correct. The tax drag as a proportion of the future investment value increases with the investment horizon. However, as the investment return increases, the tax drag % on the future investment value decreases.

14. C The return after taxes on interest income, dividends, and realized capital gains factors in the proportions of the return sources and the respective taxes on each:

$$\begin{aligned} R_{ART} &= R(1-P_I T_I - P_D T_D - P_{CG} T_{CG}) \\ &= 0.15 [1 - 0.10(0.35) - 0.25(0.20) - 0.35(0.20)] \\ &= 0.15(0.845) = 0.12675 \cong 12.68\% \end{aligned}$$

15. B The effective capital gains tax rate that adjusts for the annual taxes already paid is:

$$\begin{aligned} T_{ECG} &= T_{CG} \frac{(1-P_I - P_D - P_{CG})}{(1-P_I T_I - P_D T_D - P_{CG} T_{CG})} \\ &= 0.20 \left[\frac{1 - 0.10 - 0.25 - 0.35}{1 - 0.10(0.35) - 0.25(0.20) - 0.35(0.20)} \right] \\ &= 0.20 \left(\frac{0.30}{0.845} \right) = 0.0710 = 7.10\% \end{aligned}$$

16. B Expected future value after all taxes ($FVIF_T$) using the effective capital gains tax rate (i.e., some capital gains realized annually and some deferred):

$$\begin{aligned} FV_T &= V_P[(1 + R_{ART})^N(1 - T_{ECG})] + T_{ECG} - (1 - B)T_{CG} \\ &= €100,000[(1 + 0.1268)^7(1 - 0.0710) + 0.0710 - (1 - 1)0.20] = €221,361.22 \end{aligned}$$

17. B The expected balance in the account in seven years after payment of all taxes:

$$FV = €100,000[(1 + 0.1268)^7(1 - 0.0710) + 0.0710 - (1 - 0.80)0.20] = €217,361.22$$

18. B The accrual equivalent after-tax return:

$$R_{AE} = \sqrt[N]{\frac{FV_T}{PV}} - 1 = \sqrt[7]{\frac{221,361.22}{100,000}} - 1 = \sqrt[7]{2.213612} - 1 = 0.120212$$

19. A The accrual equivalent tax rate (T_{AE}) is the tax rate that makes the pre-tax return equal to the accrual equivalent after-tax return:

$$\begin{aligned} T_{AE} &= 1 - \frac{R_{AE}}{R} \\ &= 1 - \frac{0.12021}{0.15} = 19.86\% \end{aligned}$$

20. B The expected after-tax balance in the account in 20 years:

$$\begin{aligned} FV_{TDA} &= V_P(1 + R)^N(1 - T_N) \\ &= €100,000[(1.10)^{20}(1 - 0.30)] \\ &= €470,925 \end{aligned}$$

21. C The expected balance in the account in 20 years (no taxes are paid):

$$\begin{aligned} FV_{TEA} &= V_P(1 + R)^N \\ &= €100,000(1.10)^{20} \\ &= €672,750 \end{aligned}$$

€386,968 is the expected future value of an account taxed annually (accrual taxes). €500,925 is the expected future value of an account with deferred capital gains taxes and a basis of €100,000.

22. A The investor has €480,000 [(\$800,000 × (1 - 0.40))] after-tax invested in equity. The bonds in the tax-exempt account are not subject to taxation and thus are not adjusted. On an after-tax basis, the investor has 44.4% in equity [€480,000 / (€480,000 + €600,000)] and the other 55.6% in bonds [€600,000 / (€480,000 + €600,000)].
23. B Because the current tax rate is less than the future tax rate, the tax-exempt account will have a higher expected future accumulation, even though contributions are made from after-tax dollars. The following calculations are unnecessary to answer the question but illustrate its proof.

If the investor pays current taxes at 20% and is willing to give up \$2,000 in consumption, she can contribute \$2,500 to a tax-deferred account. Because contributions to TDAs are treated as tax deductions against income, the \$2,500 contribution will save her \$2,500 × 0.20 = \$500 in taxes. Therefore, her net consumption would be reduced by only \$2,000.

Alternatively, she could invest \$2,000 in after-tax dollars in a tax-exempt account.

Future value calculations:

<i>FVIF Formula</i>	<i>Future Value</i>
$FVIF_{TDA} = (1 + R)^N (1 - T_N)$	$\$2,500 [(1 + 0.12)^{30} (1 - 0.30)] = \$52,430$
$FVIF_{TEA} = (1 + R)^N$	$\$2,000 (1 + 0.12)^{30} = \$59,920$

24. B In a Flat and Heavy Tax regime, interest is taxed at a favorable rate but dividends are not. A tax-deferred account (TDA) provides the investor a current tax deduction as well as tax-free accumulation. Taxes are paid at withdrawal only. Assets with high annual (taxable) returns that are subject to full taxation are best held in TDAs. Assets that provide no cash flows or are otherwise subject to reduced or no annual taxation should be held in taxable accounts.

Tax-exempt bonds, which pay lower coupons than otherwise equivalent taxable bonds, should be held in taxable accounts. Because interest received on corporate bonds receives favorable tax treatment, those bonds are best held in a taxable account also. Dividends received on the stocks, on the other hand, would be fully taxed and, hence, best held in the TDA.

25. B The taxable account will have the lowest risk because the government (taxing authority) effectively shares the risk of the investment with the investor. Assuming before-tax standard deviation of σ , the after-tax standard deviation of the investment is $\sigma(1 - T_I)$.
26. A The trader will have the lowest future accumulation because her capital gains will be short term, taxed at a high rate, and taxed every year. The active investor will have the next lowest future accumulation because, although gains are taxed at a lower rate, the gains are taxed every year. The passive investor will pay a low tax rate on a deferred basis and have the highest accumulations of the three investors.

27. C If the stock is sold, there is a capital loss of $\$90,000 - \$140,000 = -\$50,000$, making net taxable gain $\$30,000$. The tax is $0.30 \times \$30,000 = \$9,000$.

If the stock is not sold, the taxes on the full gain are $\$80,000 \times 0.30 = \$24,000$. The recognition of the capital loss would result in a tax savings of $\$24,000 - \$9,000 = \$15,000$. In this case, the tax alpha from harvesting the loss can also be calculated as the capital loss multiplied by the tax rate: $\$50,000 \times 0.30 = \$15,000$.

28. A While this may look like a calculation question, it is really a concept question. The appreciation rate is the same in both cases and assuming future tax rates do not change (which is the only acceptable assumption when nothing is said), there is a benefit to the tax deferral inherent in tax loss harvesting. Tax loss harvesting changes the pattern of tax payments [i.e., the payment(s) is (are) pushed further into the future]. However, if the stock is sold in the current year, the tax savings of $\$15,000$ can be immediately reinvested and earn the 10% return. Thus, Strategy 1 will provide the higher future accumulation.
29. A Assets should be examined on an *after-tax* basis, not a before-tax basis. This means substituting accrual equivalent after-tax returns for before-tax returns and after-tax risk for before-tax risk. Note that, because most mean variance optimization is performed using annual expectations, answer choice C could technically be considered a correct answer also.

The following is a review of the Private Wealth Management principles designed to address the learning outcome statements set forth by CFA Institute. This topic is also covered in:

ESTATE PLANNING IN A GLOBAL CONTEXT

Study Session 4

EXAM FOCUS

As with the previous reading, the purpose here is not to teach law and regulation of a specific country but concepts and calculations relevant to wealth management. Be prepared to make calculations and understand the implications discussed in this section.

ESTATE PLANNING

LOS 12.a: Discuss the purpose of estate planning and explain the basic concepts of domestic estate planning, including estates, wills, and probate.

CFA® Program Curriculum, Volume 2, page 262

Your **estate** is everything you own: financial assets; real estate (a.k.a. *immovable property*); collections such as art, stamps, or coins; businesses; and non-tangible assets, such as trademarks, copyrights, and patents. Estate planning is the planning process associated with transferring your estate to others during your lifetime or at death so that the assets go to the individuals or entities you intend and in the most efficient way.

The most common tool used to transfer assets is a **will** (a.k.a. a *testament*). A will is the legal document that states the rights others will have to your assets at your death. The person transferring assets through a will is known as the *testator*.

Probate is a legal process that takes place at death, during which a court determines the validity of the decedent's will, inventories the decedent's property, resolves any claims against the decedent, and distributes remaining property according to the will. Probate involves considerable paperwork and court appearances, and all costs associated with the probate process, which can be significant, are borne by the decedent's estate. If the decedent leaves no will or if the will is deemed invalid, the decedent is said to have died *intestate* and the distribution of assets is determined by the court.

Assets *solely owned* by the decedent must be transferred by a will through the probate process. Due to the cost, the time it takes, and the public nature of the probate process, however, individuals often take steps to avoid it. This can be accomplished through joint ownership with rights of survivorship, living trusts, retirement plans, life insurance, and other means which transfer assets outside the probate process (i.e., without the need for a will).

WEALTH TRANSFER TAXES

LOS 12.b: Explain the two principal forms of wealth transfer taxes and discuss the impact of important non-tax issues, such as legal system, forced heirship, and marital property regime.

CFA® Program Curriculum, Volume 2, page 265

The two primary means of transferring assets are through **gifts** and **bequests**. Gifts are referred to as *lifetime gratuitous* (without the intent of receiving value in return) *transfers* or *inter vivos* (between living individuals) transfers and may be subject to **gift taxes**. Whether the gift is taxed and who pays the tax is determined by the taxing authorities involved. Assets transferred through bequests are referred to as *testamentary* (after death) *gratuitous transfers* and can be subject to **estate taxes**, paid by the grantor (i.e., transferor), or **inheritance taxes**, paid by the recipient.



Professor's Note: The tax treatment of testamentary transfers varies across tax systems and even in the same system according to the relationship between the transferor and recipient. In many cases, for example, transfers between spouses are not subject to taxes. Even when not between spouses, most transfers are subject to exclusions (statutory allowances), which state a maximum that may be transferred tax free.

Many jurisdictions that impose gift taxes also provide exclusions. As of 2009 in the United States, for example, the first \$13,000 given to a single recipient is exempt from taxation, subject to limitations depending upon the location and type of the asset and the tax status of the recipient. For example, the asset might be cash or securities or even real estate located in another country, and the entity could be a relative, friend, or charity in the same or another country. Thus, the first \$13,000 is exempt from U.S. gift taxes, but the recipient could have to pay gift taxes under another tax regime.

As discussed in Topic Review 11, tax laws across the globe can vary dramatically. Many of the differences are due to the foundations upon which the tax systems are based. For example, a civil law system is based on old Roman law. In this system, laws are handed down (i.e., a top down system) by a legislative body.

Common law systems, based primarily on old English law, are more “bottom up.” Judges play very important roles in common law systems by refining any existing laws to meet particular situations. Once made by a judge, the decisions become *precedent* to be applied in future cases.

Ownership Rights

Although on the surface it might seem rather clear cut, the precise legal meaning of *ownership* can be shaped by the legal regime. Some regimes provide statutory ownership that effectively gives one person the right to the assets of another. If the system has **forced heirship** rules, for example, children have a right to a portion of a parent’s estate,

regardless of the location of the child vis-à-vis the parent, the relationship that exists between the parent and child, or even the relationship between the parents.

Knowing the situation could arise, wealthy individuals might try to avoid forced heirship rules by gifting assets or moving them “offshore” into a trust where they fall under a different taxing authority with no forced heirship rule. Recognizing this, many regimes apply claw-back provisions that add the values back to the decedent’s estate before calculating the child’s share. If the estate isn’t sufficient to meet the child’s entitlement, the child may in some cases legally seek the difference from those who received the gifts.

In addition to marital rights provided under forced heirship rules, spouses can also have marital property rights according to the type of marriage they are in. Under a **community property rights** regime, each spouse is entitled to one-half of the estate *earned during* the marriage. Gifts and inheritances received before or during the marriage may be held separate from marital assets. Assets not distributed under community property rights are distributed according to the will.



Professor’s Note: Assets that are not considered part of marital assets under a community property rights regime are considered part of the total estate for purposes of forced heirship rules. Also, a marital right to the estate is a form of forced heirship.

Under a **separate property rights** regime, which is common in civil law countries, each spouse owns and controls his or her property, separate from the other. Each spouse may, barring the presence of other forced heirship rules, bequeath assets as they wish.

Example: Property rights and forced heirship

Hope and Larry have been married for 40 years. They have two married children, Emma, age 32, and Toby, age 34. The community property regime under which the family lives provides that at the death of a spouse, the surviving spouse has the right to one-half the marital estate (community property). In addition, a forced heirship rule entitles a surviving spouse to 30% of the estate, and children are entitled to split 30% of the estate. During the marriage, Larry inherited \$500,000 from his parents. His inheritance is not considered part of marital assets, which total \$1,300,000.

If Larry should die:

- A. **Determine** the amount Hope would inherit under both of the forced heirship rules.
- B. **Determine** the amount each child would inherit under the forced heirship rule.

Answer:

- A. Under the community property provision, the surviving spouse is entitled to one-half the *marital estate*. The marital estate includes assets totaling \$1.3 million. Larry's \$500,000 inheritance is considered part of the *total estate*, but not part of community property (marital estate).

When the country has both community property rights and forced heirship rules, as in this case, the surviving spouse is entitled to the *greater* of the two amounts:

- Under community property, Hope is entitled to half the marital property or $\$1,300,000 / 2 = \$650,000$.
 - Under the forced heirship rule, Hope is entitled to 30% of the *total estate* or $(0.30)(\$1,800,000) = \$540,000$.
 - Hope is entitled to the greater of the two amounts, so she would receive \$650,000 under community property rights. She could inherit more based on the stipulations of Larry's will.
- B. Under the forced heirship rules, the two children are entitled to *split* 30% of the total estate for $(0.30)(\$1,800,000) = \$540,000$ in total for \$270,000 to each child.

In total, only $\$650,000 + \$540,000 = \$1,190,000$ of the total \$1.8 million is distributed according to forced heirship rules. (The marital community property rights provision is a type of forced heirship rule.) The remaining \$610,000 would be distributed through a probate process according to Larry's will.

Example: Claw-back provision

Assume a country with forced heirship rules entitling children to split 33% of the estate of a deceased parent, subject to claw-back provisions. The estate of the (unmarried) decedent is worth \$500,000 after gifting \$2,750,000 to two of his children in anticipation of death. An estranged child has now come forth to claim his legal right under the community property described in the question data. *Based solely on this information*, determine the amount the estranged child is entitled to under the forced heirship rule.

Answer:

The three children of the deceased are entitled to *split* 33% of the parent's estate or $0.33(\$3,250,000) = \$1,072,500$.



Professor's Note: According to the claw-back provision, we use the total value of the estate ($\$500,000 + \$2,750,000 = \$3,250,000$) before the gifts.

Because there are apparently three children (the two who received gifts and the estranged child), each is entitled to $\$1,072,500 / 3 = \$357,500$ under the forced heirship rule.

Because the estate is worth \$500,000 after the gifts, the estranged child is able to receive \$357,500 without resorting to lawsuits to reclaim part of the gifts from the other two children.

CORE CAPITAL

LOS 12.c: Determine a family's core capital and excess capital, based on mortality probabilities and Monte Carlo analysis.

CFA® Program Curriculum, Volume 2, page 268

To understand the concepts of core and excess capital, consider a balance sheet; assets are on the left side and liabilities and equity are on the right; of course, equity equals asset minus liabilities.

On an individual's balance sheet, assets consist of the financial and other assets currently held by the individual plus the *present value* of net employment income expected to be generated over the lifetime, referred to as **human capital** or **net employment capital**. (Human capital is discussed at length in Topic Review 14.) In other words, the individual's *total assets* equal the value of assets currently held plus the individual's ability to accumulate more assets in the future through employment (i.e., generate more future income than is required to meet all future expenses).

The individual's liabilities on the balance sheet are the present values of all current and future costs necessary to sustain a given lifestyle. These consist of any explicit liabilities, such as mortgage or other loan payments plus costs of living and any planned gifts and

bequests. Just as with a financial balance sheet, then, the individual's **excess capital** (i.e., equity capital) is the difference between total assets and total liabilities.

The amount of assets necessary to meet all the individual's liabilities plus a reserve for unexpected needs is considered the individual's (or family's) **core capital**. It's the amount that must be maintained to meet all present and future liabilities as described previously. Any amount above core capital is considered excess capital and can be used for other purposes. Hint: In the following examples, no reserve for unexpected needs is given so one is not included. On the exam you should only include such an amount if given clear direction.

Mortality Probabilities

A major problem associated with estimating the individual's human capital and total liabilities, of course, is determining the values of future net employment income and required future outlays. Compounding the problem is determining the individual's lifetime. To estimate an individual's remaining expected life, statisticians developed **mortality tables**. Mortality tables show an individual's expected remaining years based upon attaining a given age. For example, one of these tables might show that a male who has reached the age of 80 has approximately an 87% probability of living one more year and a 16% probability of living to age 93.

For the Exam: The probabilities of survival change every year. They are based on the individual's current age and show the probability for the *average individual* who has attained that age. In our previous discussion, once the 80-year-old male reaches 85, the probability of him living to 93 increases somewhat because at 80, living to 93 means surviving another 13 years, while at 85, it means surviving only another eight years. Of course, the probability of surviving a set *number* of years decreases as the individual ages. If you are required to perform related calculations on the exam, the question will have to include a mortality table.

Consider the following mortality table, which is adapted from the 2013 CFA Level III curriculum.¹ The husband and wife are currently 79 and 68, respectively. From the table we see that the husband has a 93.55% probability (Prob.) of living one more year, to the age of 80, and a 46.74% probability of living eight more years, to the age of 87. The wife has a 98.31% probability of living one more year (age 69) and 82.52% probability of living eight more years (age 76). Additional explanation follows the table.

