14.9: Solutions to CH 9 Exercises

Question 1

An expense ratio refers to an annual charge (taken out on a daily basis) for the company that manages the mutual fund. For example, a mutual fund with a 1% expense ratio would charge investors 1% of their assets each year for managing the fund (note: assuming 250 trading days, that would work out to 0.004% per day). This is designed to cover the mutual funds expenses (mutual fund managers, cost of gathering information, cost of presenting information to investors, earning a profit, etc.) and does not factor in actual trading costs (brokerage commissions paid by the mutual fund, etc.). A load charge refers to an upfront charge based on investments into the fund. For example, if I decide to invest $100 a month into a fund with a 4% load charge, then $4 each month will go to the fund for the load and $96 will actually get invested into the fund. Typically load charges are designed to cover compensation to financial advisors and other marketing costs.

For a short-term investor, load charges are typically more important while for long-term investors expense ratios are more critical. The crossover point in terms of how long depends on the relative size of expense ratios and load charges. You can estimate the impact of load charges and expense ratios as follows:

- Estimate your future value based on contributions to the mutual fund and anticipated rate of return without expenses.
- Estimate your future value based on contributions to the mutual fund and anticipated rate of return with expenses.

For example, what is the impact of a 5% load charge and a 0.8% expense ratio for an investor who plans to initially contribute $2000 today and make additional contributions of $200 per month for the next 40 years if the mutual fund anticipates earning 6.5% before expenses?

Baseline

480 N
6.5 I/Y
-2000 PV
-200 PMT
FV⇒$483,462.99

With Expenses

480 N
5.7 I/Y
-1900 PV
-190 PMT
FV⇒$367,437.65

The baseline (without expenses) results in you having an additional $116,025.34 at retirement, so this is your net cost for the expenses. Note that reducing the expense ratio from 0.8 to 0.4 would have allowed you to accumulate an extra $43,035.87 at retirement. Small changes in the expense ratio don't amount to much in a given year, but are big over a long time-frame.

Question 2

The prospectus provides all the important information to a potential investor on the fund. It details the fund objective, talks about investment strategy, details who the fund manager is, breaks down expenses, discusses risk, looks at past returns, etc. In addition, it talks about minimum initial investments and looks at portfolio holdings for the most recent quarter. While the prospectus can't tell you if a fund will perform well in the future, it is an important document to look through to get a feel if the fund is right fit for you.

Question 3

An ETF is an Exchange Traded Fund. It is a mutual fund that trades like an individual stock. Normally, mutual funds can only be bought/sold at the end of the trading day (NOT while markets are open). Also, mutual funds discourage investors from short-term trading. They don't want people buying one day and selling a week later. Instead they want them to invest and hold the fund for multiple years. Finally, most mutual funds are actively managed. This means that mutual fund managers try to identify good stocks to own and bad stocks to avoid. They buy/sell stocks within the mutual funds portfolio regularly (most actively managed mutual funds have turnover of over 100% which means that they hold the average stock in their portfolio for less than one year). Active management is less tax-efficient (more short-term capital gains) and more expensive (more trading costs which lowers the funds returns unless they're able to find undervalued/overvalued stocks consistently…evidence suggests this doesn't happen). While some traditional mutual funds are passive (these are known as index funds and are among my favorite type of funds), they are in the minority. While most traditional mutual funds are actively-managed, most ETFs are passive. By passive, we mean that instead of trying to choose good stocks and avoid bad ones, they try to match a particular index. The index may be a broad market index (like the S&P 500), a sector (like energy stocks), international (like Brazil), or many other categories. This tendency for passive investment-strategies tends to result in lower expense ratios than traditional ETF. However, some ETFs can have exotic strategies (such as levered funds which are supposed to increase/decrease 2-3 times as fast as the overall market or levered inverse funds which are supposed to move in the opposite direction of the overall market AND at a faster pace) or focus on areas outside stocks such as gold. Because ETFs are bought like individual stocks, you need a brokerage account to trade them and pay brokerage commissions when you buy/sell. ETFs have become extremely popular and are one of the fastest growing areas of mutual funds over the last 10 years. Quick recap on ETFs:

