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Asset Management in the financial industry: the future of 60/40 portfolio

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To my family, my friends and my girlfriend,
for supporting me during this journey

"Sognando il volo tra nuvole e stelle"

Index

Introduction

The landscape of portfolio asset allocation has undergone significant changes in recent years. The traditional approach of allocating 60% to equity and 40% to bonds, based on broad, public indexes, has shown a strong start to 2023 following a challenging year. However, expecting a return of a joint stock-bond bull market similar to the Great Moderation seems unrealistic. The Great Moderation was characterized by a long period of stability in economic activity and inflation, during which most assets rallied and bonds provided diversification during stock market downturns. Nevertheless, the current new regime, marked by major central banks raising interest rates during a recession to combat inflation, calls for a reassessment of long-term allocations that were built on outdated assumptions. In the past, bonds reliably provided diversification and acted as a ballast during the Great Moderation, offsetting equity sell-offs. However, some of that diversification benefit has diminished. Since 2021, average bond returns have dipped alongside equities. Nevertheless, the higher yields present an opportunity for income generation in fixed income. The effectiveness of long-term bonds as portfolio diversifiers has sparked a debate about the future viability of the traditional 60% stocks, 40% bonds portfolio. It is important to note that the focus of the debate should not solely be on the numerical allocation levels, but rather on the approach to portfolio construction in light of the new regime.[1][2]

Therefore, the motivation for this thesis is to examine the new macro-economic regime we are in to understand both the new investment outputs for the upcoming decade and whether the traditional 60/40 asset allocation will still be profitable. Accordingly, the goal of this thesis is to provide answers to the following questions. What is Asset Management and what is the related literature that comes to its support? What are the main characteristics and roles of the different asset classes? What is the new macro-economic regime we are sliding in and which are its main drivers? What is the resulting portfolio approach of these new assumptions? Will the 60/40 portfolio be back in vogue?

The first section will provide an overview of Asset Management in the financial industry, explaining what Asset Management means, why it is important and how the industry is structured today. In the second section, the analysis will focus on the different types of

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[1] BlackRock Investment Institute (BII), Global Outlook 2023
[2] BlackRock Investment Institute (BII), Weekly Commentary 2023

securities available, divided between conventional and alternative, in order to understand the role of each asset class in financial portfolios. Subsequently, section 3 will introduce Modern Portfolio Theory and thus all the financial theory necessary to understand how to construct - by combining different asset classes - the optimum portfolios that maximize the expected return for any level of risk. Finally, the last two sections of this thesis, respectively 4 and 5, will analyze the current macro-economic regime, its main drivers and the consequent new portfolio construction approach we should adopt for both the short and long-term.

Section 1: Asset Management in the Financial Industry

1.1 Definition and Importance of Asset Management

Naturally, starting point has to be a proper understanding of what Asset Management is and which goals it has. Asset management is a crucial component of the financial industry, encompassing a broad range of activities related to managing clients' investments. The primary goal of asset managers[3] is to help their clients achieve their financial goals by maximising the value of their portfolios. To accomplish this objective, asset managers collaborate closely with their clients to understand their financial goals, investment timeframes, and tolerance for risk. Asset managers work with diverse clientele, including individuals, institutional investors, sovereign wealth funds, insurance companies, pension funds, charities, and corporations. They must customize their investment strategies to suit the unique financial circumstances and objectives of each client. For instance, the investment goals and risk tolerance of an individual investor may differ significantly from those of a large pension fund.

Asset management covers various types of asset classes, including stocks, bonds, real estate, commodities, and derivatives. The asset manager must select the appropriate asset mix based on the client's investment objectives and risk appetite. They must conduct detailed research and analysis of various investment options to identify those that offer the best returns for the level of risk involved. In addition to selecting and analysing investments, asset managers must also monitor market trends and make investment decisions based on economic conditions and market forecasts. They must stay up to date with the latest news and developments that could impact the value of their clients' portfolios, such as changes in interest rates, government policies, and international events.