Figure 1: Individual and Joint Mortality Probabilities and Core Capital

Yrs	Husband		Wife		Combined Prob.	Real Annual Spending	Expected Real Spending	Present Value	Total
	Age	Prob.	Age	Prob.					
1	80	0.9355	69	0.9831	0.9989	200,000	199,780	195,863	195,863
2	81	0.8702	70	0.9649	0.9954	204,000	203,062	195,177	391,040
3	82	0.8038	71	0.9457	0.9893	208,080	205,854	193,981	585,021

1. 2013 CFA Level III curriculum, Exhibit 2, Vol. 2, p. 270.

Study Session 4

Cross-Reference to CFA Institute Assigned Reading #12 – Estate Planning in a Global Context

4	83	0.7339	72	0.9249	0.9800	212,242	207,997	192,157	777,178
5	84	0.6686	73	0.9025	0.9677	216,486	209,494	189,745	966,923
6	85	0.6001	74	0.8785	0.9514	220,816	210,084	186,549	1,153,472
7	86	0.5327	75	0.8526	0.9311	225,232	209,714	182,569	1,336,041
8	87	0.4674	76	0.8252	0.9069	229,737	208,348	177,823	1,513,864
9	88	0.4048	77	0.7958	0.8785	234,332	205,861	172,255	1,686,119
10	89	0.3459	78	0.7646	0.8460	239,019	202,210	165,883	1,852,002
11	90	0.2912	79	0.7311	0.8094	243,799	197,331	158,706	2,010,708

- **Combined Prob.** is the (joint) probability that one or both will live to the given age. For example, there is a 98% probability that *at least* one of them will live four years.
- **Real Annual Spending** (i.e., living expenses) for the coming year is expected to be \$200,000 and is expected to increase at a rate of 2% per year.
- **Expected Real Spending** is *Real Annual Spending* multiplied by *Combined Prob.* It shows the expected amount required for the year based on the probability of either or both remaining alive.
- **Present Value** is *Expected Real Spending* discounted to year zero at the real, risk-free rate of 2%.
- **Total** is a running total. It's the amount of core *capital required* to meet living expenses through the given year. For example, assuming no further contributions, it will take a portfolio of \$1,153,472 (today) to meet estimated expenses for six years.



Professor's Note: The full table includes enough rows for both to reach 100 years of age. At 100 years old, individuals are assumed to have 0% probability of living another year.

Example: Calculating core capital using a mortality table

- Using the mortality table, determine the probability that either the husband, the wife, or both will be alive in ten years.
- Based on expenditures in the table, calculate the core capital required for the next ten years.
- If the family has a portfolio of \$2,500,000, determine (based solely on the information provided) the maximum amount they could give to charity.

Answer:

- From the mortality table, we see the probability of surviving ten years for the husband and wife is 34.59% and 76.46%, respectively. The probability that one or both will survive ten years (Combined Prob.) is calculated as follows:

$$\begin{aligned}\text{prob(joint survival)} &= \text{prob(husband survives)} + \text{prob(wife survives)} \\ &\quad - \text{prob(husband survives)} \times \text{prob(wife survives)} \\ &= 0.3459 + 0.7646 - (0.3459)(0.7646) = 84.60\%\end{aligned}$$

- The amount of core capital required for ten years is:

$$\begin{aligned}\text{core capital}_{10 \text{ years}} &= \sum_{t=1}^{10} \frac{P(\text{surv}_t)(\text{spending}_t)}{(1+r)^t}; \quad r = \text{real risk-free rate} \\ &= \frac{P(\text{surv}_1)(\text{spending}_1)}{(1.02)^1} + \dots + \frac{P(\text{surv}_{10})(\text{spending}_{10})}{(1.02)^{10}} \\ &= \$1,852,002\end{aligned}$$

\$1,852,002 is calculated by multiplying the real annual spending requirement for each year by the joint probability associated with that year, finding the present value of the result at the risk-free rate, and then summing the present values for all ten years. For example, the core capital requirement (portfolio value required today) for the next *three* years is:

$$\begin{aligned}\text{core capital}_{3 \text{ years}} &= \frac{P(\text{surv}_1)(\text{spending}_1)}{(1+r)^1} + \frac{P(\text{surv}_2)(\text{spending}_2)}{(1+r)^2} + \frac{P(\text{surv}_3)(\text{spending}_3)}{(1+r)^3} \\ &= \frac{0.9989(\$200,000)}{(1.02)^1} + \frac{0.9954(\$204,000)}{(1.02)^2} + \frac{0.9893(\$208,080)}{(1.02)^3} = \$585,021\end{aligned}$$



Professor's Note: Because we used real spending requirements in our example, we discounted at the real risk-free rate of return. We used the risk-free rate because we want the risk of the cash flows to be reflected in the discount rate. You could argue that the cash flows required to maintain a given lifestyle are uncertain, due to uncertain inflation and other unexpected events. By assuming certain cash flows and using the risk-free rate to discount them, we implicitly assume the individuals will adjust their expenditures to maintain the total expected annual expenses.

We could also have used nominal spending requirements and discounted at the nominal risk-free rate. This would amount to incorporating inflation into the numerator (spending requirement) and denominator ($1 + r$) by multiplying each by $1 + i$. Multiplying both the numerator and denominator by the same number does not change the answer.

- C. Excess capital is any amount above the core capital requirement. Based solely on the information provided and using a 10-year planning horizon, they have excess capital of $\$2,500,000 - \$1,852,002 = \$647,998$, which they could give to charity.

Safety Reserve

You should have been a bit uncomfortable with the calculations in answer C of the previous example. Remember, a mortality table assumes that when an individual reaches age 100 there is 0% probability of living one more year. Even if both the husband and wife in our example were 90 years old, mortality rates are based on averages, so in reality there is a *non-zero* probability that one or both will live beyond 100.

If they gave all the excess capital to charity (\$647,998 in the example), the implication is that they would run out of money at age 100. In other words, even when using mortality tables, or maybe even *because* you are using them, you should incorporate a **safety reserve** into your calculations.

Note also that the core-capital model implicitly assumes an average risk-free rate of return on assets. 2008's negative return should be ample evidence of the possible invalidity of that assumption over specific periods. This is another reason to incorporate a safety reserve when estimating core capital.

Monte Carlo Simulation

As you read in Topic Review 14, Monte Carlo simulation is often utilized in retirement planning to determine the size of the core capital portfolio required to meet a desired retirement lifestyle (i.e., a desired amount of annual spending). In estimating future portfolio values, the analyst inputs *distributions* of variables into a Monte Carlo program. For example, the analyst not only stipulates the expected return for every asset class in the portfolio, she also inputs the standard deviation of the *distribution* of possible returns and even their *correlations* from year to year (to incorporate the likelihood of

market trends). In the same fashion, the analyst can input a distribution of possible reinvestment rates, inflation rates, spending rates, et cetera.

The client first determines the desired level of retirement spending as well as any desired bequests or other gifts. Based on those cash flow needs, the analyst determines the size of the portfolio needed on the day the individual retires. The analyst uses distributions of reinvestment rates, inflation rates, asset class returns, tax rates, et cetera, and even a distribution of possible life spans. The output from the simulation is a distribution of portfolio sizes along with their respective probabilities of supporting the client's desired retirement lifestyle.

Next, the analyst uses Monte Carlo simulation to determine the expected value and distribution of portfolio values at retirement (retirement is several years away). Using different portfolio compositions (i.e., asset allocations), distributions of possible macro variable values, and perhaps even a variable retirement date, the Monte Carlo simulation indicates the probability of each portfolio allocation growing to the desired portfolio value at retirement.

Assume, for example, that the expected value at retirement of a 100% equity portfolio is above the minimum value required to meet the client's wishes. The distribution could even indicate a significant probability of a very high portfolio value with an accompanying luxurious lifestyle. The beauty of the Monte Carlo analysis, however, is that it also shows the probability of falling short of the necessary value (i.e., associated shortfall risk). This all-equity portfolio might have an *expected value* above the minimum and a probability of very high values, but it could also have a significant probability of falling short of the minimum. Thus, the distribution of possible portfolio values gives a clear indication of the shortfall risk associated with each asset allocation.

Now assume the client is at retirement and planning for spending over the retirement years. Monte Carlo analysis again can be useful. This time the analyst inputs various spending rates over retirement in addition to the distributions of the other inputs. The importance of this analysis is that, for each spending rate, it shows the probability of running out of assets before death (also referred to as *longevity risk*). We'll refer to the probability of running out of money (or the need to revise downward the level of spending) as the *probability of ruin*.

For all but the largest portfolios, level of spending and probability of ruin are positively correlated. There will be very high ruin probabilities with very high spending rates, and as the spending rate is reduced, the ruin probability falls. The goal for the client, therefore, is selecting the highest spending rate that has an acceptable ruin probability.

Consider the following ruin probability table (adapted from the 2013 Level III curriculum²). The table shows that to maintain approximately a 95% confidence interval—meaning a 95% probability of not out-living their capital—and a 5.2% ruin probability—meaning a 5.2% probability they will outlive their capital—a 60-year-old individual needs to adhere to an annual spending rate of 3% of the portfolio value or less.

2. Exhibit 3, 2013 CFA Level III curriculum, Vol. 2, p. 275. Exhibit 3 in CFA Curriculum Book 2 assumes a mean arithmetic return of 5%, a mean geometric return of 4.28%, and a standard deviation of 12%.

Figure 2: Ruin Probabilities and Spending Rates

Retirement Age	Median Age at Death	Hazard Rate		Real Spending Rate		
				2%	3%	4%
55	83.0	2.48	Probability of Ruin	1.8	6.3	14.0
60	83.4	2.96		1.5	5.2	11.6

Professor's Note: Such tables are built with an assumed rate of return and standard deviation of return. Those might be shown in a note to the table but are not given in this case. The table is also based on mortality assumption rates. You may notice a column labeled hazard rate. This specifies the mortality assumption. Curiously it is not defined or covered in the CFA text and is irrelevant to your purpose. Some candidates have asked. In this context it is probably related to the percentage of a population that reaches retirement age but dies before median age of death. Again, it is not defined and irrelevant to your purpose, assuming your intent is to prepare for the CFA exam.

RELATIVE AFTER-TAX VALUES

LOS 12.d: Evaluate the relative after-tax value of lifetime gifts and testamentary bequests.

CFA® Program Curriculum, Volume 2, page 277

Consider the owner of common stock who can give it to a beneficiary now, and it may or may not be subject to taxes, or hold it until death (assume 20 years from now) and transfer it to a beneficiary (i.e., recipient) through a will. If transferred at death, it will be taxed according to estate tax provisions. We know the stock has the same performance expectations over the next 20 years whether it is held by the testator (original owner) or beneficiary. To the beneficiary, then, any differences in the value of the stock must be attributable to taxes.

To determine whether the recipient would be better off receiving the stock as a gift today and paying gift taxes or waiting 20 years and receiving it as part of an estate, we calculate its estimated relative after-tax value in 20 years. We'll start by considering it a tax-free gift.

For the Exam: Technically the terms donor or testator, recipient or beneficiary depends on whether the asset is transferred as a lifetime gift (donor and recipient) or as part of an estate (testator and beneficiary). In the text and on the exam the terms giver, from the estate, donor, and testator can be used interchangeably. In each case:

r_e and t_{ie} are the pre-tax return earned on an asset and the applicable annual income tax rate for that return on assets if held by the giver or in their estate.

The terms gift receiver, receiver, recipient, and beneficiary can also be used interchangeably. In each case:

- r_g and t_{ig} are the pre-tax return earned on an asset and the applicable annual income tax rate for that return on assets if held by the gift receiver.
- T_e is the estate tax rate and would be paid from the estate.
- T_g is the gift tax rate and could be zero, paid by the receiver, or by the giver as specified by the facts in the question.

Hint: In the following relative value equations, the receiver is the numerator and giver is the denominator.

Example: Relative after-tax value; tax-free gift

An individual is trying to decide whether to give stock to a recipient today or leave it in a will. The donor (i.e., testator) is expected to live another 20 years, over which time the stock is expected to earn 8% per year. Both the donor and recipient pay investment return taxes of 35%. Inheritance taxes take 40% of a testator's estate. The gift amount is below a cut off for gift taxation and so is not subject to the otherwise 25% gift tax rate.

Determine whether the individual should gift the stock immediately or leave it to the beneficiary in a will.

Relative After-Tax Value

To determine the relative future value of a tax-free gift given during one's lifetime, we find the *ratio* of the two values:

$$RV_{\text{tax-free gift}} = \frac{FV_{\text{tax-free gift}}}{FV_{\text{bequest}}}$$

Professor's Note: The formula is simply the future value of a dollar or pound or yen, etc., if the funds are given to the receiver in the numerator over the future value if continued to be held by the giver and then subject to estate taxes in the denominator.



Because in this case the gift is tax-free and the annual returns and tax rates of the giver and receiver are equal, it should be obvious it will be best to give now and avoid the estate taxes. In addition, the solution could be found simply as the receiver of the tax-free gift's FV times 1 – the estate tax rate; $2.756226 \times .60 = 1.653735$

$$RV_{\text{tax-free gift}} = \frac{\left[1 + r_g(1 - t_{ig})\right]^n}{\left[1 + r_e(1 - t_{ie})\right]^n (1 - T_e)} = \frac{2.756226}{1.653735} \cong 1.67$$

On a relative basis, the tax-free gift is worth 1.67 times the value of the bequest, so it would be better to gift the assets immediately than to leave them to the beneficiary in a will.

For the Exam: I expect you to see a question asking you (1) whether it would be better to make a gift today or leave the assets as a bequest and (2) to support your decision. Being vague, the question will probably not directly ask for the relative value as we calculated previously, and it might not even ask you to show your calculations. It will simply ask whether it would be better to transfer the assets today as a gift or later as part of the estate. The unsuspecting Level III candidate might be tempted to answer in words, which would not provide the necessary support of the choice. You will simply have to know what is being asked and how to calculate the **relative value** as we have done here. The calculation plus last sentence of our example, "The tax-free gift is worth 1.67 times the value of the bequest, so it would be better to gift the assets immediately than to leave them to the beneficiary in a will," would be a good answer to the question.

Example: Relative after-tax value; taxable gift with gift tax paid by receiver

If the gift is subject to taxes paid on receipt by the receiver, we reduce the present value of the gift to the recipient by multiplying the numerator by $(1 - T_g)$:

$$RV_{\text{taxable gift}} = \frac{FV_{\text{taxable gift}}}{FV_{\text{bequest}}} = \frac{[(1 - T_g)][1 + r_g(1 - t_{ig})]^n}{[1 + r_e(1 - t_{ie})]^n (1 - T_e)}$$

where:

$$\begin{aligned} T_g &= \text{gift tax rate} \\ 1 - T_g &= \text{after-tax value of the gift} \end{aligned}$$

Let's return to our tax-free gift example, but now we assume the gift is subject to taxes at a rate of 25% to be paid by the recipient. We reduce the value of the gift by 25% in the numerator, indicating that the recipient pays 25% gift taxes, but nothing else changes:

Answer:

$$RV_{\text{taxable gift}} = \frac{(1 - T_g)[1 + r_g(1 - t_{ig})]^n}{[1 + r_e(1 - t_{ie})]^n (1 - T_e)} = \frac{(1 - 0.25)2.756226}{1.653735} = \frac{2.067170}{1.653735} = 1.25$$

Considering a 25% gift tax, the value of gifting is 1.25 times the value of a bequest. It is still better to gift the stock than to leave it as part of an estate.



Professor's Note: Again, it should not be surprising it is better to pay the (in this case) lower gift tax rate than wait and be subject to the (in this case) higher estate tax rate when all other factors were the same.

GIFT TAXES

LOS 12.e: Explain the estate planning benefit of making lifetime gifts when gift taxes are paid by the donor, rather than the recipient.

CFA® Program Curriculum, Volume 2, page 281

When the *donor* pays the gift taxes, the future value of the gift to the recipient is increased by an amount equal to the product of the estate and gift tax rates (t_g and t_e) and the value of the gift (i.e., the cross-product term inside the first set of parentheses in

the numerator). It represents the added benefit of reducing the estate by the amount of the gift taxes, which reduces future estate taxes.

$$RV_{\text{taxable gift}} = \frac{PV(1 - T_g + T_g T_e)[1 + r_g(1 - t_{ig})]^n}{PV[1 + r_e(1 - t_{ie})]^n (1 - T_e)}$$

For the Exam: This formula has given candidates considerable difficulty. By themselves, the numerator and denominator are not particularly useful as it is a derived formula. Looking at the first set of parentheses in the numerator, it appears as if the recipient is paying gift taxes ($-T_g$) and then receiving $T_g T_e$. That is not the case, as the result incorporates the effects on both the numerator and denominator. The expression is not derived in the curriculum, so you will not be expected to understand its derivation. Just remember to add $(+T_g T_e)$ to the expression when the *donor pays the gift taxes*. This is one formula you just need to accept and memorize.