- Purchased through a broker
- Trade like a stock (buy/sell during periods when the market is open) so better for active traders
- Tend to have lower expense ratios
- Tend to follow a passive investment management strategy
- Can have a wide variety of objectives to match the interests of a wide-variety of investors

Question 4

In class, we have often discussed the idea that risk-aversion is closely related to age (or years to retirement). As people are younger (20s – 40s), they can afford to take more risks for higher expected returns as they have more time to recover from losses and adjust their savings. However, as people get close to retirement (50s – 60s), they need to reduce their risk exposure. Lifecycle funds are designed to do this automatically by investors choosing a target date for their retirement (typically in 5 year increments). For example, a person like myself with about 10 years to retirement might choose a target-date of 2030. A person near retirement may choose a target date of 2020. Someone just graduating may choose a target date of 2055, 2060, or even 2065. Each of these different "target-dates" would be different mutual funds with noticeably different investment strategies. The 2020 fund would probably have about 50-55% stock exposure (with many of the stocks more conservative companies), 35-40% bond exposure, and 5-10% cash exposure for a less risky mix. The 2055 fund would probably have about 90% stock exposure (with more of it in aggressive growth stocks, emerging markets investments, etc.) and 10% bond exposure (including some junk bonds). Over time, the management team running the 2055 fund would slowly reduce the risk by moving to fewer, more conservative stocks and more (and safer) bonds. This way the investor does not need to worry about adjusting the risk over time. It is designed to maximize "ease of management" for the individual investor as risk is gradually reduced to match age.

The advantage is clearly simplicity for the average investor. Many people find reviewing/managing their investment funds as much fun as a trip to the dentist. This reduces the time that needs to be spent assessing the portfolio mix as it is taken care of for you by the fund managers. There are however a couple of disadvantages that one needs to be aware of before choosing this route. First, risk aversion is not solely dependent on time to retirement. It is also impacted by personality, income, wealth, job security, dependents, and many other factors. The lifecycle fund only controls for one factor (although typically one of the most critical factors), so may provide a risk mismatch for YOU if you do not fit the normal profile in all other areas. Second, each lifecycle fund is managed a bit differently. The 2030 fund offered by one firm may have 70% weighting in stocks while the 2030 fund offered by another may have 50% weighting. Because of this, even if an investor fits the normal profile and chooses the right target date, they may have a slightly riskier/higher expected return fund or a slightly safer/lower expected return fund depending on which mutual fund company he/she buys from. A third disadvantage is that these funds typically have higher expense ratios. Often they are formed not by individual securities, but essentially mutual funds within mutual funds. This can mean paying expenses for management of the lifecycle fund and paying expenses within the mutual funds the lifecycle fund holds. Check the prospectus of the lifecycle fund you are choosing to before buying to see about its risk profile and its expenses instead of just picking any fund with the appropriate target date.

Question 5

There are many things to consider when evaluating a mutual fund. However, a few simple ones that I would recommend are as follows:

- Eliminate any fund that is in the bottom 25% of its category over the last 3-5 years in performance. Often (not always), this is a sign that there are some structural problems with the fund.
- Look for funds with below average expense ratios. I prefer index funds because they have extremely low expense ratios and evidence suggests that mutual fund managers do not outperform the market on a risk-adjusted basis. If they don't have an edge over the market, why pay for them to try to outperform it? Instead, just get exposure to the assets you want through low-cost, passive funds.
- Focus on risk for you. Look at the risk of the funds you invest in and make sure you are comfortable with it. If losing 30% of your money is going to cause you to not sleep at night, don't expose yourself to that risk. There are thousands of funds with very different risk-return profiles, so choose ones that you are comfortable with.
- Closely related to the previous factor – choose a portfolio of funds that works for you. Even if you are more risk averse, you can put SOME of your funds into higher-risk, higher-return type funds as long as you have a portfolio. A portfolio doesn't mean 10 random mutual funds, but maybe 3-8 specific mutual funds with different objectives (such as 10% in an emerging market stock fund, 10% in an emerging market bond fund, 10% in a broader international stock fund, 10% in a broader international bond fund, 30% in a US stock index fund, 20% in a US bond fund, and 10% in a precious metals or real estate fund – note, this mix is meant as an example NOT a recommendation).
- Adjust your asset allocation (how much stocks, bonds, international, etc) at least annually to maintain an appropriate risk balance. Otherwise you will find yourself over-weighted towards areas that did well in the recent past and underweighted towards areas that did poorly. It also allows you to re-evaluate how much risk you feel comfortable with based on your current situation.

Question 6

The primary reasons mutual funds don't outperform the markets on a risk-adjusted basis are (a) markets are relatively efficient and (b) managing a fund entails costs which are not captured by market indices (such as the S&P 500). Even though mutual fund managers are professionals and typically very good at what they do, they are largely competing against other professionals who are typically very good at what they do. The vast majority of trading in the financial markets is among professional/institutional investors. They all are smart, have access to lots of information, etc. Because of this, it is rare for one to consistently outdo the others. The efficient markets hypothesis may not be 100% valid, but it is reasonably close. There are not a lot of easily exploitable opportunities out there because so many people are constantly seeking them out. Also, running a mutual fund involves costs. There are basic trading costs, costs to gathering information, cost to paying the portfolio manager and staff, cost to preparing/presenting information to investors, the fund company's profit, etc. These things are covered in the expense ratio (except for trading costs which lower pre-expense returns) and impact the return that the investor receives from the mutual fund (often these costs are around 1%). Because the index is not a managed portfolio, it doesn't have any of these costs to lower its performance. Studies show that after accounting for trading costs and expense ratios, mutual funds typically match the overall market returns.

This does not mean that mutual funds are a poor investment tool. If you tried to invest on your own through individual stocks/bonds, you also would likely not outperform the market due to investment skill (it's possible, but not likely). You would also be gathering information (dollar cost and time cost), paying brokerage commissions, and needing to have a large enough portfolio to adequately diversify (remember that you'd need at LEAST 15 different stocks – most mutual funds have over 100 different stocks in their portfolio). Between the time spent managing your portfolio, the initial investment required to have a diversified portfolio, and the trading costs you would encounter, most people find mutual funds far more efficient than managing their own stocks/bonds. I would argue that unless you had at least $50,000 (probably a low estimate) AND enjoyed doing investment research, you are better off with mutual funds (carefully selected mutual funds) than trying to manage your individual portfolio of stocks/bonds. However, if you really like investments, there can be other advantages other than pure cost efficiency (enjoyment of the challenge provided, learning experience, etc.). The vast majority of individuals are better served by mutual funds than opening a brokerage account to trade stocks.

Question 7

SIMILARITIES

- Both allow $6000 per person per year contribution ($7000 for people 50 and older under catch up IRA rules)
- Both allow investments to compound tax-free during the time period they are in the IRA (no taxes on investment income – dividends, interest, capital gains)
- Both allow a wide variety of investments (stocks, bonds, mutual funds, bank CDs, etc.) to be held within the IRA