Broadly speaking, since Asset Management is a vast field with many roles that require different skills and expertise, we should divide the industry in 3 key areas where the roles can slide into: distribution, investment, and support. The distribution channel is where all the Sales & Marketing people together with Clients Relationship Managers (CRMs) are. They are in charge of bringing the money from the clients and build with them relationships. Within the investment channel we can find Portfolio Managers, Traders, and Research Analyst. They are responsible for coming up with the ideas and the ways to invest into the financial markets. Finally, the

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[3] For ease and simplicity, I will use the term 'asset managers' to encompass client facing, investment focused and all other employee roles within an asset management company

support back-office[4] functions include teams such as Compliance, Legal, Finance and HR. They provide support to front-office[5] roles.

Overall, Asset Management is a complex and dynamic field that demands extensive knowledge of various financial instruments, market trends, and economic conditions. Asset managers need to be highly skilled and experienced professionals capable of navigating the intricacies of financial markets and making informed investment decisions to maximize their clients' returns while minimizing their exposure to risk.

1.2 Industry Overview: Major players and clients

The investment management industry is growing sharply in the last few decades. By year-end 2017, U.S. registered investment company assets under management had expanded to $22.5 trillion from $2.8 trillion in 1995, managed over 16,800 funds, and employed an estimated 178,000 people[6]. The global money management business has grown in parallel. Figure 1 shows that worldwide assets under management have expanded over 2.5× from 2005 to 2017.
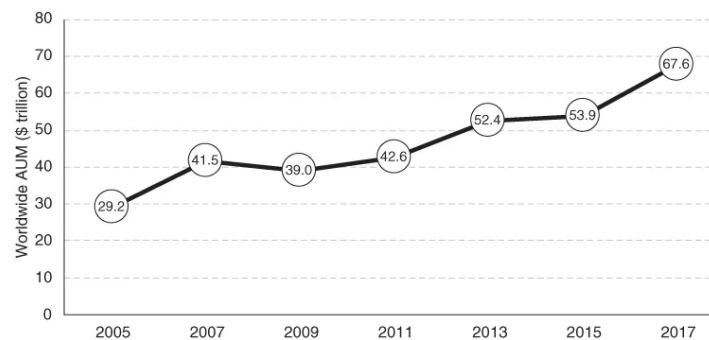
Figure 1: AUM Growth

Figure 1: This Figure was taken over from Stewart, Piros and Heisler, Portfolio Management (2019). It shows the total worldwide growth of Assets Under Management from 2005 to 2017.

As the Asset Management industry continues to evolve, it showcases a wide array of players and approaches. When considering the key participants in this industry, there are several intriguing aspects worth noting. These include their significant size and influence within the financial sector, their distinct areas of specialization and expertise, their diverse investment strategies, and their performance across different market conditions. Furthermore, some of these companies have been involved in notable controversies or legal cases, while others have

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[4] Back office work refers to positions within a company that are not client-facing. The back office provides support to the front office by handling several administrative tasks
[5] Front office work refers to positions within a company that interacts directly with customers or clients
[6] Stewart, Piros and Heisler, Portfolio Management (2019)

gained recognition for their commitment to sustainable and socially responsible investment practices. The companies also exhibit varying structures, with some being publicly traded while others are privately held. Additionally, certain companies function as subsidiaries of larger financial conglomerates. Overall, the main players are: (i) BlackRock: The world's largest asset manager, with over \$8 trillion AUM[7] and a focus on ESG Investing[8]. (ii) Vanguard Group: A leader in low-cost index fund investing, with over \$7 trillion AUM. (iii) UBS Asset Management: A global investment manager with a diversified portfolio of asset classes, managing over \$3 trillion in assets[9]. (iv) State Street Global Advisors: Known for its ETFs[10], State Street has over \$3 trillion AUM and it is committed to responsible investing. (v) Fidelity Investments: A leading mutual fund company with over \$3 trillion AUM. (vi) Asset Management divisions of Investment Banks as JP Morgan Asset Management and Goldman Sachs Asset Management.