In our last example, we assumed gift and estate taxes of 25% and 40%, respectively. Incorporating these into the example and assuming the *donor pays the gift taxes*:

$$RV_{\text{taxable gift}} = \frac{(1 - T_g + T_g T_e)[1 + r_g(1 - t_{ig})]^n}{[1 + r_e(1 - t_{ie})]^n (1 - T_e)}$$

where:

T_g = gift tax rate = 25% (paid by donor)

T_e = estate tax rate = 40%

r_g = expected return in the recipient's portfolio = 8%

r_e = expected return in the donor's portfolio = 8%

t_{ig} = recipient's tax rate on investment income = 35%

t_{ie} = donor's tax rate on investment income = 35%

$$\begin{aligned} RV_{\text{taxable gift}} &= \frac{[1 - 0.25 + (0.25)(0.40)][1 + 0.08(1 - 0.35)]^{20}}{[1 + 0.08(1 - 0.35)]^{20} (1 - 0.40)} \\ &= \frac{0.85(2.756226)}{1.653735} = 1.416667 \cong 1.42 \end{aligned}$$

If instead of the recipient paying them the *donor pays the gift taxes*, the relative value of the gift is increased from 1.25 to 1.42 times the value of an equivalent bequest. The increase in relative value is due to the reduction in the estate and the accompanying estate taxes.

ESTATE PLANNING STRATEGIES

LOS 12.f: Evaluate the after-tax benefits of basic estate planning strategies, including generation skipping, spousal exemptions, valuation discounts, and charitable gifts.

CFA® Program Curriculum, Volume 2, page 284

Generation Skipping

In the absence of generation-skipping transfer taxes, as in the United States, transferring assets directly to a third generation avoids possible double taxation. When the first (i.e., oldest) generation transfers assets to the second generation, the transfer is typically subject to taxes. Then when the second generation transfers the assets to the third generation, the assets are taxed again.

Example: Generation skipping

Assume an expected after-tax return of 5% on assets that will ultimately be transferred to the third generation from the second generation. We'll assume the first generation will transfer the assets to the second generation in 15 years, and the second generation will transfer the assets 30 years after that to the third generation. We'll also assume equal gift and inheritance tax rates of 40%.

Answer:

The value of the assets to the third generation in 45 years, without generation skipping and with generation skipping, is:

$$\begin{aligned} FV_{\text{no skipping}} &= PV \left[(1 + 0.05)^{15} (1 - 0.40) \right] \left[(1 + 0.05)^{30} (1 - 0.40) \right] \\ &= PV(2.0789)(0.60) \times (4.3219)(0.60) = PV(3.2344) \end{aligned}$$

$$FV_{\text{skipping}} = PV(1 + 0.05)^{45} (1 - 0.40) = PV(5.3910)$$

With the ability to skip generations, the value to the third generation is increased by a factor of $1 / (1 - t)$, where t is the gift/inheritance tax rate:

$$\frac{1}{1 - t} = \frac{1}{1 - 0.40} = \frac{5.3910}{3.2344} = 1.6667 = \text{relative value of generation skipping}$$

The amount to be transferred, PV, is the excess above the core capital requirements for both the first and second generations. The first generation must first determine its core capital to determine the total excess that can be transferred to future generations. After calculating and then deducting the core capital for the second generation, any remaining excess (PV) can be transferred directly to the third generation.

Spousal Exemptions

Many countries allow tax-free transfers of estates between spouses. Whether or not this is optimal from a tax perspective depends upon other possible gift and inheritance exclusions. For example, assume tax laws permit tax-free transfers of estates less than \$500,000. If the decedent leaves a large estate, and assuming the spouse's core capital is satisfied, \$500,000 of the estate could be transferred immediately to his children.

In this fashion, \$500,000 of the estate is transferred immediately to the children tax free, while if the surviving spouse waited until later to transfer the assets, they could be subject to gift and/or inheritance taxes.

Valuation Discounts

Assets such as marketable securities have readily determined fair market values, but valuing ownership claims in partnerships and other privately held interests can be difficult. Because valuation discounts can reduce the value of wealth transfers and the associated transfer taxes, high net worth individuals will utilize them whenever possible by, for example, transferring interest in a family business.

The value of a nonpublicly traded family business is determined using financial models with discount rates and other assumptions from otherwise comparable publicly traded firms. The resulting value, of course, implicitly assumes the family business is also publicly traded, so the valuator must reduce it to reflect the family business's lack of liquidity. In addition, the *proportion* of the family business transferred may not give the recipient control of the firm's operations, so the value could also be subject to a **minority interest discount**.

An important consideration is that discounts are not typically additive. For example, a 20% liquidity discount plus a 20% minority discount do not necessarily imply a total discount of 40%. The total discount is subject to court approval and both tend to be inversely related to firm size; as the size of the firm increases, the percentage discount falls.

Charitable Gifts (Charitable Gratuitous Transfers)

Rather than taking valuation discounts, the testator wants to *maximize* the value of assets transferred to non-profit and charitable organizations. This is because most jurisdictions do not tax gifts to these organizations, and the donor is allowed to take a **tax deduction** (in calculating personal income taxes) in the amount of the gift. Then, because the organizations themselves are not subject to income taxes, the future value of a donation can be considerable.

Example: Relative value of a charitable gift

Determine the relative value of leaving assets to a charitable organization as opposed to bequeathing them to beneficiaries.

Answer:

First, the future value of the gift to charity:

$$FV_{\text{charitable gift}} = (1 + r_g)^n + T_{oi} [1 + r_e (1 - t_{ie})]^n (1 - T_e)$$

where:

r_g = expected return on the assets in the charity's portfolio

T_{oi} = tax rate on ordinary income

r_e = expected return on the assets in the donor's portfolio

t_{ie} = donor's tax rate on investment income

T_e = estate tax rate

The value of the donation to the charity is considerable for two primary reasons:

(1) there is no deduction in the value of the gift due to gift or estate taxes (first term in the expression) and (2) the investment grows tax free. The second, larger term represents the added value due to the tax-free nature of the organization.

Study Session 4

Cross-Reference to CFA Institute Assigned Reading #12 – Estate Planning in a Global Context

Next, if the donor instead bequeaths the assets to a beneficiary, the future value is:

$$FV_{\text{bequest}} = [1 + r_e(1 - t_{ie})]^n (1 - T_e)$$

where:

r_e = expected return on the assets in the donor's portfolio

t_{ie} = donor's tax rate on investment income

T_e = estate tax rate

The expression shows the after-tax value of the assets in n years, which is then subject to estate taxes when transferred to beneficiaries. Putting the two expressions together show us the **relative value** of the charitable donation:

$$RV_{\text{charitable donation}} = \frac{FV_{\text{charitable gift}}}{FV_{\text{bequest}}} = \frac{(1 + r_g)^n + T_{oi}[1 + r_e(1 - t_{ie})]^n (1 - T_e)}{[1 + r_e(1 - t_{ie})]^n (1 - T_e)}$$

Now assume:

$r_g = r_e = 8\%$

$T_{oi} = 40\%$

$t_{ie} = 30\%$

$T_e = 50\%$

$n = 20$ years

$$RV_{\text{charitable donation}} = \frac{(1 + r_g)^n + T_{oi}[1 + r_e(1 - t_{ie})]^n (1 - T_e)}{[1 + r_e(1 - t_{ie})]^n (1 - T_e)}$$

$$= \frac{(1.08)^{20} + 0.40[1 + 0.08(0.70)]^{20} (0.50)}{[1 + 0.08(0.70)]^{20} (0.50)}$$

$$= \frac{4.6610 + 0.40(2.9736)0.50}{(2.9736)0.50} = 3.5349$$

The assets are worth 3.5349 times as much as a charitable gift than as a bequest.



Professor's Note: By gifting the assets to charity now, they are worth more (approximately 3.5349 times as much) to the charity than if bequeathed to a beneficiary who then donates them in 20 years.

TRUSTS

LOS 12.g: Explain the basic structure of a trust and discuss the differences between revocable and irrevocable trusts.

CFA® Program Curriculum, Volume 2, page 287

Trusts are a means by which a **grantor** (or **settlor**) can transfer assets to beneficiaries outside of the probate process. The trustee (i.e., manager of the trust) holds the assets and manages them in the best interests of the beneficiaries according to the constraints of the trust documents.



Professor's Note: Asset ownership can be a fuzzy concept with trusts. It might help to think of the assets as being placed into limbo somewhere between the settlor and the beneficiary. A trustee actually has possession of and manages the assets for the benefit of the settlor and/or beneficiaries and may be considered the owner of the assets for tax purposes only. Legal ownership of the assets may be held by the settlor or transferred to the trustee or beneficiaries, while ownership for tax purposes may reside with the settlor or the trustee. Thus, the legal owner and the owner for tax purposes may be two different entities, depending on the structure of the trust.

In a **revocable trust**, the settlor can rescind (i.e., revoke) the trust and resume ownership of the assets. The settlor is considered the legal owner of the assets for tax and reporting purposes, and creditors, divorcing spouses, et cetera can make claims against the trust assets.

In an **irrevocable trust**, the settlor relinquishes ownership and control. The trustee is considered the owner of the assets for tax purposes and is responsible for reporting and paying taxes on income generated by the trust. The irrevocable trust protects the trust assets from claims against the settlor.



Professor's Note: A trust will not protect assets if it is deemed to have been created in anticipation of a claim.

The trustee may be responsible for distributing assets to the beneficiaries. In a **fixed trust**, the pattern of distributions to the beneficiaries is predetermined by the settlor and incorporated into the trust documents. When setting up a trust for a minor, for example, the settlor may wish the trustee to distribute a fixed portion of the assets when the minor reaches 21 years of age and then distribute a given percentage each year until they are depleted.

With a **discretionary trust**, the trustee determines how the assets are to be distributed. The primary concern is that the assets are distributed to produce the greatest benefit to the beneficiary or beneficiaries. The settlor can convey her general wishes through the trust documentation or separately through a *letter of wishes*. Beneficiaries have no legal right to either the income or the assets of the discretionary trust. Thus, the trust assets are protected from claims *against the beneficiaries*.

A **spendthrift trust** is used to transfer assets to a beneficiary who is too young or is otherwise unable to manage the assets. It provides a means for the settlor to transfer assets outside the probate process while maintaining some control over the distribution of the assets.

In some countries, trusts are recognized as legally transferring the ownership of assets but not for tax purposes. If that is the case, the settlor remains responsible for taxes on income generated by the trust.

Trusts are recognized by, and are thus most prevalent in, common law countries but can be found in (i.e., are recognized by) some civil law countries. Foundations, on the other hand, are most prevalent in civil law countries but can also be found in common law countries.

LIFE INSURANCE

LOS 12.h: Explain how life insurance can be a tax-efficient means of wealth transfer.

CFA® Program Curriculum, Volume 2, page 290

As the only assets transferred by the grantor (policy owner) are the premiums paid,³ life insurance policies represent a very efficient means for transferring assets or even helping beneficiaries pay inheritance taxes. In most jurisdictions, life insurance proceeds pass to beneficiaries without tax consequences, and, depending on jurisdiction, the policy might provide tax-free accumulation of wealth and/or loans to the policy holder on beneficial terms.

Life insurance can be used in combination with a trust. By establishing a trust on behalf of the beneficiaries and making that trust the direct beneficiary of the life policy, the policy holder can transfer assets to young, disabled, et cetera, beneficiaries outside the probate process.

3. The premiums are not usually considered part of the grantor's estate for tax purposes, but in some jurisdictions the premiums are considered gifts to the beneficiary and may be subject to taxation.

TAX JURISDICTION

LOS 12.i: Discuss the two principal systems (source jurisdiction and residence jurisdiction) for establishing a country's tax jurisdiction.

CFA® Program Curriculum, Volume 2, page 293

LOS 12.j: Discuss the possible income and estate tax consequences of foreign situated assets and foreign-sourced income.

CFA® Program Curriculum, Volume 2, page 294

Income Taxes

- Under **source jurisdiction** (a.k.a. **territorial tax system**) a country levies taxes on all income generated within its borders, whether by citizens or foreigners.
- Under **residence jurisdiction**, the most prevalent type of jurisdiction, a country taxes the income of its residents, whether generated inside or outside the country. Citizens of residence jurisdiction countries pay taxes on their worldwide income, regardless of their current place of residence (i.e., whether currently living in the country or not).

Countries use many different tests to determine residency. They may utilize subjective standards such as personal ties (e.g., family, house) or economic ties (e.g., own a local business) to the country. They may also use objective measures such as the number of days residing within the country's borders.

Wealth Transfer Taxes

- Under **source jurisdiction**, transfer taxes are levied on assets located within (e.g., real estate) or transferred within a country, whether by citizens or foreigners.
- Under **residence jurisdiction**, citizens and residents pay transfer taxes, regardless of the worldwide location of the assets.

Exit Taxes

In an effort to avoid residence taxation, individuals may renounce their citizenship and move to a less strict jurisdiction. In response, some residence jurisdictions impose an **exit tax**. The amount is usually based on the gains on assets leaving, as if the individual sold the assets and realized the gains. (This is referred to as a **deemed disposition**.) The exit tax could include a tax on income earned for a period (called a **shadow period**) following the expatriation.

RELIEF FROM DOUBLE TAXATION

LOS 12.k: Evaluate a client's tax liability under each of three basic methods (credit, exemption, and deduction) that a country may use to provide relief from double taxation.

CFA® Program Curriculum, Volume 2, page 295

Due to overlapping tax systems, countries often lay claim to the same income and/or assets for tax purposes. In a **residence-residence conflict**, for example, two countries claim residence for the same individual and hence claim taxing authority over the individual's world-wide assets and income. Alternatively, two countries could claim authority over the same income in a **source-source conflict** (think of a multinational company with operations that generate income in several countries).

In another possible double taxation scenario, an individual might be subject to residence jurisdiction and receive income on assets in a foreign country with source jurisdiction. This is a **residence-source conflict**, because the individual's world-wide assets and income are taxed by the residence jurisdiction, and income generated by the foreign assets is taxed again under the source jurisdiction. In response, some countries have adopted policies that help relieve the double taxation.



Professor's Note: The following discussions relate to resolution of the residence-source conflict only. Under Double Taxation Treaties (DTTs) the Organization for Economic Cooperation and Development (OECD) recognizes "tie breakers" (e.g., permanent home, citizenship, center of vital interest) for residence-residence conflicts. Also, most DTTs do not offer resolutions for the source-source conflict.

The **credit method** provides complete resolution of the *residence-source conflict*. Under the credit method, the residence country allows the individual to take a *tax credit* for taxes paid to a source country. The tax rate paid by the resident on the foreign source income is the *greater* of the domestic and source tax rates.

For example, consider an individual who lives in a residence jurisdiction that charges 40% taxes on world-wide income. The individual has income from a foreign country that enforces source jurisdiction and charges 50% income tax. The individual will end up paying 50% income tax to the foreign country on income generated within its borders. If the tax rates were reversed (i.e., 50% domestic, 40% foreign), the individual would still pay tax on the foreign source income at 50%, but the taxes will be split between the resident and source countries: 10% to the residence country and 40% to the source country.

The **exemption method** also provides complete resolution of the *residence-source conflict*. Under the exemption method, the country of residence charges no income tax on income generated in a foreign country that enforces source jurisdiction (i.e., that income is *exempt* from domestic taxation). This effectively eliminates the residence-source conflict because foreign-generated income is taxed by the source country, only.

The **deduction method** provides only *partial* resolution of the residence-source conflict. Under the deduction method, the individual pays the full tax to the source country and is only allowed to *deduct* the amount of taxes paid to the source country in calculating total world-wide income.

For the Exam: To avoid the complications associated with different currencies, the source material uses only *tax rates*. Be sure you know how to calculate the resulting tax rates on foreign source income under the three methods. In the following example, we use amounts without accompanying currency symbols.

Example: Residence-source conflict

An individual living in a country that bases income tax on residency has total worldwide income of 1,500,000. 600,000 of that amount is generated in a source jurisdiction country. The domestic country charges 40% income taxes on worldwide income, and the source country charges 35% taxes on income generated within its borders.

Determine the income taxes paid on the foreign source income and the amount received by each country under the:

- A. Credit method.
- B. Exemption method.
- C. Deduction method.

Answer:

- A. Under the **credit method**, the individual receives a *credit* against domestic taxes equal to the amount of taxes paid to the source country. The tax rate paid on the foreign source income is the greater of the domestic and foreign tax rates:

$$T_{\text{credit}} = \text{Max}(T_{\text{residence}}, T_{\text{source}}) = \text{Max}(40\%, 35\%) = 40\%$$

The individual will pay a total of $600,000 \times 0.40 = 240,000$ taxes on the foreign source income, 5% (30,000) in domestic taxes, and 35% (210,000) in foreign taxes.

The individual owes *domestic* taxes of $600,000 \times 0.40 = 240,000$ on the foreign source income. She is allowed a credit, however, for foreign taxes paid on that income, which is applied directly to domestic taxes due. Because she owes 210,000 to the source country, her domestic tax bill on the foreign source income is $240,000 - 210,000 = 30,000$.

For the Exam: If you are asked for *total taxes paid* as well as the amounts received by each country on the foreign source income, don't forget the domestic income. This person will have to pay $900,000 \times 0.40 = 360,000$ on the domestic income in addition to taxes paid on the foreign source income. Note that she pays *total taxes* of $1,500,000 \times 0.40 = 600,000$: $360,000 + 30,000 = 390,000$ to the domestic country and 210,000 to the foreign country.

- B. Under the **exemption method**, income generated in a source country is totally exempt from domestic taxation. In this case, the individual will pay 40% domestic taxes on only the income generated domestically (900,000). She will pay 35% taxes to the source country on the foreign-generated income (600,000):

$$\text{domestic taxes on the foreign income} = 0$$

$$\text{domestic taxes on the domestic income} = 900,000 \times 0.40 = 360,000$$

$$\text{foreign taxes on foreign-generated income} = 600,000 \times 0.35 = 210,000$$

The individual's *total taxes* are $360,000 + 210,000 = 570,000$ rather than 600,000 as under the credit method.