DIFFERENCES

- The Traditional IRA has a tax incentive for your contribution. For every $1 you put in the IRA, the IRS allows you to lower your taxable income by $1. For someone in the 25% tax rate, this is essentially the same as getting an extra $0.25 for every $1 you contribute. This is a front-loaded tax incentive. The Roth IRA does not provide a tax incentive on your contribution (you don't pay any extra taxes than you would if you spent/invested the money elsewhere…you just don't get the tax break).
- The traditional IRA has more restrictive income guidelines for getting the full tax advantage. For example, if you are married and make $124,000 or more (2020) in joint adjusted gross income, neither you nor your spouse can take advantage of a traditional IRA (assuming you are covered by a retirement plan at work). However, you can take full advantage of a Roth IRA assuming you don't make more than $196,000 (2020). This allows more people to take advantage of Roth IRAs than Traditional IRAs
- With the Roth IRA, you do not pay any taxes on eligible withdraws (post-retirement). With a Traditional IRA, eligible withdraws are taxed as ordinary income. This creates a back-loaded tax incentive for Roth IRAs
- With the Roth IRA, you are not required to initiate withdraws at age 70½. This is because there is no tax payment necessary on withdraws, so the IRS has no incentive to make you initiate withdraws. This makes Roth IRAs better for estate planning purposes.
- With the Roth IRA, you can withdraw contributions (not investment income) prior to retirement without a tax penalty. This is because you did not get any tax break on your contribution (only the investment income) so there is no rationale for a penalty. However, I would strongly recommend avoiding early withdraws if possible as it limits your ability to use the IRA to accumulate significant wealth at retirement.

Question 8

This is an example of a poor question. The reason it is a poor question is because IRAs (like 401k plans) are not investments and therefore don't earn rates of returns. Instead they are tax shelters that we can put investments into to reduce the taxes associated with our investment income. Someone that is very conservative could put short-term bank CDs into their IRA. Right now (7-13-2020), most banks are paying approximately 1.00% on a 2-year CD, so if that was the investment you were holding in your IRA, you would earn a 1.00% return. You could invest your entire IRA into a single stock. If it did well, you'd have a great return. If it did poorly, you'd have a negative return. Within your IRA, you can choose a wide variety of investments (a few – such as collectibles – are typically off limits) and then your rate of return will depend on the rate of return from those investments. So, to answer this question for YOUR IRA (or 401k plan), think about what you are going to invest in within the tax shelter and that will provide you your anticipated rate of return.

Question 9

$6000 per person per year (this is the answer you need to know for the test). However, there are a few exceptions. One, you need to have earned income of that amount (so you can't start funding your kids IRA at $6000 per year when they are 2). Two is that you might be restricted by the income restrictions on eligibility (if you earn above certain amounts you will be able to contribute less – or even zero – to an IRA). Third is that if you are over 50, you are eligible to contribute $7000 per person per year. Note that those are individual levels, so a couple could contribute up to $12,000 per year by each contributing $6000 to their personal IRAs (remember that IRAs are individual accounts).

Question 10

This is based on the income restrictions. For people filing individual tax returns, only those earning under $65,000 in adjusted income are able to take full advantage of a Traditional IRA (and the ability to use the traditional IRA – assuming you are covered by a retirement plan at work – is phased out entirely for those making $75,000 or more). For a Roth IRA, individuals can participate fully at up to $124,000 in adjusted income and are not phased out entirely until $139,000. For couples, the Traditional IRA cutoff point kicks in at $104,000 and any couple with over $124,000 is not eligible. Again, Roth IRAs are less restrictive in that the cutoff point kicks in at $196,000 and eligibility is eliminated at $206,000 (note that these income limits are for the 2020 tax year). Therefore, while everyone at lower income points could choose either type of IRA, people at higher income points are limited to the Roth version.

Question 11

Mutual funds are probably the largest type of asset. However, individual stocks and bonds are also popular choices. Bank CDs are another popular investment that is held within IRAs. Under certain circumstances, real estate, precious metals, and other types of investments can also be held within IRAs. However, it is harder to find financial institutions that will fulfill a custodial agreement, so most people use traditional securities (mutual funds, stocks, bonds, and CDs). Some investment strategies (collectibles, using margin, and/or many derivatives such as options and futures are typically not approved IRA assets).