The clients of these big asset managers vary depending on the type of asset management firm and the specific services they offer. Generally, asset managers work with institutional investors such as pension funds, endowments, and foundations, as well as high net worth individuals (HNWI) and retail investors. These clients entrust asset managers to invest their money in a range of assets, such as stocks, bonds, real estate, and alternative investments, with the aim of generating returns and growing their wealth over time. Asset managers may also work with corporations and government entities to manage their own investment portfolios or provide financial advice. As written ahead, some common types of clients for asset managers include: (i) Institutional investors such as pension funds, endowments, and insurance companies, which are some of the largest clients of asset managers. These investors have significant amounts of capital to invest, and often require the expertise of asset managers to help them achieve their investment objectives. (ii) HNWI with a net worth of \$1 million or more, excluding their primary residence. These clients typically have complex financial needs and may require tailored investment solutions to accomplish their financial goals. (iii) Retail investors who purchase investments for their personal portfolios. Asset managers may offer a range of investment products and services for retail investors, such as mutual funds, ETFs, and financial

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[7] AUM stands for Assets Under Management

[8] ESG Investing will be analyzed later on this thesis, but it stands for Environmental, Social and Governance Investing

[9] UBS AUM will reach a \$5 trillion outstanding after the forced merge with Credit Suisse

[10] An ETF is a basket of securities that you can buy or sell through a brokerage firm on a stock exchange

planning services. (iv) Pension Funds that manage assets on behalf of pension plans. These funds are responsible for ensuring that pension plans have sufficient assets to meet their long-term financial obligations to their beneficiaries. Pension funds are typically among the largest institutional investors and may have a significant impact on financial markets through their investment decisions. However, pension funds have unique investment objectives and constraints that asset managers must take into account when designing investment strategies. Pension funds are often subject to regulatory requirements and must meet specific funding targets, which can influence their investment decisions. Asset managers must also be mindful of the fact that pension funds have long-term liabilities that they must be able to meet, which means that they may require investments with specific cash flow profiles. (v) Endowments & Foundations which are non-profit organisations that manage assets on behalf of charitable or educational institutions. They are responsible for managing their assets in a way that allows them to support the mission of the organisation over the long term. Endowments and foundations are typically long-term investors with a focus on capital preservation and growth. They are often subject to specific legal requirements and must operate in a highly regulated environment. (vi) Sovereign & Wealth Funds which are investment funds that are owned and managed by national governments. These funds are typically created from the proceeds of natural resource exports or other government revenues. As for Pension Funds, Sovereign & Wealth Funds are often among the largest investors in financial markets, and their investment decisions can have a significant impact on the global economy. These clients are typically long-term investors with a focus on generating returns over the long term. (viii) Corporations and businesses: asset managers may also provide investment services to corporations and businesses, such as managing corporate pension plans or providing treasury management services.

In conclusion, asset managers work with a wide range of clients, from individual investors to large institutional investors, each with their unique investment objectives, constraints, and risk tolerance. To be successful, asset managers must understand the needs of their clients and be able to design investment strategies that meet those needs.

Section 2: Security Analysis

2.1 Investments Background

A Investment refers to the present commitment of money or resources with the expectation of future benefits. In our society, there is a significant distinction between real assets, such as land, buildings, equipment, and knowledge used for producing goods and services, and financial assets like stocks and bonds. While real assets generate net income to the economy, financial assets primarily determine the allocation of income or wealth among investors. Financial assets can be broadly categorized into three types: debt, equity, and derivatives.[11]

(i) Debt securities, also known as fixed-income securities, promise a fixed stream of income or a stream of income determined by a specified formula. They come in various maturities and payment provisions. At one extreme, the money market includes short-term, highly marketable, and low-risk fixed-income securities like U.S. Treasury bills and bank Certificates of Deposit (CDs). On the other hand, the fixed-income capital market encompasses long-term securities like Treasury bonds, as well as bonds issued by federal agencies, state and local municipalities, and corporations which range from low-risk to relatively risky high-yield or "junk" bonds. (ii) Equity, or common stock, represents ownership in a corporation without any specific payment commitment. Equityholders receive dividends and have ownership in the real assets of the firm. The value of equity increases with the firm's success and decreases if it fails. Equity investments are inherently riskier than investments in debt securities as they are directly linked to the performance of the firm and its real assets. (iii) Finally, derivative securities, such as options and futures contracts, derive their payoffs from the prices of other assets like bonds or stocks. They serve as tools for hedging risks or taking speculative positions and have become an integral part of the investment environment.