- C. Under the **deduction method**, the individual is allowed to deduct the taxes paid to the foreign source country from taxable income. The resulting tax rate on the foreign income is less than the sum of the two rates but greater than under the other two methods:

$$T_{\text{deduction}} = T_{\text{residence}} + T_{\text{source}}(1 - T_{\text{residence}}) = 0.40 + 0.35(1 - 0.40) = 0.61 = 61\%$$

The individual will pay 61% taxes on the foreign source income. Let's see how that breaks down.

- Total foreign source income = 600,000.
- Taxes paid to the source country = $600,000 \times 0.35 = 210,000$.
- Foreign source income taxed by domestic country = $600,000 - 210,000 = 390,000$.
- Domestic taxes on foreign source income = $390,000 \times 0.40 = 156,000$.
- Tax rate on foreign income = $(210,000 + 156,000) / 600,000 = 61\%$.

The individual pays taxes on the domestic income of $900,000 \times 0.40 = 360,000$ for total world-wide taxes of $360,000 + 210,000 + 156,000 = 726,000$.

Alternatively, we could have calculated total domestic taxes directly by deducting foreign income tax paid from total world-wide income and multiplying by the domestic income tax rate:

$$(1,500,000 - 210,000) \times 0.40 = 516,000$$

This is equivalent to the sum of the domestic tax on domestic income (360,000) plus the domestic tax on foreign source income (156,000).

Of the three methods, the deduction method produces the highest total tax bill as shown in Figure 3. You probably noticed that in each case the source country receives full taxes on income generated within its borders. Differences in domestic country taxes arise from different handling of the foreign taxes:

Figure 3: Credit, exemption, and deduction method results (1,500,000 total income; 900,000 domestic income; 600,000 foreign-source income)

Method	Domestic Income	Foreign Income		Total Worldwide Taxes
	Domestic Taxes (40%)	Domestic Taxes (40%)	Foreign Taxes (35%)	
Credit	360,000	30,000	210,000	600,000
Exemption	360,000	0	210,000	570,000
Deduction	360,000	156,000	210,000	726,000

INTERNATIONAL TRANSPARENCY

LOS 12.l: Discuss the impact of increasing international transparency and information exchange among tax authorities on international estate planning.

CFA® Program Curriculum, Volume 2, page 298

In the estate planning process, financial advisers should attempt to structure estates to hold and transfer assets in the most tax-efficient ways. This could include holding foreign assets and even holding funds in a foreign country to more efficiently provide living and/or business expenses. At times, as we saw in LOS 16.k, holding assets in foreign countries can avoid domestic taxes.

Tax avoidance is legal. Any tax-paying entity or individual would be expected to minimize the amount of taxes paid through various legal tax-reduction strategies. Tax evasion, on the other hand, is hiding, misrepresenting, or otherwise not recognizing income so as to *illegally* avoid taxation. To avoid complications related to tax evasion strategies that are ultimately uncovered through global tax treaties, it is important to structure estates as efficiently and legally as possible.

Most countries attempt to maximize the amount of taxes to which they are legally entitled and to do so enter into global treaties which provide for the sharing of information. In an effort to maximize world-wide taxation on its residents and citizens, for example, the United States demands that global banks disclose the names of U.S. securities owners, whether U.S. citizens or not. In response, many global banks became Qualified Intermediaries (QIs). To avoid disclosing the names of all their customers, the QIs collect all the required information but provide the information on their U.S. customers only. A similar agreement exists in the European Union, by which EU member banks exchange customer information with each other.

KEY CONCEPTS

LOS 12.a

The most common tool used to transfer assets is a **will** (also known as a *testament*). **Probate** is a legal process that takes place at death, during which a court determines the validity of the decedent's will, inventories the decedent's property, resolves any claims against the decedent, and distributes remaining property according to the will. Due to the cost, the time it takes, and the public nature of the probate process, individuals take steps to avoid it. This can be accomplished through joint ownership with rights of survivorship, living trusts, retirement plans, life insurance, and other means which transfer assets outside the probate process.

LOS 12.b

Gifts are *lifetime gratuitous transfers* or *inter vivos transfers* and may be subject to **gift taxes**. Bequests are *testamentary gratuitous transfers* and can be subject to **estate taxes**, paid by the grantor, or **inheritance taxes**, paid by the recipient.

Forced heirship rules provide statutory ownership. Many regimes apply **claw-back** provisions. Under a **community property rights** regime, each spouse is entitled to one-half of the estate earned *during* the marriage. Under a **separate property rights** regime, each spouse owns and controls his or her property, separate from the other.

LOS 12.c

Core capital is the amount necessary to meet all of an individual's liabilities plus a reserve for unexpected needs. It is the sum of the products of expected spending for each year and the probability of living that long. An individual has 50% probability of outliving mortality table expected life, so incorporate a safety **reserve** into core capital.

Monte Carlo simulation gives the expected portfolio value and distribution of possible values at retirement. The probability of running out of money is known as the *probability of ruin*. Level of spending and probability of ruin are usually positively correlated.

LOS 12.d

Relative after-tax value is used to determine whether the recipient would be better off receiving a gift today when there is no gift tax, or the receiver pays the gift tax, versus waiting and receiving it as part of an estate:

$$RV_{\text{tax-free gift}} = \frac{FV_{\text{tax-free gift}}}{FV_{\text{bequest}}} = \frac{\left[1 + r_g(1 - t_{ig})\right]^n}{\left[1 + r_e(1 - t_{ie})\right]^n (1 - T_e)}$$

$$RV_{\text{taxable gift}} = \frac{FV_{\text{taxable gift}}}{FV_{\text{bequest}}} = \frac{\left[(1 - T_g)\left[1 + r_g(1 - t_{ig})\right]\right]^n}{\left[1 + r_e(1 - t_{ie})\right]^n (1 - T_e)}$$

r_g = pre-tax return on the stock if gifted and held by the recipient

t_{ig} = tax rate on investment returns if gifted

r_e = pre-tax return on the stock if held in the estate

t_{ie} = tax rate on investment returns in testator's portfolio

T_e = estate tax rate

LOS 12.e

When the *donor pays the gift taxes*, the future value of the gift to the recipient is increased by an amount equal to the product of the estate and gift tax rates (t_g and t_e) and the value of the gift:

$$RV_{\text{taxable gift}} = \frac{(1 - T_g + T_g T_e)\left[1 + r_g(1 - t_{ig})\right]^n}{\left[1 + r_e(1 - t_{ie})\right]^n (1 - T_e)}$$

LOS 12.f

Skipping a generation can avoid the double taxation of assets that are transferred by two generations:

$$FV_{\text{no skipping}} = PV[(1 + r)^{n1} (1 - t)][(1 + r)^{n2} (1 - t)]$$

$$FV_{\text{skipping}} = PV[(1 + r)^N(1 - T_e)] \quad [N = n1 + n2]$$

Skipping a generation increases the future value of the gift by a factor of $1 / (1 - t)$. Many countries allow **spousal exemptions**. **Valuation discounts** can be employed to reduce the taxable value of gifts or the estate. A donor is allowed to take a **tax deduction** in the amount of the **charitable gift**. Value of a gift to charity relative to leaving it in a bequest:

$$RV_{\text{charitable donation}} = \frac{FV_{\text{charitable gift}}}{FV_{\text{bequest}}} = \frac{\left(1 + r_g\right)^n + T_{oi}\left[1 + r_e(1 - t_{ie})\right]^n (1 - T_e)}{\left[1 + r_e(1 - t_{ie})\right]^n (1 - T_e)}$$

LOS 12.g

In a **revocable trust**, the settlor can rescind the trust and is considered the legal owner of the assets for tax purposes. In an **irrevocable trust**, the settlor relinquishes ownership. The trustee is considered the owner of the assets for tax purposes. An irrevocable trust protects the trust assets from claims against the settlor.

In a **fixed trust**, the pattern of distributions to the beneficiaries is predetermined by the settlor and incorporated into the trust documents. In a **discretionary trust**, the trustee determines how the assets are distributed. A **spendthrift trust** is used to transfer assets to a beneficiary who is too young or is otherwise unable to manage the assets.

LOS 12.h

Premiums paid on life insurance are not usually considered part of the grantor's estate for tax purposes but are sometimes considered gifts to the beneficiary. In most jurisdictions, life insurance proceeds pass to beneficiaries without tax consequences, and, depending on jurisdiction, the policy might provide tax-free accumulation of wealth and/or loans to the policy holder on beneficial terms. By establishing a trust on behalf of the beneficiaries and making that trust the direct beneficiary of a life policy, the policy holder transfers assets to young, disabled, et cetera, beneficiaries outside the probate process.

LOS 12.i

Under **source jurisdiction** (a.k.a. territorial tax system) a country levies taxes on all income generated within its borders. Wealth transfer taxes are levied on assets located within or transferred within a country. Under **residence jurisdiction**, a country taxes the global income of its residents, whereby citizens and residents pay wealth transfer taxes, regardless of the world-wide location of the assets.

LOS 12.j

In response to citizens who renounce their citizenship to avoid taxes, some residence jurisdictions impose an exit tax, usually based on the gains on assets leaving, as if they were sold (deemed disposition). This could include a tax on income earned for a shadow period.

LOS 12.k

In a **residence-residence conflict**, two countries claim residence for the same individual. In a **source-source conflict**, two countries claim authority over the same income. In a **residence-source conflict**, an individual is subject to residence jurisdiction and receives income on assets in a foreign country with source jurisdiction.

Under the **credit method**, the residence country allows a *tax credit* for taxes paid to a source country. Under the **exemption method**, the country of residence charges no income tax on income generated in a foreign country. Under the **deduction method**, the individual is only allowed to *deduct* the amount of taxes paid to the source country.

$$T_{\text{credit}} = \text{Max}(T_{\text{residence}}, T_{\text{source}}); T_{\text{deduction}} = T_{\text{residence}} + T_{\text{source}}(1 - T_{\text{residence}})$$

LOS 12.1

In the estate planning process, financial advisers should attempt to structure estates to hold and transfer assets in the most tax-efficient ways. This could include holding foreign assets and even holding funds in a foreign country to more efficiently provide living and/or business expenses. **Tax avoidance** is legal. **Tax evasion** is hiding, misrepresenting, or otherwise not recognizing income so as to illegally avoid taxation.

Many countries enter into global treaties which provide for the sharing of information. QIs collect all the information required by the United States but provide the information on their U.S. customers only. A similar agreement exists in the European Union, by which EU member banks exchange customer information with each other.

CONCEPT CHECKERS

1. Which of the following are the main objectives of estate planning and the results of the techniques used to facilitate those objectives? The main objectives of estate planning are to minimize taxes and:
 - A. achieve effective diversification. The results of the techniques used can include tax efficiency, access to assets to be transferred, and control over those assets.
 - B. transfer assets to heirs or recipients of charitable bequests in an efficient manner. The results of the techniques used can include asset protection from creditors, creating liquidity, and transferring assets for a specific purpose.
 - C. transfer assets to heirs or recipients of charitable bequests in an efficient manner. The results of the techniques used can include tax efficiency, access to assets to be transferred, control over the management of those assets, and the ability to maximize excess returns.
2. Individuals must generally be concerned with tax planning on:
 - A. two levels.
 - B. three levels.
 - C. four levels.
3. What are the main targets for taxation, the fundamental methodologies for improving after-tax returns, and a key feature in the tax code to assist married couples in pursuing one or both of these methodologies? The main targets for taxation are:
 - A. income, assets held, assets transferred, and expenditures. The two main methodologies for improving after-tax returns are to realize income and capital gains in the most advantageous way so that taxes are minimized and to defer the realization of gains for as long as possible. The provision in the tax code that permits the tax-free transfer of assets between spouses upon the death of one can assist married couples in pursuing one or both of these tax-reducing methodologies.
 - B. income and assets transferred. The two main methodologies for improving after-tax returns are to realize income and capital gains in the most advantageous way so that taxes are minimized and to defer the realization of gains for as long as possible. The provision in the tax code that permits the tax-free transfer of assets between spouses upon the death of one can assist married couples in pursuing one or both of these tax-reducing methodologies.
 - C. income, assets held, assets transferred, and expenditures. The two main methodologies for improving after-tax returns are to realize income and capital gains in the most advantageous way so that taxes are minimized and to defer the realization of gains for as long as possible. The provision in the tax code that resets the cost basis of assets after transfer of assets to the surviving spouse and payment of related estate taxes can assist married couples in pursuing one or both of these tax-reducing methodologies.

4. Which of the following is *most correct*? When investors make charitable gifts of appreciated securities, they are usually able to:
 - A. avoid capital gains taxes but are not able to take a deduction for the gift.
 - B. take a deduction in an amount designed to exactly offset the capital gains tax.
 - C. avoid gift transfer taxes and can take an income tax deduction equal to the current fair market value of the gift.
5. Under a community property regime, which of the following is *most correct*? When one spouse dies, estate taxes on:
 - A. all marriage assets (community property) are avoided.
 - B. at least one-half of the marriage assets are avoided.
 - C. at least one-half of the marriage assets are deferred.
6. For estate planning purposes, investments in privately held companies are usually tax:
 - A. efficient because gains realized are usually taxed at long-term rates.
 - B. inefficient because it is difficult to determine fair market value, thus the correct amount to be taxed cannot be determined.
 - C. efficient because they can be transferred from an estate using a valuation discount, which reduces the basis on which the transfer tax is calculated.
7. What is usually the *most important* concern with determining the level of feasible retirement income, and what is the *best* method used to address this concern? The main concern with determining the level of feasible retirement income is:
 - A. outliving one's assets and income, and this can be addressed by estimating core capital with Monte Carlo analysis and incorporating a safety reserve.
 - B. outliving one's assets and income, and this can be addressed by multiplying expected future cash flows by the probability that each cash flow will be needed, which is called a survival probability.
 - C. maintaining purchasing power, and this can be addressed by calculating the present value of anticipated spending over one's remaining life expectancy and incorporating a safety reserve.

8. Joe Angelone, age 65, recently retired after a long career in the aerospace industry, first as a fighter pilot in the Vietnam war, then as a fighter test pilot, and finally as a project manager overseeing the testing and production of fighter planes. He and his wife Charlene, age 63, recently retired in Texas. Even though they are retired, they prefer to maintain their current lifestyle with spending needs of \$80,000 per year in real terms. Inflation is expected to be 3% with the nominal risk-free rate equal to 5%. The Angelones' survival probabilities for the next three years are shown in the table below.

Year	Joe		Charlene	
	Age	P(Survival)	Age	P(Survival)
1	66	0.992	64	0.997
2	67	0.982	65	0.987
3	68	0.972	66	0.967

- A. Determine the probability that either Joe or Charlene will survive for three years.
- B. Calculate the capitalized value of the Angelones' core spending needs over the next three years.

ANSWERS – CONCEPT CHECKERS

1. B The primary objectives of estate planning are to minimize taxes and to facilitate the tax-efficient transfer of assets to heirs or recipients of charitable bequests. Diversification and the ability to maximize excess returns are usually not the objectives of estate planning and are part of the grantor's/settlor's investment policy statement while accumulating assets throughout working years and throughout retirement.

Estate planning tools include trusts that allow for the control of those assets, asset protection from creditors, and reduced taxes for either the settlor or beneficiary depending upon how the trust is structured. Foundations are used to transfer assets for specific purpose, such as helping to fund hospitals, libraries, or colleges. Life insurance is a liquidity planning technique that can be used to pay estate and gift taxes. Investing in partnerships or having a controlling interest in a foreign company may also be effective tax-reducing strategies.

2. C Individual taxation generally occurs on four levels—tax on income, tax on spending, tax on wealth, and tax on assets when they are transferred to others.
3. A The main targets for taxation are income, assets held, assets transferred, and expenditures. The two main methodologies for improving after-tax returns are to realize income and capital gains in the most advantageous way so that taxes are minimized and to defer the realization of gains for as long as possible. The provision in the tax code that permits the tax-free transfer of assets between spouses upon the death of one of them can assist married couples in pursuing one or both of these tax-reducing methodologies. In virtually all cases, this feature of the tax code allows couples to defer the payment of estate taxes, often for a considerable period of time, until the death of the surviving spouse. To the extent that future tax rates are lower than those present at the time the assets are transferred between spouses, there will also be some reduction in the effective tax rate.
4. C When an investor makes a charitable gift of appreciated securities, the investor is usually able to avoid gift transfer taxes and can take an income tax deduction equal to the current fair market value of the gift. The appreciated securities continue to avoid capital gains taxes once transferred to the tax-exempt organization.
5. C Under a community property regime, the surviving spouse is entitled to one half of marriage assets, which are considered community property. This means that estate taxes that would have been paid immediately on at least half of the marriage assets are deferred until the surviving spouse's death. The remaining property is divided according to the testator's will and other asset transfer mechanisms.
6. C Investments in privately held companies are usually tax-efficient from an estate planning perspective, because they can be transferred after taking a valuation discount. The discount relates to uncertainty of true value as well as lack of liquidity and sometimes control. It is true that they are also tax-efficient from the standpoint that any gains realized are usually taxed at favorable long-term rates, but this pertains to liquidating the assets that would normally not be done before transferring them in an estate.