Question 12

A 401(k) plan is what we would describe as a DEFINED CONTRIBUTION pension plan. Defined contribution pension plans base their benefits on (a) how much is contributed and (b) what return on investment is generated. In other words, people that make significant contributions to their 401(k) plans over a long period of time and earn decent rates of return will have significantly more retirement assets (and, in turn, retirement income) than those that don't make many contributions or earn poor rates of return. This differs from a DEFINED BENEFIT plan where retirement benefits are based on years of service and average salary (or last year's salary). Due to longer life expectancies, companies realized that the traditional defined benefit plan was too expensive and most have moved to 401(k) plans. Many companies will provide a matching contribution. The level of the match varies significantly from firm to firm, but an example would be a 50% match on the first 6% contribution. So, assume you earn $1000 for your paycheck and contribute 6% ($60). Then your employer would match that at 50% ($30) and your total contribution to your 401(k) plan would be $90. Some employers match more, some less so it is one thing to evaluate as you look at potential job offers. Many firms cut or eliminated matching plans during the worst of the financial crisis, but a recent article noted that ¾ of those firms have reinstated their matching.

Once you decide how much you are going to contribute and what the match is, the next step is to figure out how you are going to invest it. Most 401(k) plans provide a variety of mutual-fund based alternatives within the plan. The better the plan, the more choices (and better choices) you will have to allocate your contribution dollars. It will be up to you to decide how much risk you are willing to take in search of higher expected returns and to monitor the allocations over time to make sure that you stay on track with your goals. Effectively, 401(k) plans have shifted the burden of retirement income from the employer to the employee. While they may help with that burden through matching contributions, if you don't contribute enough or don't earn enough on your investments, you will have less wealth/income during retirement. On the plus side, it also increases your ability to control that by letting you set how much you want to save and how you want to invest those savings.

The 401(k) plan has tax treatment similar to a Traditional IRA. Your taxable income is reduced by the amount you contribute and the investment income is not taxed while it is in the 401(k). However, when you withdraw money from your 401(k) in retirement, it is taxed as ordinary income. Recently, legislation was passed to allow Roth 401(k) plans. These may or may not be an option for you depending on your employer. The current maximum contribution to a 401(k) plan is $19,500 per person per year ($26,000 for those 50 and older).

Question 13

Vesting refers to your ability to take your firm's matching contributions (and the investment income from those contributions) with you when you leave the firm. If you are not vested, you can only take your contributions and investment income from those contributions. Contributions from the employer belong to the employer if you leave the firm. However, once you are vested, the employer's contributions are officially yours even if you leave the firm. The sooner you are vested, the more valuable the employer's contribution is to you. If you are not vested, it may be an anchor that ties you to the firm and prevents you from taking an attractive opportunity with a different company because of the cost of giving up the employer's contribution. Vesting policies vary from firm to firm, but firms are required to meet minimum standards that have you fully vested within a 5-7 year time-frame (either fully vested at 5 years or gradually vested starting 20% in year 3 to 100% in year 7). Note that firms can vest quicker than this, but not slower.

Question 14

The less the better. Remember that not only are you investing your retirement funds, but your current earnings into the performance of your current employer. If the company does poorly you may be out of a job AND see your retirement assets shrink (especially if it goes bankrupt). An absolute upper ceiling should be 20%, but under 10% is better. This is essential, especially as you get older and your risk tolerance drops.

Question 15

Leave your money with the company – Most firms will allow you to leave the money in the plan and then access it when you retire. The downside of this is that you have less control and if you change jobs frequently you will have several accounts to keep track of.

Move your money to your new employer’s 401(k) plan – Most employers will allow you to transfer your money to your new company’s plan. The downside of this is that you are limited to the options available in your new plan.

Use a Rollover IRA – You can set up a special account called a “Rollover IRA” (discussed in the IRA handout), which allows you control over your investment decisions. If you put your money in a Rollover IRA it is important that your old employer transfer the money directly to the IRA account to avoid a 20% withholding penalty.

Cash Out – This will result in significant tax penalties and should only be done as a last resort if you desperately need the cash.