Investors and corporations also engage in other financial markets as well. Firms involved in international trade exchange money between different currencies. Investors may directly invest in real assets, such as commodities traded on exchanges like the New York Mercantile Exchange or the Chicago Board of Trade, including corn, wheat, natural gas and gold. Commodity and derivative markets allow firms to adjust their exposure to various business risks.

An investor's portfolio is simply his collection of investment assets. Once the portfolio is established, it is updated or "rebalanced" by selling existing securities and using the proceeds

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[11] Bodie, Kane and Marcus, Essentials of Investments (2012)

to buy new securities, by investing additional funds to increase the overall size of the portfolio, or by selling securities to decrease it. Investment assets can be categorized into broad asset classes, such as stocks, bonds, real estate, commodities, and so on. Constructing a portfolio involves two types of decisions: asset allocation and security selection. Asset allocation entails choosing among different asset classes, while security selection focuses on selecting specific securities within each asset class. The "top-down" approach starts with asset allocation decisions, while the "bottom-up" approach focuses on analyzing individual securities without as much consideration for overall asset allocation.[12]

Securities are traded on highly competitive financial markets, where analysts continuously search for the best investment opportunities. This competition implies that finding underpriced securities or "free lunches" is unlikely. Investors face a risk-return trade-off, as anticipated returns cannot be predicted precisely, and actual returns deviate from expectations. Higher-risk assets are expected to offer higher expected returns compared to lower-risk assets. This efficient market hypothesis (EMH) suggests that financial markets quickly and efficiently process all available information about securities. This implies that security prices adjust rapidly to reflect the market consensus estimate of their value. If markets are efficient, it raises the question of whether active investment management strategies, which attempt to outperform the market through security analysis or timing asset class performance, are worthwhile. Passive management, which involves holding diversified portfolios without extensive efforts to improve performance, may be considered a more suitable approach if markets are efficient and prices reflect all relevant information.

2.2 Conventional Asset Classes

The focus of this section is to analyze the main asset classes and understand what investors can expect from each of them, as well as the precautions they need to take. It also explores the role of each asset class within a portfolio. Typically, a portfolio consists of multiple asset classes, and each class should contribute to achieving the client's goals. As a result, the portfolio manager must present compelling reasons for including an asset in the portfolio. The decision to allocate capital to an asset class is usually based on factors such as expected return, risk, and diversification. In terms of asset allocation policy, an asset class should either drive the portfolio's return or provide diversification effects, especially during times of crisis. Therefore,

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[12] Bodie, Kane and Marcus, Essentials of Investments (2012)

even if an asset class has a negative risk premium, it may still be reasonable to include it in a portfolio if it is expected to have low correlation or negative correlation with other asset classes. When making further decisions, such as market timing and security selection, additional characteristics like liquidity or market efficiency become relevant.

2.2.a Equities

There are two primary types of equity: common stock and preferred stock.[13] Preferred stock typically has a predetermined dividend that must be paid before dividends are distributed to common stockholders. As a result, the price of preferred stock behaves more like a bond, especially if the dividend is secure. On the other hand, common stock is more volatile as it represents ownership in the company. This can lead to significant gains if the company performs well or losses if the company performs poorly. Each share of common stock grants its owner one vote on corporate governance matters at the annual meeting and and a share in the financial benefits of ownership[14][15]. The performance of a company is typically assessed based on its earnings and cash flow levels and growth. As opinions about a company's prospects change, the stock price fluctuates as investors react to these changing perceptions. Common stock of large corporations can be freely bought or sold on one or more stock markets. A corporation whose stock is not publicly traded is considered closely held, where the owners are often involved in managing the company.