Study Session 4

Cross-Reference to CFA Institute Assigned Reading #12 – Estate Planning in a Global Context

7. A The main concern with determining the level of feasible retirement income is outliving one's assets and income. This potential problem can be addressed by all three methods mentioned. Calculating the present value of anticipated spending over one's remaining life expectancy has the weakness of being based on average life expectancies, thus half of all individuals will live longer than expected. A better method, but one that still uses a mortality table, is to multiply expected future cash flows by the probability that each cash flow will be needed, which is called a survival probability. These two methods do not consider market risk, however. The best method is by estimating core capital with Monte Carlo analysis, which uses thousands of simulations, meaning it considers market risk and is the most accurate (realistic) method. All three methods should incorporate a safety reserve to account for the risk of capital markets or a change in spending needs.
8. A. Joe and Charlene's joint probability of surviving for a given number of years is equal to the sum of their individual probabilities minus the product of their individual probabilities:

$$p(\text{Joint}) = p(\text{Joe survives}) + p(\text{Charlene survives}) - p(\text{Joe survives})p(\text{Charlene survives})$$

There is effectively 100% probability (0.99998) at least one of them will survive for one year:

$$\text{Year 1} = 0.992 + 0.997 - (0.992)(0.997) = 1.0000$$

There is 99.98% probability at least one of them will survive for two years:

$$\text{Year 2} = 0.982 + 0.987 - (0.982)(0.987) = 0.9998$$

There is 99.91% probability at least one of them will survive for three years:

$$\text{Year 3} = 0.972 + 0.967 - (0.972)(0.967) = 0.9991$$

- B. The capitalized value of the core spending needs is the sum of the product of the joint probability of survival and the real spending need discounted by the real risk-free rate.

The real risk-free rate is calculated as:

$$(1 + \text{nominal risk-free rate}) / (1 + \text{inflation rate}) - 1 = (1.05 / 1.03) - 1 = 1.94\%$$

Year	Spending	Joint $p(\text{Survival})$	Expected Spending	Discount Factor	Discounted Value
1	80,000	1.0000	80,000	1.0194	\$78,478
2	80,000	0.9998	79,984	$(1.0194)^2$	\$76,969
3	80,000	0.9991	79,928	$(1.0194)^3$	\$75,451

Total capitalized value of core spending needs = \$230.898

The following is a review of the Private Wealth Management principles designed to address the learning outcome statements set forth by CFA Institute. This topic is also covered in:

LOW-BASIS STOCK

Study Session 4

EXAM FOCUS

Successful investors often hold equity positions that have a low cost basis. Because of psychological and/or tax reasons, they often find these positions difficult to sell. In many cases, failure to sell results in inadequate diversification and increased portfolio risk. Investment advisers must recognize the impediments to effective diversification and understand the techniques that can be used to reduce portfolio concentration. Also remember that when proposing a strategic asset allocation (SAA), recommend bringing the position down to that of a diversified holding. Now we will look at some of the pros and cons of actually selling to implement the SAA or alternate ways to reduce the risk of the concentrated position.

LOS 13.a: Explain the psychological considerations, investment risk, and tax issues related to concentrated holdings of low-basis stock.

CFA® Program Curriculum, Volume 2, page 308

LOS 13.b: Discuss how exposure to stock-specific risk is expected to change over the entrepreneurial, executive, and investor stages of an individual's "equity holding life."

CFA® Program Curriculum, Volume 2, page 309

LOS 13.c: Explain individual investors' attitudes toward holding their own company stock during the entrepreneurial, executive, and investor stages.

CFA® Program Curriculum, Volume 2, page 311

Basis, or more correctly, cost basis, refers to the reference point for calculating capital gains or losses for a given asset. This is ordinarily either the gross purchase price or the value of the asset when transferred to the holder. When the current market value is greater than the cost basis, the investor realizes a taxable capital gain if the asset is sold.

In some cases, the cost basis may be extremely small (i.e., close to zero). In these very low-basis situations, the capital gains taxes that accrue upon sale are large. The problem relating to such so-called "low-basis stock" is that the tax ramifications (and other factors) can serve to inhibit the investor from taking an action that would otherwise be desirable. Specifically, when the investor is unwilling to reduce a large position in a low-basis security—at the cost of holding a concentrated portfolio—the level of portfolio risk can be excessive.

By looking at an individual's position and history, it is fairly easy to determine exactly how he ended up with a large position in a single, low-basis stock. The individual will usually fall into one of three categories: *entrepreneur*, *executive*, or *investor*. The three categories are differentiated by the manner in which the wealth was accumulated and the individual's psychological attachment to the stock (i.e., the firm). All categories present the financial adviser with the same challenge: reduce the position to achieve the *desired* level of diversification but do so in a way that minimizes the tax bill. In the following, we discuss each category according to its source of wealth, psychological issues, and risk considerations.

Entrepreneurs

Source of wealth. An entrepreneur is an individual (or family) who has developed a company, usually from inception. From both a financial and personal standpoint, the entrepreneur has put everything into the company. The result is that the entrepreneur's wealth is dominated by that one, privately held stock. The cost basis for the stock is the original investment required to get the company started plus any additional infusions of capital and is typically far below the stock's current value. Thus, if any shares are sold, most of the selling price is a taxable capital gain.

Entrepreneurs can also have concentrated positions even after selling a portion of the firm through an IPO or other sale. If shares are sold for cash, the entrepreneur pays capital gains taxes and ends up with cash, making it fairly easy for the financial adviser to construct a strategy to suit the investor's goals and objectives (e.g., diversification). Alternatively, if through an IPO or other equity-based sale, the entrepreneur ends up with new publicly or privately traded shares that retain the original cost basis. In that case, only the *form* of the concentrated position has changed. The investor still has a concentrated position in a low-cost basis stock.

Psychological issues. A factor that contributes to entrepreneurs maintaining concentrated portfolios is their *psychological attachment* to their firms. They are highly loyal to their firm and don't mind having most or all of their wealth tied to it. In fact, while an entrepreneur is running a firm, she even feels no need for diversification. She has confidence in her abilities to run the firm and is not averse to having her entire fortune tied to the future of the firm as long as she is in *control*. As she transfers control to others, however, the entrepreneur becomes increasingly uncomfortable with a concentrated portfolio and begins to desire a more diversified position. The result for the financial adviser is a need to achieve the desired diversification while respecting the entrepreneur's devotion to the firm (to the extent it exists) and reluctance to sell shares.



Professor's Note: This discussion about psychological issues relates to entire families (i.e., current and future generations) as well as individual entrepreneurs. Out of loyalty, for example, heirs often feel obligated to hold onto shares of a (once) family firm, especially if the firm retains the family name.

Risk considerations. Specific risk refers to the risk of the individual security, the risk that can be reduced or eliminated by holding the security in a diversified portfolio. If held in a well-diversified portfolio, the holder is left with only the security's market risk and

residual risk. **Residual risk**, which deals with successfully implementing the desired strategy, can be broken down into counterparty risk and regulatory risk.

Counterparty risk is the probability that a counterparty will not correctly complete the transaction as expected. For example, once you have decided on a specific strategy (e.g., selling a portion of a position to achieve the desired diversification), you depend upon the broker to invest the proceeds as instructed. **Regulatory risk** is the possibility that tax authorities will not accept the tax treatment applied to a transaction (e.g., the value placed on private shares donated to a charity and the amount of the resulting tax deduction).



Professor's Note: You will notice that specific risk is equivalent to unsystematic risk that you studied in portfolio theory. Residual risk, however, is related more to the actual trading strategies employed, how they are carried out, and how they are interpreted by taxing authorities.

It should be fairly obvious that the entrepreneur faces both the specific risk of the individual stock as well as residual risk associated with the trading strategies employed to avoid tax issues. In fact, any investor should be concerned with residual risk, but the amount of specific risk faced by the investor depends on the amount of the individual stock held as a proportion of the total portfolio. As long as the concentrated position exists, the investor faces considerable *specific risk*. Remember, however, that the entrepreneur is not usually concerned with the specific risk of the firm, as long as he is in control.



Professor's Note: As you read through the following discussion on executives, notice how they compare to entrepreneurs. The higher up in the ranks, the more the executive acts like an entrepreneur.

Executives

Source of wealth. Executive compensation packages typically contain significant equity components (e.g., stock, stock options), and the higher in the ranks, the greater the proportion of total compensation received in equity. As with an entrepreneur, the result is a heavily concentrated portfolio. The cost basis for the accumulated stock is usually quite low, so an executive also faces the same diversification problem (i.e., selling low-basis stock) faced by entrepreneurs.

Psychological issues. Just like an entrepreneur, a top executive's fortunes are tied directly to the firm. Also like an entrepreneur, the more *control* the executive exerts over the fortunes of the firm, the less he is concerned with diversification and the more *psychologically attached* he becomes to the firm.

Risk considerations. As long as they maintain the concentrated holding, executives face considerable *specific risk*. Remember, however, that the executive does not "feel" the specific risk, if he has sufficient control over the firm's operations.

Investors

Source of wealth. An investor can accumulate a considerable position in a single stock as the result of a particularly good investment. For example, an investor in a venture capital fund can end up with a considerable position in a single, successful firm when the fund liquidates. Notice that the investor is faced with the same concentration in one security and the same resulting level of specific risk as both the entrepreneur and the executive.

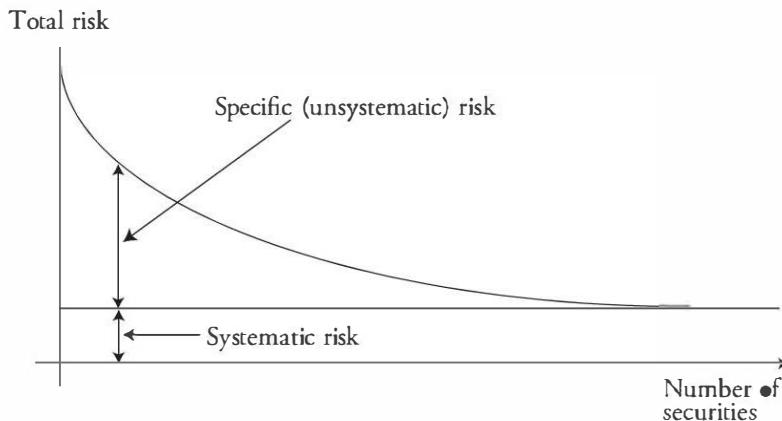
Psychological issues. Although the investor may feel gratitude toward the firm that produced his wealth, he does not usually feel the same attachment as the entrepreneur or top executive. Also, note that the investor does not exert significant *control* over the firm's operations, so he is less willing to accept exposure to the specific risk.

Risk considerations. As long as the investor maintains the concentrated position in the single stock, she faces considerable specific risk. The difference between the investor and the entrepreneur or executive is the lack of attachment and the willingness to take the steps necessary to diversify.

For the Exam: If you are asked to discuss the *risk* faced by a given investor, remember to include the interaction of the investor's psychological attachment to the firm as well as the types and amounts of risk in the portfolio. As to the *types of risk* faced and their relative proportions in the portfolio, think of that graph you saw at Level I (Figure 1); the graph shows how total risk falls through diversification as you increase the number of different securities in the portfolio.

Equity Portfolio Risk

Figure 1: The Effect on Risk of Increasing the Number of Shares in the Portfolio



The graph in Figure 1 shows that as you add securities to the portfolio, total risk decreases because unsystematic risk (i.e., *specific risk*) is diversified away. As you continue

to add securities, you are left with nothing but systematic risk (i.e., all specific risk has been eliminated). Remember that at that point the investor can still face residual risk in the form of *counterparty risk* and *regulatory risk*.

The types of risks faced by the investor can include market (systematic risk), specific risk (unsystematic risk), and residual risk. The relative proportions of market and specific risk depend upon the value of the security in the portfolio relative to the overall size of the portfolio (i.e., dollar value and number of other investments in the portfolio). For the entrepreneur, the single holding can represent total wealth, so the entrepreneur will fall at the far left of the curve. For the top executive, the single holding might also be significant and represent a major portion of the executive's wealth. The top executive will also fall near the left, but the firm is probably more established and, hence, presents the executive with less overall risk. Investors fall the farthest out to the right on the curve, as they have the least psychological attachment to any single investment and are more willing to diversify.

Psychological issues. Although portfolio theory tells us that diversification produces optimal portfolios, entrepreneurs and top executives frequently feel psychologically attached to the single stock (i.e., the firm) and are therefore reluctant to sell it to achieve diversification. In fact, the entrepreneur and top executive might not even feel diversification is necessary, as long as they retain sufficient control of the firm's operations. It's only when they start relinquishing control that they start thinking about the need to diversify. Even then, however, their psychological ties might make it difficult for the financial adviser, and other strategies must be considered. These are discussed in the next LOS.

EQUITY HOLDING LIFE

Figure 1 can be utilized in discussing equity holding life, which consists of three stages: (1) the *entrepreneurial stage*, (2) the *executive stage*, and (3) the *investor stage*. The investor stage is further divided into the *diversified investor stage* and the *indexing stage*. In many regards, these stages can be related directly to the three categories of wealth accumulation we have discussed. It is probably easiest to discuss them by starting with a wealthy entrepreneur and following the progression through to indexing.

The entrepreneur falls at the extreme left-hand margin of Figure 1. During this *entrepreneurial stage*, all of the individual's wealth is tied to one security (i.e., one firm), so the investor faces the firm's *total risk*.

For the Exam: Recall our discussion that describes total risk as consisting of market risk and *specific risk*. Although they are technically the same thing, on the exam, use the phrase *specific risk* rather than *unsystematic risk*.

When the entrepreneur takes the firm public, he ends up with a large position in a now publicly traded security, and the entrepreneur has entered the *executive stage*. Whether the investor holds a top-level position in the firm or not, he still has most or all wealth tied to the one firm and thus is faced with considerable specific risk. Remember that the

executive's attitude toward risk (i.e., psychological attachment to the firm) varies directly with the amount of control the executive exerts over the firm's operations.



Professor's Note: Once the firm has gone public, we can assume that it is more mature and thus has less specific risk than when it was younger. Therefore, even though the executive faces the firm's total risk, the amount of specific risk faced is somewhat less than when the executive was at the entrepreneur stage.

Once the executive advances to the **investor stage**, his primary focus changes from accumulating/generating wealth to protecting and growing the wealth he has. At the investor stage, the individual's focus is no longer on owning the firm, *per se*. Stock in any firm is now just considered a stock investment (i.e., part of an investment portfolio rather than ownership in a firm). Once the individual has entered the investor stage, he no longer has an emotional tie to the firm.

The investor stage itself has a progression of stages. At the earliest stage, the investor still faces considerable specific risk but has begun to focus on managing it. (Remember, at the entrepreneur and executive stages, the individual is not overly concerned with specific risk, so now the focus is starting to change.) The stock may still represent a concentrated position, but the investor is open to suggestions on mitigating its effects. The investor then progresses through stages until he reaches the indexing stage. At this stage, the investor faces no specific risk whatsoever. Replacing it is the risk associated with the index of choice.

DIVERSIFICATION TECHNIQUES

LOS 13.d: Critique the effectiveness of outright sales, exchange funds, completion portfolios, and hedging strategies as techniques for reducing concentrated equity risk.

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Four principle options for improving the diversification (i.e., reducing the risk) of a concentrated, low-basis position include (1) sell all or part of the position, (2) place the position in an exchange fund, (3) pursue a completion portfolio, and (4) hedge the position.

1. **Sale**—Preferred by those wishing maximum investment flexibility. Any unrealized capital gains are recognized immediately for tax purposes. The primary disadvantage is that taxes must be paid on the gain, which reduces the size of the portfolio and funds invested. The subsequent strategies, if done properly, avoid triggering the tax due, but the unrealized gain and potential tax liability remain.
2. **Exchange funds**—Several individuals combine their large, low-basis holdings in a single portfolio. In exchange for a commitment to remain in the pool for a given period of time, the investor's low-basis position becomes part of a well-diversified portfolio. Exchange funds can be public or private.

- a. **Public exchange funds.** Under U.S. partnership law, each contributing investor must commit for a minimum of seven years. In addition to the contributed shares, the public exchange fund must also hold a minimum of 20% illiquid assets. The fund manager determines the weight of each stock held as well as the nature of the illiquid assets.

Primary *advantages*, in addition to the diversification benefit, include the ability to borrow (i.e., *monetize* the position). Because partners now hold a portion of a well-diversified portfolio, they can borrow against their wealth more easily than when it was tied up in the concentrated position. Also, at the end of the partnership, each investor receives his proportional share of the entire fund, including the illiquid investments, rather than the original contributed shares. The original cost basis of each investor in the fund carries over as their cost basis for their new diversified position. Thus, each partner shares the gains on other partners' shares.

Disadvantages of public exchange funds include the lock-up period (illiquidity), inflexibility, and management fees. The fund manager determines the initial mix of stocks, and individual investors can accept or reject inclusion in the fund; they have no control over the fund's composition or the amount of shares they can contribute. Public exchange funds are passively managed, so the composition of the fund remains the same and is subject to market movements. This means the manager cannot eliminate holdings that are under-performing, so all partners are subject to the performance of each asset. In addition, there are fees associated with setting up the fund.

- b. **Private exchange funds.** This is a new type of fund, and it is not yet completely clear how it will be treated by taxing authorities, a significant risk. The intent of these funds is to avoid some of the disadvantages of the public exchange fund. These funds usually consist of several investors who may contribute the same security, thus there is no initial diversification created. There must be at least one unrelated investor who then goes out and purchases the same security at current market value for some business purpose other than hedging to qualify the fund as a private exchange fund. The partnership can then partially hedge (but not fully hedge) the holding as well as borrow and invest the borrowing proceeds to seek diversification.

Advantages of the structure include: avoid the out-right sale and taxes due, potentially better borrowing terms, and a psychological benefit to the contributors if they do not see it as selling the asset they contribute. In addition, and unlike the public fund, there is no requirement to hold a portion of assets in illiquid assets, the assets can be managed and changed over time. The minimum partnership life is seven years like a public fund.

The primary risk is the not yet finalized regulatory and tax treatment (in the United States).