The two most important characteristics of common stock as an investment are its residual claim and limited liability features. Residual claim means that stockholders are the last to receive payments after all other claimants, such as tax authorities, employees, suppliers, bondholders, and other creditors, have been paid in the event of a liquidation of the company's assets. Limited liability implies that shareholders can lose, at most, their original investment in case of corporate failure. Unlike owners of unincorporated businesses, shareholders are protected from personal asset claims by creditors.

Stocks are traded on stock exchanges, which are marketplaces for buying and selling stocks, bonds, and other securities. However, stock exchanges serve purposes beyond being mere markets. They facilitate companies in raising capital, promote transparency and openness

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[13] https://www.investopedia.com/ask/answers/difference-between-preferred-stock-and-common-stock/
[14] https://corporatefinanceinstitute.com/resources/equities/common-vs-preferred-shares/
[15] The right to any dividends that the corporation may choose to distribute

among investors and companies, and help the general public understand the value of their investments. To be listed on an exchange, a company must meet specific criteria, including registration with regulatory bodies like the U.S. Securities and Exchange Commission (SEC), having a minimum number of shareholders and shares outstanding, and fulfilling other qualifications. Stock exchanges also enable private companies to raise significant funds by offering equity shares through initial public offerings (IPOs). In an IPO, the company becomes publicly owned, and its shares are listed for trading on an exchange. While there are numerous major stock exchanges globally, the majority of trading occurs on a few prominent exchanges, such as the NYSE, NASDAQ, LSE, and SSE.[16]

Within the equities world we can easily distinguish two different sub-classes: US Stocks and International Stocks. In a portfolio model that includes only marketable equities and fixed income investments, such as a 60/40 portfolio, marketable equities are typically expected to provide the highest returns for the portfolio. However, they also contribute significantly to the overall volatility of the portfolio. Table 1 presents the data for the S&P500 [17] index, which serves as a representative of US stocks. Over the period from 1988 to 2010, the S&P500 generated an average yearly return of 10.58% with a volatility of 14.85%. This indicates that US stocks exhibit higher levels of both return and volatility compared to fixed income investments. Although the results may vary depending on the time period and index chosen, historically, the average yearly returns on marketable equities have generally surpassed those of fixed income investments. Therefore, it can be inferred that US marketable equities are likely to outperform fixed income investments and contribute to higher portfolio returns. Since the S&P500 is used as a benchmark for other asset classes, the correlation coefficients and structural betas are referenced for the relevant asset classes. The monthly returns from 1990 to 2010 do not follow a normal distribution, as indicated in Table 2. There is a negative skewness[18]

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[16] https://www.forbes.com/advisor/investing/stock-exchange/

[17] S&P500 is a stock market index tracking the stock performance of 500 of the largest companies listed on stock exchanges in the US

[18] Skewness serves as a quantitative representation of how much a particular distribution deviates from a normal distribution. It helps to quantify the extent of variation present in the dataset compared to the idealized symmetrical distribution

of -0.5, but the kurtosis[19] is insignificant at 0.66. Consequently, the Sharpe ratio may overstate the performance of the S&P500.

Table 1: Asset Class Characteristics, maximal time period

	T-Bill	Venture capital	Private equity	Hedge fund	Internat. stocks	Emerg. markets	U.S. Stocks	Real estate	Fixed income	Natural resources
Frequency	M	Q	Q	M	M	M	M	Q	M	M
Time period	'60-'11	'81-'10	'86-'10	'90-'10	'70-'11	'95-'11	'88-'10	'78-'10	'76-'10	'70-'11
Mean (%)	5.19	14.45	12.89	11.70	8.46	12.08	10.58	8.70	8.14	11.59
Standard deviation (%)	0.83	21.54	9.67	7.02	17.20	24.78	14.85	4.54	5.75	20.30
Beta		0.653	0.431	0.339	0.837	1.143		0.070	0.242	-0.107
Beta (crisis 1)		0.337	0.280	0.290	0.748	1.050		0.010	0.188	-0.414
Beta (crisis 2)		0.283	0.474	0.356	1.157	1.502		0.227	1.082	0.405
Correlation		0.429	0.696	0.731	0.710	0.744		0.228	0.166	-0.082
Correlation (crisis 1)		0.405	0.839	0.803	0.852	0.805		0.121	0.165	-0.360
Correlation (crisis 2)		0.725	0.853	0.810	0.941	0.878		0.504	0.626	0.231
Beta excess return (%)		3.52	2.33	1.83	4.51	6.17		0.38	1.30	-0.58
Alpha return (%)		5.74	5.38	4.69	-1.24	0.72		3.13	1.65	6.99

Table 1: This Table was taken over from Jiri Knesl, Asset Management – University Endowments (2013). The data are based on multiple indices (Cambridge Associates U.S. Venture Capital Index, Cambridge Associates U.S. Private Equity Index, Hedge Fund Research Index, MSCI EAFE, S&P/IFCI, S&P500, NCREIF, Barclays Capital U.S. Aggregate Bond Index and Goldman Sachs Commodity Index S&P GSCI). All calculations are based on monthly (M) and quarterly (Q) returns, over the maximal time period. Crisis 1 and Crisis 2 refer respectively to the Dot-com crisis (2000-2002) and the financial crisis (2007-2009). Correlation is the correlation coefficient between the particular asset class and U.S. stocks.

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[19] Kurtosis serves as a representation of how much the data points that lie farthest from the mean are typically located in the tails on both sides of the distribution. Kurtosis quantifies the amount of data that is concentrated in these tails

Table 2: Asset Class Characteristics, identical time period (1990-2020)

	T-Bill	Venture capital	Private equity	Hedge fund	Internat. stocks	U.S. Stocks	Real estate	Fixed income	Natural resources	Emerging Markets
Mean (%)	3.68	18.28	14.04	11.84	4.89	9.48	6.61	7.16	6.76	12.94
Standard deviation(%)	0.99	25.49	10.36	8.86	19.17	16.55	5.14	4.05	25.43	28.34
Beta	0.01	0.68	0.44	0.29	0.97	1.00	0.04	-0.02	0.13	1.16
Correlation	0.10	0.44	0.71	0.54	0.83		0.14	-0.07	0.08	0.74
Beta excess return (%)		3.93	2.58	1.69	5.66	5.80	0.25	-0.10	0.74	5.81
Alpha return (%)		10.67	7.78	6.47	-4.44	0.00	2.68	3.58	2.34	3.82
Beta sigma (%)		11.22	7.35	4.82	16.13	16.55	0.71	†	2.10	20.82
Alpha risk (%)		22.88	7.31	7.44	10.36	0.00	5.09	4.04	25.34	19.22
Sharpe ratio		0.58	1.00	0.93	0.06	0.35	0.59	0.88	0.12	0.34
Skewness		3.17***	-0.61**	-0.92***	-0.26	-0.50**	-1.6***	-0.06	0.01	-0.19
Kurtosis		18.3***	1.78***	3.09***	3.81***	0.66	3.98***	-0.30	3.62***	-0.265

Table 2: This Table was taken over from Jiri Knesl, Asset Management – University Endowments (2013). The data are based on multiple indices (Cambridge Associates U.S. Venture Capital Index, Cambridge Associates U.S. Private Equity Index, Hedge Fund Research Index, MSCI EAFE, S&P500, NCREIF, Barclays Capital U.S. Aggregate Bond Index and Goldman Sachs Commodity Index S&P GSCI, S&P/IFCI). All calculations are based on quarterly returns over the time period from 1990 to 2010. The last two rows show the skewness and the kurtosis of the return distributions. ***,**,* denote significance at the 1 per cent, 5 per cent, and 10 per cent levels, respectively.

Historical data also indicates that small-cap stocks and non-U.S. stocks exhibit different behavior compared to large-cap U.S. stocks, and that style and size exposures follow different performance cycles[20]. Consequently, diversification preferences prompt investors to choose either a single portfolio that provides exposure across the entire equity market or multiple portfolios with exposure to different management styles. The estimates presented in Table 3 below demonstrate the historically high average correlation among U.S. equities within the same style category, while the correlation between international and U.S. equities is relatively low. Statistically, the index constituents within style categories tend to display high correlations, but lower correlations can be observed within size groups. However, it is important to note that these correlations are still higher than the correlations between different asset classes, as correlations tend to be higher within sub-asset classes (such as small-cap versus large-cap U.S. equities) than between asset classes (such as U.S. equities versus U.S. fixed-income).