3. **Completion portfolios**—Completion portfolios are utilized by investors with other, liquid assets in addition to the large low-basis position. In other words, the investor has a large liquid or illiquid position that dominates a very large portfolio. The investor identifies a target portfolio (e.g., an index) that exhibits the desired degree of diversification, and the manager purchases diversifying shares using existing funds, by borrowing funds, or by using portfolio cash flows (i.e., dividends). Along the way, the manager sells shares and uses the proceeds to purchase others, continually moving toward the desired diversified position. By harvesting losses on shares that have fallen in value, the manager can offset gains on others that have increased. This provides necessary cash while minimizing taxes.

A primary *disadvantage* of completion portfolios is the need for a large portfolio containing other assets. Without these other assets, the manager is limited to selling the low-basis shares or borrowing to raise cash. Borrowing, of course, only serves to increase (i.e., lever up) the systematic risk of the position. Also, with only the single, large low-basis position, reaching the desired level of diversification can take a significant amount of time, which could leave the investor subject to significant risk for a significant period of time.

4. **Hedging**—Hedging can take a variety of forms including equity collars and variable pre-paid forwards. Although hedging is a common technique to achieve desired diversification of a low-basis position, investors must be aware of *constructive sale* provisions in the U.S. tax code. Accordingly, transactions that effectively take an offsetting position in the currently owned position are deemed constructive sales. The constructive sale rule was designed to prevent investors from locking in investment gains without paying capital gains and to limit their ability to transfer gains from one tax period to another. The following would be considered constructive sales transactions: short sales of substantially identical securities, the investor assumes a position in a swap with a notional principal equivalent to the position held, or the investor assumes a position in a forward contract to deliver the low-basis asset or substantially identical assets.

- a. **Equity collars.** Just as banks sell interest rate calls and purchase interest rate puts to protect against falling rates on floating-rate assets, individuals can create an equity collar to hedge the value of their low-basis position. The individual sells a call on the asset while simultaneously purchasing a put. The collar can be zero cost or the investor can incur a net cost, if the proceeds from the call do not cover the put. If the proceeds from the call are greater than the cost of the put, the position actually generates income. Note that the collar must be set (i.e., must be wide enough) such that the investor can lose money, or it will be deemed a constructive sale.

The equity collar can effectively monetize the position by setting a minimum value. Because the collar places a minimum value on the position, lenders are more apt to use it as collateral for a loan to the investor.

- b. **Variable pre-paid forwards.** A pre-paid forward contract stipulates the asset to be delivered, the delivery date, and the delivery price. Because it is pre-paid, the delivery price is paid at the inception of the agreement. Using a pre-paid forward, an investor with a low-basis position can agree to deliver all or part of

the stock for a payment received today. To avoid the constructive sale provision, the investor must remain exposed to a loss of approximately 15% on the position.

The diversification options are summarized and presented in Figure 2.

Figure 2: Effectiveness of Diversification Techniques

<i>Technique</i>	<i>Advantages</i>	<i>Disadvantages</i>
Sale	<ul style="list-style-type: none"> • Simple. • Non-systematic risk of the position is completely eliminated for shares sold. • Proceeds can be reinvested or distributed as desired. 	<ul style="list-style-type: none"> • Most costly from a tax standpoint. • Usually requires that shares are publicly traded. • Taxes due on sale reduce the size of the invested portfolio.
Public Exchange Funds	<ul style="list-style-type: none"> • Can facilitate monetization (borrowing) through risk reduction. • Investor holds diversified portfolio, without recognizing capital gains. 	<ul style="list-style-type: none"> • Management fees. • Must remain in the fund for a minimum period. • Cannot determine or adjust holdings. • Must hold $\geq 20\%$ in illiquid assets. • Unrealized tax liability remains in place.
Private Exchange Funds	<ul style="list-style-type: none"> • Can facilitate monetization (borrowing) through risk reduction. • Provides the ability to utilize hedging techniques. • Not required to hold illiquid assets. • Can adjust holding and diversification strategies. 	<ul style="list-style-type: none"> • Management fees. • Must remain in the fund for a minimum period. • Must find outside, unrelated party willing to purchase the security and join the partnership. • Unrealized tax liability remains in place.
Completion Portfolios	<ul style="list-style-type: none"> • Investor builds a diversified portfolio over time. • Can provide cash and avoid capital gains to the extent of loss harvesting. 	<ul style="list-style-type: none"> • Investor must have other assets. • May take substantial time to effect proper diversification. • Unrealized tax liability remains in place.
Hedging	<ul style="list-style-type: none"> • Fast. • Can facilitate monetization through risk reduction. 	<ul style="list-style-type: none"> • Upside potential typically limited after hedge is in place. • Potential regulatory risk (constructive sale provision). • Unrealized tax liability remains in place.

KEY CONCEPTS

LOS 13.a

Basis, or more accurately, cost basis, refers to the reference point for calculating capital gains or losses for a given asset. This is ordinarily either the gross purchase price or the value of the asset when transferred to the holder. When the current market value is greater than the cost basis, the investor realizes a taxable capital gain if the asset is sold.

In some cases, the cost basis may be extremely small (i.e., close to zero). In these very low-basis situations, the capital gains taxes that accrue upon the sale are large. The problem relating to such so-called “low-basis stock” is that the tax ramifications (and other factors) can serve to inhibit the investor from reducing a large position in a low-basis security at the cost of holding a concentrated portfolio which may significantly increase the level of portfolio risk.

The individual will usually fall into one of three categories: *entrepreneur*, *executive*, or *investor*. Entrepreneurs and top executives frequently feel psychologically attached to the single stock (i.e., the firm) and are therefore reluctant to sell in order to achieve diversification. The investor is no longer emotionally tied to the firm.

LOS 13.b

The types of risks faced by the investor can include market (systematic risk), specific risk (unsystematic risk), and residual risk.

Specific risk refers to the risk of the individual security or the risk that can be reduced or eliminated by holding the security in a diversified portfolio. If held in a well-diversified portfolio, the holder is left with only the security's market risk and residual risk.

Residual risk, which deals with successfully implementing the desired strategy, can be broken down into counterparty risk and regulatory risk.

Counterparty risk is the probability that a counterparty will not correctly complete the transaction as expected. For example, once you have decided on a specific strategy (e.g., selling a portion of a position to achieve the desired diversification), you depend upon the broker to invest the proceeds as instructed. **Regulatory risk** is the possibility that tax authorities will not accept the tax treatment applied to a transaction (e.g., the value placed on private shares donated to a charity and the amount of the resulting tax deduction).

For the entrepreneur, the single holding of his firm's stock can represent total wealth, so the entrepreneur's stock holding will contain a significant amount of specific and, therefore, total risk. For the top executive, the single holding of his firm's stock might also be significant and represent a major portion of the executive's wealth; thus, his stock holdings will also contain a significant amount of specific risk, although less than the entrepreneur. Because the top executive's firm is probably more established, his stock holdings will contain less overall risk than the entrepreneur. Investors have the least psychological attachment to any single investment and are more willing to diversify, so their stock holdings will contain the least amount of specific risk and total risk.

LOS 13.c

A factor that contributes to entrepreneurs maintaining concentrated portfolios is their psychological attachment to their firms. An entrepreneur has confidence in her abilities to run the firm and is not averse to having her entire fortune tied to the future of the firm as long as she is in control. As she transfers control to others, however, the entrepreneur becomes increasingly uncomfortable with a concentrated portfolio and begins to desire a more diversified position.

Just like an entrepreneur, a top executive's fortunes are tied directly to the firm. The more control the executive exerts over the fortunes of the firm, the less he is concerned with diversification and the more psychologically attached he becomes to the firm.

Once the executive advances to the investor stage, his primary focus changes from accumulating/generating wealth to protecting and growing the wealth he has. At the investor stage, the individual's focus is no longer on owning the firm, *per se*. Stock in any firm is now just considered a stock investment (i.e., part of an investment portfolio rather than ownership in a firm). Once the individual has entered the investor stage, therefore, he no longer has an emotional tie to the firm.

LOS 13.d

1. Sale—Preferred by those wishing maximum investment flexibility. Any unrealized capital gains are recognized immediately for tax purposes.
2. Exchange funds—Several individuals combine their large, low-basis holdings in a single portfolio. In exchange for a commitment to remain in the pool for a given period of time, the investor's low-basis position becomes part of a well-diversified portfolio. Exchange funds can be public or private.
3. Completion portfolios—Are utilized by investors with other, liquid assets in addition to the large low-basis position. The investor identifies a target portfolio (e.g., an index) that exhibits the desired degree of diversification, and the manager purchases diversifying shares using existing funds, by borrowing funds, or by using portfolio cash flows.
4. Hedging—Although hedging is an action of first choice in achieving the desired diversification of a low-basis position, investors must be aware of constructive sale provisions in the U.S. tax code. Accordingly, transactions that effectively take an offsetting position in the currently owned position are deemed constructive sales. The constructive sale rule was designed to prevent investors from locking in investment gains without paying capital gains and to limit their ability to transfer gains from one tax period to another.

An equity collar is created by buying puts and selling calls on the asset to hedge the value of their low-basis position.

A pre-paid forward contract stipulates the asset to be delivered, the delivery date, and the delivery price. Using a pre-paid forward, an investor with a low-basis position can agree to deliver all or part of the stock for a payment received today.

CONCEPT CHECKERS

1. According to capital market theory, there are two fundamental types of risk for an investor holding equity securities. These are:
 - A. concentrated, non-concentrated.
 - B. systematic, non-concentrated.
 - C. systematic, non-systematic.
2. Discuss the stylized characterization of how an investor's portfolio risk changes as she moves from an entrepreneurial stage to a fully diversified stage in the equity holding cycle.
3. Entrepreneurs and executives often find it difficult to hold a well-diversified portfolio for all of the following reasons except:
 - A. they hold non-marketable securities.
 - B. suppliers of capital may require that they hold a significant share of their wealth in the firm's equity.
 - C. the market value of the securities is less than fundamental value.
4. Describe why non-executive investors (i.e., former executives) may find it difficult to sell a concentrated portfolio holding.
5. Techniques that can be used to diversify a concentrated position include all of the following except:
 - A. exchange funds.
 - B. replicating portfolios.
 - C. hedging.
6. Of the techniques that can be used to diversify a concentrated position, identify which is likely to take the longest to achieve complete diversification and explain why.

ANSWERS – CONCEPT CHECKERS

1. C According to capital market theory, there are two fundamental types of risk for an investor holding equity securities: systematic or market-based risk, and non-systematic or firm-specific risk.
2. During the entrepreneurial stage, they are holding a concentrated portfolio with one nonpublicly traded security. At this point, they retain all investment risk, systematic and non-systematic, as well as liquidity risk due to the non-marketability of the securities.

When the firm goes public, or is purchased by a publicly traded firm with stock, the individual often moves to the executive stage. At this stage, the individual is holding a concentrated portfolio with one publicly traded security. Because the security is publicly traded, the liquidity risk is eliminated, but the individual retains all investment risk.

As time goes by, and the individual is no longer an executive of the firm, he moves to the investor stage. When he reaches this point, he begins diversifying his portfolio, but the portfolio remains concentrated in the firm's publicly traded stock. Therefore, he continues to hold some non-systematic risk.

During a period of years in the investor stage, the individual continues to diversify, eventually reaching the stage wherein he holds a well-diversified portfolio that eliminates non-systematic risk. At this point, he has reached the final stage from a portfolio diversification perspective.

3. C Entrepreneurs often find it difficult to hold a well-diversified portfolio because they hold non-marketable securities, and the suppliers of capital may require that they hold a significant share of their wealth in the firm's equity. Executives may find it difficult to diversify because they have to wait to become vested. The security's market value is not a direct impediment to diversification, as are the other factors.
4. Non-executive investors may feel a sense of loyalty to a firm that has rewarded them with significant wealth. They may also have other emotional attachments to the firm, such as the family name still being associated with the firm's operations, or receive special perquisites as a result of their former executive position. These factors can make it difficult for the investors to sell, even when this course of action would be desirable.
5. B Techniques that can be used to diversify a concentrated position include exchange funds, hedging, completion portfolios, and outright sale. Replicating portfolios are used in option pricing theory.
6. A completion portfolio is likely to take longer than the other methods. This is because any sale of the concentrated holding requires the ability to harvest offsetting losses on the holdings in the completion portfolio, so it may take years to achieve significant diversification.

The following is a review of the Private Wealth Management principles designed to address the learning outcome statements set forth by CFA Institute®. This topic is also covered in:

LIFETIME FINANCIAL ADVICE: HUMAN CAPITAL, ASSET ALLOCATION, AND INSURANCE

Study Session 4

EXAM FOCUS

This reading assignment introduces the concept of human capital and its relationship to financial capital and total wealth. It then examines the implications for asset allocation and the use of life insurance and annuities in wealth management. The Learning Outcome Statements for this section are very broad and many of them apply throughout the reading. Essentially, you should understand the material that follows and not try to narrowly apply an outcome to a narrow section of text. Some of the Learning Outcome Statements will be repeated through the text in particularly relevant sections but you are essentially responsible for all of the text that follows.

You should focus your attention on the basic concepts and implications. The CFA curriculum includes a specific note directing that you “should focus on the framework, concepts, and conclusions of this reading, rather than the specific formulas used to optimize investor utility.” We will show the formulas but will not cover any mathematical solutions, which is consistent with the CFA curriculum.

The reading assignment opens with a long section of optional material; however, the opening segment includes helpful terminology. The key points you should review and know for the exam are covered below. If some of the items seem cryptic, you should proceed through the rest of this assignment because they will be covered in more detail as you continue.

IMPORTANT SUMMARY OF INTRODUCTORY MATERIAL

LOS 14.a: Explain the concept and discuss the characteristics of “human capital” as a component of an investor’s total wealth.

LOS 14.b: Discuss the earnings risk, mortality risk, and longevity risk associated with human capital and explain how these risks can be reduced by appropriate portfolio diversification, life insurance, and annuity products.

CFA® Program Curriculum, Volume 2, pages 328, 333

- Human capital (HC) is the discounted present value of the individual’s projected future earnings.
- Financial capital (FC) is the current market value of the individual’s portfolio assets.
- Total wealth is the sum of HC and FC.

- Most investors earn and save from HC to build FC over time to fund retirement and other objectives that continue past death. Generally, HC will be zero at retirement as paid earnings will cease.
- HC is subject to earnings risk as employment could cease due to health, economic, or other changes in conditions. The earnings risk can be reduced by saving more now to build FC more quickly and allow it to start compounding in value more. The risk can also be reduced by selecting FC assets with low correlation to HC, in other words, FC assets that would appreciate when HC is diminished.
- Life insurance can be purchased to provide a payout at death to cover the risk of premature death occurring before sufficient FC has been accumulated to cover those objectives that continue beyond death. (Note: you should not view life insurance as a lottery ticket to create a windfall. The proper use is to fund what would have been accumulated if premature death had not occurred.)
- At retirement, the individual faces longevity risk of outliving his FC. This risk can be hedged with annuities, which provide a payment as long as the individual lives.
- The traditional asset allocation of stocks and bonds can be improved with the inclusion of life insurance and annuities.
- Traditionally (in the United States), retirees would draw in roughly equal portions from Social Security (i.e., government), private pensions, and personal savings. The first two were defined benefit in nature and paid for the life of the retiree—effectively no longevity risk. In recent years, the first two have declined in proportion to private savings leaving individuals more exposed to longevity risk.
- An integrated investment model should:
 - Consider the size, volatility, and correlation to other asset of HC.
 - Jointly analyze life insurance, portfolio asset allocation, and HC.
 - Consider annuities at retirement.

HUMAN CAPITAL AND ASSET ALLOCATION

LOS 14.a: Explain the concept and discuss the characteristics of “human capital” as a component of an investor’s total wealth. (Cont.)

CFA® Program Curriculum, Volume 2, page 333

Human capital is a measure of the individual's lifetime earning capacity. It is the present value of the individual's expected future labor income from salary, wages, bonuses, et cetera. It should be treated as another portfolio asset. Over time most individuals

will save from HC to build FC to meet future obligations at retirement. HC can be calculated as:

$$HC_j = \sum_{t=j+1}^n \left(\frac{\hat{I}_t}{(1+r)^{t-j}} \right)$$

where:

j = individual's current age

HC_j = individual's human capital at age j

= present value of expected annual income starting in year $j+1$

\hat{I}_t = expected income in year t

n = expected remaining years of life (at age j)

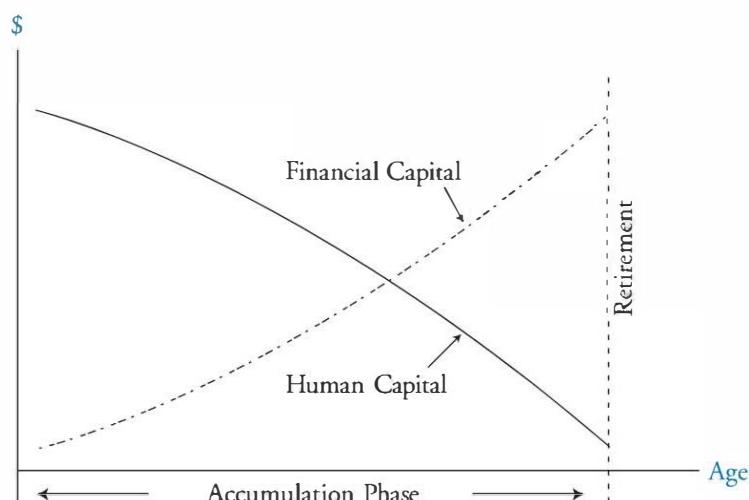
r = discount rate reflecting the inherent risk of the investor's income

= risk-free rate + risk premium



Professor's Note: Passive income generated by investments is considered financial income and, to the extent saved, part of financial capital.