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[20] Stewart, Piros and Heisler, Portfolio Management (2019)

Table 3: Historical Correlations – Equity style and size groups

	Large Growth	Large Value	Mid Growth	Mid Value	Small Growth	Small Value	International
Large Growth	1.000						
Large Value	0.826	1.000					
Mid-Growth	0.887	0.739	1.000				
Mid-Value	0.774	0.911	0.798	1.000			
Small Growth	0.785	0.675	0.945	0.776	1.000		
Small Value	0.685	0.786	0.796	0.914	0.870	1.000	
International	0.644	0.662	0.639	0.649	0.599	0.591	1.000

Table 3: This Table was taken over from Stewart, Piros and Heisler, Portfolio Management (2019). The data are based on multiple indices (Russell 1000 and MSCI EAFE Equity Indexes). All calculations are based on monthly results, over the time period from 1986 to 2016.

International equities represent another category of marketable equities, although they may not always be considered a distinct asset class. However, from the perspective of certain US funds, they carry additional risks. International equities can be categorized into developed foreign markets, represented by the MSCI EAFE in this thesis, and emerging markets, represented by the S&P/IFCI Composite index. In most cases, the correlation between international and U.S. equity returns is lower than the correlations between U.S. style and size groups, with mid-cap and small-cap stocks showing the highest correlation. Large-cap stocks demonstrate a higher correlation with international stocks compared to smaller-cap stocks, which is logical considering many large-cap index constituents are multinationals. Swensen (2000)[21] identifies specific risks associated with international equity investments from the perspective of U.S. investors. These risks include exposure to currency fluctuations, foreign interest rates (in addition to common stock risk), and a greater impact from inflation in the home country rather than in the U.S. Emerging markets, in particular, face additional risks such as political instability.

Table 1 shows that MSCI EAFE has an average return of 8.46% with a volatility of 17.20%, while stocks in emerging markets have an average return of 12.08% with a volatility of 24.78%. The monthly returns of MSCI EAFE from 1990 to 2010 appear to follow a normal distribution,

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[21] Swensen, Pioneering Portfolio Management (2000)

as indicated by insignificant skewness and kurtosis values in Table 2. In terms of correlation, both MSCI EAFE and S&P/IFCI exhibit high correlations with S&P500, with values of 0.83 and 0.74, respectively (see Table 2). Finally, according to Swensen[22] (2000), international equities offer greater potential for active management, as even the most developed overseas markets have lower market efficiency compared to U.S. stock markets. However, active management in overseas markets also comes with several challenges, making it potentially costly[23].

Lastly, reviewing the historical performance of the various equity styles mentioned, Table 4 below presents annualized historical gross returns for the equity style and size groups. Smaller stocks have shown the strongest historical performance over the long term. However, when divided by style, mid-cap value, closely followed by small-cap value, has exhibited the highest returns over the past 25 years. Small-cap growth stocks have had the weakest performance among domestic equity indices during this period. The relative underperformance of international stocks can be observed across all three periods.

Table 4: Annualized Historical Gross Returns – Equity style and size groups

	Large Growth	Large Value	Mid Growth	Mid-Value	Small-Growth	Small Value	International
Last 5 Years	14.9%	14.4%	13.5%	15.7%	13.7%	15.1%	7.0%
Last 10 Years	8.6%	5.0%	7.8%	7.6%	7.8%	6.3%	1.2%
Last 25 Years	8.0%	9.3%	9.2%	11.9%	7.4%	11.5%	5.4%

Table 4: This Table was taken over from Stewart, Piros and Heisler, Portfolio Management (2019). The data are based on multiple indices (Russell 1000 and MSCI EAFE Equity Indexes). All calculations are based on yearly results (ending in 2016).