Figure 1: The Expected Relationship Between Human and Financial Capital



At any point total wealth is the sum of HC and FC. Over time the portion of total wealth from HC would typically decline and FC would rise, though unexpected events could disrupt the progression.

Utility Maximization

An asset allocation model should consider not only the risk aversion and objectives of the individual but also the correlation of HC and FC in order to maximize the individual's utility. The optimal mix of human and financial capital maximizes the individual's *utility* according to the following utility functions:¹



Professor's Note: Remember the CFA curriculum directs you to focus on concept and implications and not the formula.

$$U_{i,t} = \frac{\text{Exp}(W_{t+1} + HC_{t+1})^{1-\delta}}{1-\delta}$$

where:

$U_{i,t}$ = the individual's utility at time t

$\text{Exp}(W_{t+1} + HC_{t+1})$ = expected total of human and financial capital

δ = the individual's risk aversion score ($\delta < 1$)

and

$U_{i,t} = \ln(W_{t+1} + HC_{t+1})$ for $\delta = 1$

LOS 14.c: Explain how asset allocation policy is influenced by the risk characteristics of human capital and the relative relationships of human capital, financial capital, and total wealth.

LOS 14.g: Recommend basic strategies for asset allocation and risk reduction when given an investor profile of key inputs, including human capital, financial capital, stage of life cycle, bequest preferences, risk tolerance, and financial wealth.

CFA® Program Curriculum, Volume 2, pages 333, 338

Capital market theory (i.e., the CML) determines the individual's optimal portfolio solely by identifying the combination of the risk-free asset and the market portfolio that maximizes the individual's utility. When human capital is considered, however, the optimal mix of financial assets must consider the *nature* of human capital as well as the *amount* of financial capital.

As we will discuss throughout this reading assignment, the nature of the individual's human capital, whether equity-like or debt-like, determines the optimal composition of the financial portfolio. The investor's human capital (HC) should be treated as equity like if it is highly correlated with the equity market and volatile or as a fixed income

1. 2013 CFA Level III curriculum, Vol. 2, page 336.

asset if uncorrelated and less volatile. The following scenarios illustrate the concept and implications:

Scenario 1: A young investor with highly certain future income and HC. Financial capital (FC) is minimal. The HC should be treated as low risk or risk free and the financial capital allocated to equity. As the investor ages, FC would follow the normal shift toward lower risk fixed income and away from equity.

Scenario 2: A young investor with uncertain future income. Also the income is highly correlated with the economy and stock market making for risky, equity-like HC. Financial capital (FC) is minimal. The HC should be treated as equity and the financial capital allocated to fixed income investments. As the investor ages and FC becomes larger in relation to HC, the FC could first shift to equity as the portion of equity like HC declines over time and later start to shift back to fixed income following the normal progression as the individual ages.

Scenario 3: A young investor with uncertain future income but the income is uncorrelated with the economy and stock market making for risky but non-equity-like HC. Financial capital (FC) is minimal. This investor will follow a path similar to Scenario 1.

Scenario 4: A more established investor with significant FC and HC whose HC is less risky than stocks. With less risky and significant HC, the investor can allocate the FC to more risky equity investments. Then as the investor ages and HC declines as FC rises, the investor will need to reduce the equity in the FC to begin the normal process of reducing the risk of his total wealth.

HUMAN CAPITAL AND LIFE INSURANCE

LOS 14.d: Discuss how asset allocation and the appropriate level of life insurance are influenced by the joint consideration of human capital, financial capital, bequest preferences, risk tolerance, and financial wealth.

LOS 14.e: Discuss the financial market risk, longevity risk, and savings risk faced by investors in retirement and explain how these risks can be reduced by appropriate portfolio diversification, insurance products, and savings discipline.

CFA® Program Curriculum, Volume 2, pages 344, 354

Individuals face a mortality risk that they may die prematurely (at which point their HC is zero) and at a point prior to accumulating sufficient FC to fund any objectives that continue beyond their death. This could include things like educating children, providing for spouse, or making death bequests. Obviously it does not include things like their own retirement as they are now dead. Life insurance is the perfect vehicle to hedge this mortality risk, as it pays out if the individual dies. The optimal amount of insurance would be the amount needed to fund the FC shortfall at premature death. In the following analysis, the insurance is simple, annual term life insurance. In simple form, the individual would pay one premium at the start of the year and his estate would

receive a stated insurance amount if death occurs during the year. If insurance is needed the following year, insurance can be bought next year.

The interaction of HC, asset allocation, and life insurance to optimize the individual's utility can be modeled as:



Professor's Note: Again, remember the CFA curriculum directs you to focus on concept and implications and not the formula.

$$\text{Max E}\left[\left(1 - P_{\text{death},t}\right)(1 - D)(U_{\text{alive}})\left(FC_{t+1} + HC_{t+1}\right)\right] + \left(P_{\text{death},t}\right)(D)(U_{\text{dead}})\overbrace{\left(FC_{t+1} + LIP\right)}^{\text{expected estate}}$$

where:

- $P_{\text{death},t}$ = subjective probability (at time t) of dying before time $t+1$
- D = 0 to 1 = strength of the investor's desire to leave a bequest; $D = 0$ if the investor does not wish to leave an estate
- FC_t = value of the investor's financial capital at time t (or $t+1$); FC is allocated according to the nature and amount of human capital to meet the investor's objectives and constraints and to maximize the investor's utility
- HC_t = value of the investor's human capital at time t (or $t+1$)
- U_{alive} = utility derived from the expected value (at $t+1$) of human capital and accumulated financial capital
- U_{dead} = utility derived from the degree to which the accumulated financial capital coupled with life insurance proceeds will meet the desired bequest
- LIP = life insurance payout; face value of the 1-year renewable term life policy

While the model would allow for precise calculations, it also allows for important general conclusions that include the following:

- As with traditional asset allocation modeling, the individual's risk aversion will affect the riskiness of the portfolio with risk-averse individuals holding lower risk portfolios and risk-tolerant individuals holding more aggressive portfolios.
- Asset allocation and life insurance holdings both affect investor utility and should be solved for jointly.
- A strong correlation between HC and risky assets reduces the allocation to risky assets in the FC. However, it also reduces the need for life insurance. The reduction in life insurance need is caused by high correlation raising risk (i.e., less risk reduction from low correlation), which increases the discount rate used to calculate the PV of future labor earnings. It lowers the computed HC. With lower HC, there is less to insure against mortality risk and less need for life insurance.
- An asset allocation is expected to meet both pre- and post-death objectives. The larger and more important the post-death objectives are to a given individual, the greater the need for life insurance to fund those objectives that continue beyond premature death. Consider the other extreme of an individual whose only objective is to fund her own retirement. There will be no need for funds once she dies, so no insurance against premature death is needed.

- An individual's subjective assessment of his mortality would affect demand for insurance. If he thinks he will live forever, there is no need for life insurance, as it would never pay off. On the other hand if he expects or has a family medical history of early death, life insurance may be a bigger priority. Essentially the key issue is what probability of death during the insurance period the insurance company priced into the cost of the insurance and does the individual have reason to believe the death probability rate is higher or lower than what is priced into the policy.
- Those with relatively more FC (meaning less HC) have less HC to insure and less need for life insurance.
- As FC increases over time, the risk taken with the FC should be positively related to the riskiness of the HC. In other words, if the remaining HC is risky, invest more FC in equity but if the remaining HC is lower risk, take less risk with the FC.

Professor's Note: This last bullet point appears to contradict earlier discussions that higher risk HC leads to lower risk FC to meet the overall risk objective. The earlier discussion of an inverse relationship was extensive in the material and is illustrated with examples.



This new point of why there could be a positive correlation is premised on there being greater FC is not explained, and it is not illustrated with an example. Do not let it distract you from the earlier issue. Perhaps it could be rationalized as with considerable FC and little HC, a portion of the FC can mirror the riskiness of the small amount of HC. The CFA curriculum provides no explanation.

LOS 14.g: Recommend basic strategies for asset allocation and risk reduction when given an investor profile of key inputs, including human capital, financial capital, stage of life cycle, bequest preferences, risk tolerance, and financial wealth. (Cont.)

CFA® Program Curriculum, Volume 2, page 333

The following cases illustrate some of the implications of the model:

Case 1: Consider this as a base case of a young individual with little FC accumulated. The HC is initially large and declines towards zero at retirement while, hopefully, the FC rises to fund retirement. Initial allocation of FC is weighted towards risky assets but begins a shift to more moderate risk as retirement comes closer. Life insurance is highest initially to hedge mortality risk with the larger the portion of wealth coming from HC. The insurance need declines as HC declines and FC rises.

Case 2A: A mid-life investor with considerable FC and HC will have higher needs for life insurance, the larger the bequest (post-death) objectives.

Case 2B: The same mid-life investor's assets will shift to lower risk FC assets if their aversion to risk is high and increase the holding of life insurance. More aggressive investors would shift to higher risk assets and less life insurance.

Case 2C: For the mid-life investor:

- Life insurance demand is inversely related to FC, as FC rises, there is less need for life insurance to meet obligations.
- Allocation to low-risk investment is positively related to FC, as FC rises, there is less need to invest in higher risk assets to meet objectives.

Case 2D: Again, consider the mid-life investor. If there is a strong positive correlation of FC and HC, this leads to a more conservative asset allocation and less need for life insurance. A classic example of this issue is the investor who concentrates his portfolio holdings in the stock of his employer. He has linked both his future income and portfolio return to the same company. Ideally he would reduce the holding of employer stock to lower the correlation of FC and HC, but if this is not possible, any other FC assets should shift to lower risk. In this case of positively correlated HC and FC, the HC calculation should reflect a higher, riskier discount rate, which lowers the HC and therefore lowers the life insurance need.

THE PORTFOLIO AT INVESTOR'S RETIREMENT

LOS 14.e: Discuss the financial market risk, longevity risk, and savings risk faced by investors in retirement and explain how these risks can be reduced by appropriate portfolio diversification, insurance products, and savings discipline. (Cont.)

LOS 14.f: Discuss the relative advantages of fixed and variable annuities as hedges against longevity risk.

LOS 14.g: Recommend basic strategies for asset allocation and risk reduction when given an investor profile of key inputs, including human capital, financial capital, stage of life cycle, bequest preferences, risk tolerance, and financial wealth. (Cont.)

CFA® Program Curriculum, Volume 2, page 333, 354, 359

The typical investor goal at retirement is to maintain his lifestyle and perhaps make gifts or bequests at death. Three significant risks he now faces are as follows:

1. Financial risk is due to changes in financial market prices or conditions. The retired individual must continue to consider both short-run and long-run risk. In the short run, holding assets with lower volatility lowers portfolio volatility, but in the long run may produce lower return and increase the risk of an inadequate return. Monte Carlo simulation can better model these path-dependent issues, such as a need for a fixed amount withdrawal that is not adjusted for changing portfolio value.



Professor's Note: Recall that these issues were discussed earlier in the curriculum and you are responsible for them even though the current section does not elaborate on them.

- Study Session 4
2. Longevity risk is the risk of outliving the FC assets, and it rises now that HC is zero. This risk has also been rising as life expectancies have been increasing while public and private defined-benefit pension plans have been becoming less significant. This makes the retired individual more dependent on personal savings and makes her face greater longevity risk.
 3. Spending uncertainty risk is the simple inability to precisely predict how much will be needed during retirement or how long it will be needed.

These retirement risks are interrelated. While traditional mean-variance optimization is a good starting point for determining the asset allocation, it should be supplemented. Monte Carlo simulation provides additional insight into path dependency and the probabilities of meeting or not meeting objectives. This can be used to point out to individuals the need to save more to build FC. In addition behavioral finance offers insights into how to counsel individuals on the need to save more now (and consume less now).

In addition, the longevity risk can be hedged by combining lifetime annuities with the more traditional stock and bond portfolio. A combination of both fixed and variable annuities is generally best. Both are contracts purchased and paid for in advance, often from an insurance company. Each pays out to the beneficiary for the life of the beneficiary. In effect with the individual paying the insurance company up front, longevity risk is now transferred to the insurance company as the company must make payments for the remaining life of the beneficiary of the annuity.

- A fixed annuity makes a constant nominal payment for life and leaves the beneficiary exposed to declining real value over time, in other words, inflation risk. For example, an individual would pay GBP100,000 and receive GBP7,000 per year for life.
- A variable annuity is also for life but the size of payments is linked to some underlying portfolio, markets, or assets. This may provide some inflation protection over time. This would also make its return more correlated with the stocks and bonds in the portfolio. It would provide some inflation protection but less overall portfolio volatility reduction, as it will be more correlated with stocks and bonds. In a simple concept, suppose the previous GBP100,000 cost annuity pays out 6% of the future market value of the initial 100,000 for the life of the beneficiary, creating a lifetime receipt but of changing size.

Generally a combination of stocks, bonds, fixed, and variable annuities likely offers the best combination at retirement.



Professor's Note: While the annuities are often purchased for a lump sum, payment over a specified schedule is another option. The payouts can also be structured in a variety of ways. Payouts could be limited to a predetermined time period, but that would provide no protection from longevity risk. Payouts may also be for life or a specified time period, whichever is longer. Payouts could be for the longer of the lifetime of two or more recipients—a useful feature if a spouse must be provided for as well.

KEY CONCEPTS

LOS 14.a

Human capital is the present value of earned income (i.e., income generated by the individual's labor). Passive income generated by investments is considered financial income. Social security and employer-related pension payments are considered human capital. Thus, an individual's human capital may maintain a positive value at retirement. In addition to an amount of human capital at time t , each individual has an amount of financial capital, defined as the total value of financial assets owned.

LOS 14.b

Earnings risk relates to the potential for a disruption in the expected income flow. Possible remedies for earnings risk include increasing the savings rate, minimizing the correlation of human and financial capital, and offsetting the risk of the human capital with financial capital.

Mortality risk is the sudden, unexpected loss of human capital caused by premature death. The most commonly employed hedge against mortality risk is life insurance, which has perfect negative correlation with human capital.

Longevity risk relates to the inability of your financial assets to meet your living expenses because you live longer than expected or your financial capital has experienced an unexpected, severe drop in value. The most often cited remedy for longevity risk is the lifetime-payout annuity.

LOS 14.c

Total wealth is the combination of financial and human capital. To consider human capital as part of the investor's asset allocation, we must treat it like an asset class. An individual's human capital could be considered equity-like because of its high expected return and accompanying high variability or because it has a high correlation with equity markets. The investor's human capital could be more fixed income-like if it has lower volatility and low correlation with equity markets. For an individual with equity-like human capital, a higher allocation to fixed-income securities is warranted. For an individual with bond-like human capital, an increased allocation to equities is warranted. Just as with any other asset class, we should consider the human capital's inherent risk, its correlation with other assets, and its size relative to the rest of the portfolio.

LOS 14.d

Life insurance acts as a substitute for human capital, based on present values. Fixed-income characteristics in human capital dictate a lower discount rate with accompanying higher present value and higher demand for life insurance. Equity-like characteristics of human capital dictate a higher discount rate with an accompanying lower present value and lower demand for life insurance.

Risk aversion and the demand for life insurance are positively related. The more risk averse the individual, the less aggressive the financial portfolio, and the higher the demand for life insurance. An aggressively allocated portfolio typically indicates a low aversion to risk (high risk tolerance) and a decreased demand for life insurance.

The probability of death is positively related to the demand for life insurance. As the probability of dying increases, the individual turns to life insurance to increase the value of the estate.

Generally, the greater the accumulated wealth, the lower the need for life insurance will be. As the bequest desire increases, the demand for life insurance increases.

LOS 14.e

There are three primary risks that could jeopardize the desired lifestyle and/or the bequest: (1) financial market risk, (2) longevity risk, and (3) savings risk.

Financial market risk refers to the effects of volatility in the financial markets that could result in significant drops in portfolio values. Diversification is the primary means of mitigating financial market risk.

Longevity risk is the risk of outliving one's financial assets. Actuarial life expectancies are based on population averages. Half will reach the actuarially determined age, but many will live longer. Lifetime-payout annuities are the primary tool for mitigating longevity risk. Employer- and government-based pension plans (e.g., social security) also represent possible solutions to longevity risk.

Savings risk, also known as spending uncertainty, relates to spending more than you should so that you save less than you should during the accumulation stage. Some employers have resorted to SMarT ("Save More Tomorrow") programs. In these programs, individuals pledge to save a portion of future raises.

LOS 14.f

Fixed annuities pay a set nominal amount each period for the life of the investor. In contrast, variable annuities are indexed to some underlying investment. Both provide a lifetime cash flow.

For fixed annuities—because the cash flows are stated in constant nominal terms, the real values of the cash flows fall over time.

For variable annuities—in some periods, the funds perform well and provide high returns. In other periods, however, the payments might fail to meet the investor's needs.

LOS 14.g

Always offset the risk of the **human capital** with the risk of the financial capital and minimize the correlation of the human and financial capital. If the human capital is equity-like, then allocate more of the financial portfolio to fixed income with less demand to life insurance. If the human capital is bond-like, then allocate more of the financial portfolio to equities with increased demand for life insurance.

Financial capital is based on an expected savings rate and an expected return on capital. Attaining the expected retirement portfolio is subject to savings risk, earnings risk, and financial market risk.

When the investor first enters the accumulation phase of their **life cycle**, human capital is typically at its highest and financial capital at its lowest. At that time, the allocation to risky assets depends on the nature of the investor's human capital.

For most individuals entering the accumulation phase, their human capital is more equity-like; thus, their financial assets should be allocated more heavily toward low-risk investments. For some, the nature of human capital is bond-like, permitting investment in riskier financial assets. As the investor ages, financial capital increases while human capital decreases. If the investor is sufficiently successful, accumulated **financial wealth** grows to the point that life insurance is no longer needed as a hedge against mortality risk.

The strength of the **bequest** desire affects the demand for life insurance and the utility the investor receives from leaving a bequest. Generally, the greater the bequest desire, the more likely the individual is to save adequately during the accumulation phase.

The proportion of risky assets in the individual's financial portfolio is inversely related to the individual's **risk aversion**; the greater the aversion to risk, the smaller the allocation to risky assets. The individual's demand for life insurance, however, is positively related to risk aversion. The more risk averse the individual, the greater the demand for life insurance.

CONCEPT CHECKERS

1. When measuring human capital, the individual's expected inflows should include all of the following EXCEPT:
 - A. expected bonuses.
 - B. dividends that are consumed rather than reinvested.
 - C. the post-retirement pension.
2. Explain two factors that contribute to shifting the financial capital curve up when an individual's savings rate is increased.
3. Which of the following is the *most appropriate* strategy for mitigating earnings risk? The investor should:
 - A. minimize the correlation between financial and human capital.
 - B. establish a more conservative savings rate.
 - C. increase the allocation to risky assets in the financial portfolio.
4. Explain how life insurance is used to hedge mortality risk.

Use the following information to answer Questions 5 through 7.

A 69-year-old tenured full professor has just retired. Through each working year, she was required to deposit a portion of her state salary into the state university professors' pension plan, and the amount she invested was matched by the university. Based on her contributions and those of the university, she is now eligible to receive a sizeable state pension. Because she was and is concerned about having enough for retirement and has a strong desire to leave a bequest, the professor has also invested for many years in a 403(b) account through a broker. As a result, she has also accumulated a fairly large financial portfolio.

Over the years, she has continually allocated her 403(b) contributions 20% to large-cap equity mutual funds, 50% to bond mutual funds, and 30% to money market mutual funds. She is now withdrawing those funds and investing them with a financial adviser.

5. Based only on the facts presented above, the professor's risk tolerance would be *best* described as:
 - A. average.
 - B. above average.
 - C. below average.

6. **Describe and explain** the optimal allocation to risky assets in the professor's new financial portfolio.

7. **Determine** the professor's most probable demand for life insurance and **explain** your decision.

8. Rudi Bell is a 55-year-old salesman working in the paper industry. Bell has an expected annual income of \$60,000, a financial portfolio of \$250,000, and he is expected to receive a pension of \$10,000 for the duration of his retirement. He is planning on retiring soon and would like to travel to Europe several times. Although Bell has a son in college, he does not plan to leave the son a bequest. Given these facts, the face value of Bell's term life insurance policy is *most likely*:
 - A. low, given his low bequest preference.
 - B. moderate, because he is nearing retirement and will soon receive his pension.
 - C. high, given that the son would benefit from his father's policy.

9. Alan Roberts, a 30-year-old computer database analyst, has a moderate-size financial portfolio made up almost entirely of fixed-income securities. Roberts has changed his career path five times since graduating from college. His income has varied widely from job to job, but he is currently earning a sizable salary. Roberts is looking forward to his bonus this year, which is rumored to be quite good. Given the structure and size of his financial portfolio and his unstable career path, Roberts's demand for life insurance is *most likely*:
 - A. low.
 - B. high.
 - C. indeterminate.

10. Mort Rasmussen has retired and has based his retirement spending on his actuarial life expectancy. His closest friend, Sue Bernard, has warned him that by doing that he exposes himself to longevity risk. **Define** longevity risk. Explain why basing retirement spending on actuarial life expectancy can lead to longevity risk.

11. Fixed annuities provide relatively stable cash flows. However, there are several drawbacks to using fixed annuities. Which of the following statements is not a drawback of a fixed annuity?
- A. The annuity is typically illiquid.
 - B. The real values of the cash flows fall over time given that the cash flows are stated in nominal terms.
 - C. Because current interest rates are used to determine the present value of the annuity, if interest rates are historically high when the annuity is purchased, the investor is locked into a low lifetime return.

ANSWERS – CONCEPT CHECKERS

1. **B** The cash flows included in measuring the individual's human capital should include all cash flows generated through employment, including employment-related pensions. Earnings (dividends and interest) on investments are considered financial capital, whether consumed or reinvested. Consuming them, however, decreases the growth in the individual's financial capital.
2. One advantage to increasing the rate of savings is that financial capital grows more quickly when contributions are increased. Another advantage is that financial capital is put to work sooner and starts earning investment returns more quickly than originally planned.
3. **A** To offset the inherent riskiness of the individual's earnings, always minimize the correlation between the individual's financial and human capital. Although establishing a more conservative (i.e., lower) savings rate might make regular saving easier, an increased savings rate and low-risk financial assets are advised when the investor has above-average earnings risk.
4. The primary use of life insurance is to replace lost human capital. When human capital falls to zero upon death, the payoff on the life insurance replaces the lost income (human capital).
5. **C** We have several facts that suggest the professor has below-average tolerance for (above-average aversion to) risk:
 - The simple fact that she chose to be a professor *could* indicate that she actively sought out a career with minimal earnings risk.
 - She started the 403(b) account.
 - ◆ She is still concerned about having a sufficient portfolio to meet retirement living expenses.
 - ◆ She is still concerned with leaving a bequest.
 - She continually allocated her 403(b) account 80% to low-risk investments and 20% to large-cap equities.
6. The professor's account should probably be allocated more heavily toward fixed-income and other lower-risk investments. Assuming her aversion to risk has not changed (we see nothing to suggest it has changed), she remains highly risk averse. A substantial guaranteed pension would ordinarily indicate the ability to allocate heavily to equities and other risky assets. However, we must honor the professor's risk tolerance and stay with lower-risk investments.

7. Even as she retires, the professor probably has a strong demand for life insurance. The demand for life insurance is driven by the investor's risk aversion, the investor's wealth, and the strength of the investor's bequest desire.

Risk aversion: The professor has high aversion to risk, which would indicate a strong demand for life insurance.

Wealth: The professor has a substantial financial portfolio, which could indicate that she has her retirement and bequest covered. However, we are told that she still has concerns about meeting both her expenses and the bequest, so this would indicate that she retains the strong desire for insurance.

Bequest desire: The professor retains a strong desire to leave an estate, and this would also translate into high demand for life insurance.

8. A Despite approaching retirement and having a son, Bell has no desire to leave a bequest. The fact that he has any insurance at all is surprising, because he has no desire to leave an estate. Life insurance has perfect negative correlation with human capital; it only has value at the policyholder's death. Therefore, with no bequest desire, Bell should be investing the insurance premium in financial assets.
9. C Roberts's moderately sized financial portfolio is made up solely of fixed-income securities. This is a good indication of his risk tolerance; he would appear to have a low tolerance for risk. Low risk tolerance typically indicates a high demand for life insurance. However, Roberts's human capital volatility indicates that his human capital is equity-like. Because equity-like human capital has a lower present value than bond-like human capital and life insurance acts as a substitute for human capital, this should imply a reduced demand for life insurance. Because the two facts contradict each other, we cannot determine conclusively whether Roberts's demand for life insurance is high or low.
10. Longevity risk is the risk of living longer than expected or experiencing significant drops in financial asset values so that you run out of capital too soon. Actuarial life expectancies are based on population averages. Half the individuals reaching a certain age have the actuarially determined life expectancy, and many will live longer. As a result, there could be a fairly high probability of outliving one's assets if you plan to spend them over your actuarial life.
11. C Fixed cash flows are based on a current interest rate. If interest rates are historically low when the annuity is purchased, the investor is locked into a low lifetime return. A high interest rate would indicate a high lifetime return.

SELF-TEST: PRIVATE WEALTH MANAGEMENT AND BEHAVIORAL FINANCE

Use the following information for Questions 1 through 6.

Chen Wang and his wife, Tao, have been married for nearly 30 years, during which time they have enjoyed enormous business success. The Chens started their marriage as small shopkeepers and grew their business rapidly. They turned their first shop into a successful chain of retail stores. From that base, they expanded into global trading. Eventually, they began to manufacture a variety of items for sale in both their own stores and for export.

After diversifying their business geographically and integrating vertically, the Chens broadened their business interests into real estate. Their holdings expanded beyond their initial investment in residential apartments into large commercial spaces and office buildings. Ultimately, they parlayed their first small business into a large conglomerate, incorporating several industries on both sides of the Pacific. Even though Chen Wang is 61 and his wife is 58, they remain very active in running their businesses.

In addition to their varied business interests, the Chens have a substantial portfolio of marketable securities. Although they have historically managed their securities portfolio themselves, they decided to bring in a professional adviser once the portfolio exceeded 100 million Hong Kong dollars (HKD). They consulted Park Jung Hee, CFA, about the asset allocation and security selection in their investment portfolio.

The Chens told Park, "We have two grandchildren, and we would like to be able to leave each one 100 million HKD (in today's dollars) of marketable securities in our estate." Park reminded the Chens that they could expect to enjoy long lives, but Chen Wang responded, "Kindly plan our investments so the portfolio reaches the target by the time I am 75." Park points out that the current value of the portfolio is already 102 million HKD, so that goal should be reachable, especially because the Chens are not subject to income taxes on portfolio income or capital gains.

The Chens would also like to fund some charitable activities. "If the portfolio can afford it, we would also like to give 1 million HKD per year to various organizations," Chen Tao tells Park. "And we would like to increase that figure every year for inflation," adds Chen Wang. Park and the Chens agree to plan for an inflation rate of 1% per year.

Park reviews the current holdings in the portfolio with the Chens. He notes that the portfolio contains nearly 20 million HKD of equity in the Golden Flower Trading Company (GFTC). The Chens have had GFTC in their portfolio for several years because they consider it a good company. Park advises them, however, to sell some of the position in order to diversify their portfolio. Chen Wang points out to Park that GFTC has fallen 15% from its high, reached several months ago. "We don't want to lose money, so please wait to sell until it comes back."

Chen Tao elaborates, “We prefer to own companies that we know. We don’t like to rely on investment research because a company’s financial statements do not tell us what the company is really like. We want to know personally the people who run the companies we invest in and know that they are careful and prudent. Once we make an investment, we hold on to it.”

1. The process for creating an investment policy statement (IPS) for the Chens would *least likely* include which of the following?
 - A. Define appropriate investment strategy based on analysis of market conditions and other variables.
 - B. Eliminate portfolio constraints.
 - C. Determine asset allocation to meet the Chens’ objectives and constraints.
2. Which of the following is *least likely* to be included in the five main classes of investment constraints?
 - A. Regulatory and legal constraints.
 - B. Risk tolerance.
 - C. Time horizon.
3. The return objective on the portfolio necessary for the Chens to reach their investment goals is *closest* to:
 - A. 5%.
 - B. 6%.
 - C. 7%.
4. The Chens’ decision to invest in the equity of GFTC because they consider it a good company is *best* described as:
 - A. familiarity.
 - B. overconfidence.
 - C. representativeness.
5. Chen Wang’s reluctance to sell GFTC until it returns to its earlier high is *best* described as:
 - A. regret.
 - B. anchoring.
 - C. myopic loss aversion.
6. Chen Tao’s description of how she and her husband choose the companies they invest in *most closely* describes which type of investor?
 - A. Cautious.
 - B. Methodical.
 - C. Individualistic.

SELF-TEST ANSWERS: PRIVATE WEALTH MANAGEMENT AND BEHAVIORAL FINANCE

1. B An IPS would appropriately determine, not eliminate, portfolio constraints. It is highly unlikely that constraints could be eliminated. All other choices are appropriate steps in the construction of an IPS.
2. B Although risk tolerance is a critical aspect of an IPS, it is not considered an investment constraint. The five main categories of investment constraints are liquidity, time horizon, legal and regulatory concerns, tax considerations, and unique circumstances.
3. C Because Chen Wang is currently 61 years old and wants the portfolio to reach 200 million HKD by the time he is 75, the time horizon for the portfolio is 14 years. In order for the portfolio to reach 200 million in that time, ignoring the annual distribution, it would need to return $[200 / 102 = (1 + x)^{14} =]$ 5% per year. Because the portfolio will be distributing approximately $(1 \text{ million} / 102 \text{ million} =)$ 1% per year in gifts in addition to taking into account a 1% inflation rate, it would need to earn approximately $(5 + 1 + 1 =)$ 7% per year to reach the target and fund the annual distribution. Using the TVM keys: -102 million = PV, 200 million = FV, 1 million = PMT, 14 = N, CPT → I/Y = 5.66% + 1% inflation = 6.66% or about 7%.
4. C Viewing a “good company” as a “good stock” is an example of representativeness. Overconfidence is when people place too much confidence in their ability to predict. Familiarity is when people invest in securities with which they are familiar. Frame dependence is judging information within the framework in which it is received rather than on its own merits.
5. A The Chens are attempting to avoid the feeling of regret associated with not selling GFTC at its historical high. This is a stereotypical case of trying to avoid a feeling of *if only*. If they sold the stock now, they would say, “*If only* we had sold GFTC when it was at \$X, we would have realized much more on the investment.” In other words, they would have to admit that they were unable to recognize and take advantage of the historical high. Anchoring refers to locking onto the first information received and is more common in a forecasting setting. The Chens are showing loss aversion but myopic loss aversion is something else. It refers to loss aversion that leads to distortions in the market equity risk premium for equity and is not relevant here.
6. A Cautious investors are the most risk averse and tend to exhibit low turnover in their portfolios. Chen Tao’s description of choosing prudent and careful businessowners with whom they have emotional relationships, not relying heavily on financial data and investment research, and holding on to their holdings once a decision is made is most closely aligned with the cautious personality type. Methodical investors research investments thoroughly and rarely form emotional attachments. Individualistic investors make careful investment analyses, and spontaneous investors follow trends.

FORMULAS

investment income tax (accrual taxes): $FVIF_{IT} = [1 + R(1 - T_1)]^N$

deferred capital gains tax (MV = cost basis): $FVIF_{CGT} = [(1 + R)^N(1 - T_{CG}) + T_{CG}]$

deferred capital gains tax (MV ≠ cost basis): $FVIF_{CGBT} = [(1 + R)^N(1 - T_{CG})] + T_{CG}B$

wealth-based tax: $FVIF_{WT} = [(1 + R)(1 - TW)]^N$

return after realized taxes: $R_{ART} = R[1 - (P_1 T_1 + P_D T_D + P_{CG} T_{CG})]$

effective capital gains tax rate:

$$T_{ECG} = T_{CG}(1 - P_1 - P_D - P_{CG}) / (1 - P_1 T_1 - P_D T_D - P_{CG} T_{CG})$$

future value interest factor after all taxes:

$$FVIF_T = [(1 + R_{ART})^N(1 - T_{ECG})] + T_{ECG} - (1 - B)T_{CG}$$

accrual equivalent after-tax return: $R_{AE} = \sqrt[N]{\frac{FV_T}{PV}} - 1$

accrual equivalent tax rate: $T_{AE} = 1 - \frac{R_{AE}}{R}$

future value interest factor for a tax-deferred account (TDA):

$$FVIF_{TDA} = (1 + R)^N(1 - T_N)$$

future value interest factor for a tax-exempt account: $FVIF_{TEA} = (1 + R)^N$

human capital at time t , $HC_j = \sum_{t=j+1}^n \left(\frac{\hat{I}_t}{(1+r)^{t-j}} \right)$

objective function for allocation of risky assets:

$$\text{Max } E[(1 - P_{\text{death},t})(1 - D)(U_{\text{alive}})(FC_{t+1} + HC_{t+1})] + (P_{\text{death},t})(D)(U_{\text{dead}}) \overbrace{(FC_{t+1} + LIPO)}^{\text{expected estate}}$$

relative after-tax value:

$$RV_{\text{tax-free gift}} = \frac{FV_{\text{tax-free gift}}}{FV_{\text{bequest}}} = \frac{\left[1 + r_g(1 - t_{ig})\right]^n}{\left[1 + r_e(1 - t_{ie})\right]^n (1 - T_e)}$$

$$RV_{\text{taxable gift}} = \frac{FV_{\text{taxable gift}}}{FV_{\text{bequest}}} = \frac{\left[(1 - T_g)\left[1 + r_g(1 - t_{ig})\right]\right]^n}{\left[1 + r_e(1 - t_{ie})\right]^n (1 - T_e)}$$

$$RV_{\text{taxable gift}} = \frac{(1 - T_g + T_g T_e)\left[1 + r_g(1 - t_{ig})\right]^n}{\left[1 + r_e(1 - t_{ie})\right]^n (1 - T_e)} \quad (\text{donor pays gift taxes})$$

$$RV_{\text{charitable donation}} = \frac{FV_{\text{charitable gift}}}{FV_{\text{bequest}}} = \frac{\left(1 + r_g\right)^n + T_{oi}\left[1 + r_e(1 - t_{ie})\right]^n (1 - T_e)}{\left[1 + r_e(1 - t_{ie})\right]^n (1 - T_e)}$$

generation skipping:

$$FV_{\text{no skipping}} = PV[(1 + r)^{n1} (1 - t)][(1 + r)^{n2} (1 - t)]$$

$$FV_{\text{skipping}} = PV[(1 + r)^N (1 - T_e)] \quad [N = n1 + n2]$$

double taxation: effective tax rates:

$$T_{\text{credit}} = \text{Max}(T_{\text{residence}}, T_{\text{source}}); T_{\text{deduction}} = T_{\text{residence}} + T_{\text{source}}(1 - T_{\text{residence}})$$

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