It is important to note that slight variations in the length of the period and the ending date can alter the conclusion regarding relative performance. Stewart, Piros, and Heisler (2019)

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[22] Swensen, Pioneering Portfolio Management (2000)
[23] As availability of information and foreign language problems

attribute this to economic cycles[24]. Let's consider value investors who look for stocks that are priced lower compared to their book values, resulting in higher price-to-book (P/B) ratios[25]. Conversely, stocks with high growth expectations typically have low PB ratios. As a result, the performance of value stocks and growth stocks tends to be inversely related. Historically, value stocks tended to outperform the market during periods of economic improvement, while growth stocks performed better when the economy was in decline. This was because investors sought out large companies with strong earnings prospects (large-cap growth stocks) when the economy showed signs of weakness. Consequently, stocks with high long-term growth potential experienced price increases, while stocks more sensitive to economic conditions saw their prices decline. When the economy stabilized, value stocks, especially undervalued small-cap value stocks, made a recovery. Figure 2 illustrates this pattern by comparing GDP growth with the returns of active growth and value strategies, represented by the return difference between the S&P Value and Growth indexes and the S&P500, over rolling three-year periods.
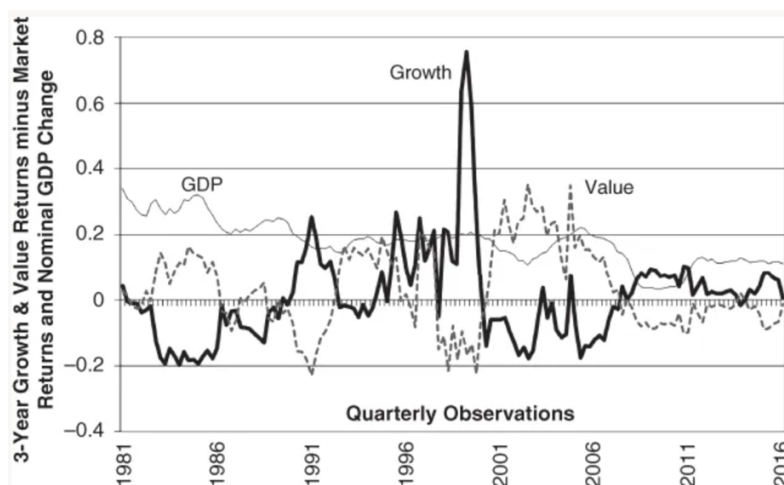
Figure 2: Growth, Value and GDP Changes

Figure 2: This Figure was taken over from Stewart, Piros and Heisler, Portfolio Management (2019). It shows Growth, Value, and GDP Changes

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[24] Stewart, Piros and Heisler, Portfolio Management (2019)
[25] The P/B ratio is calculated by dividing the company's current stock price per share by its book value per share (BVPS)

2.2.b Fixed Income

Fixed income broadly refers to investment securities that offer either a predetermined fixed income stream or an income stream determined by a specific formula. These investments provide investors with fixed interest or dividend payments until their maturity date[26]. Upon maturity, investors receive the principal amount they initially invested. Unlike equities, which may not generate cash flows, fixed-income securities have predetermined and consistent payments throughout their tenure.

Government and corporate bonds are the most prevalent types of fixed income products. Governments and companies issue debt securities to raise funds for daily operations and large-scale projects. Bonds are traded over-the-counter (OTC)[27] in the bond market and secondary market. Examples of fixed income products include: (i) Treasury Notes (T-Notes) and Treasury Bonds (T-Bonds): The U.S. government primarily borrows funds by issuing Treasury notes and bonds. T-Notes have original maturities of up to 10 years, while T-Bonds have maturities ranging from 10 to 30 years. Both bonds and notes are commonly traded in denominations of $1,000 and make semiannual interest payments called coupon payments. (ii) Treasury Inflation-Protected Bonds (TIPS): These bonds are linked to an index of the cost of living, providing investors with a means to hedge against inflation. The principal amount on TIPS is adjusted proportionally to increases in the Consumer Price Index (CPI)[28]. (iii) Municipal Bonds: Similarly to Treasury bonds, municipal bonds are government-issued. However, they are issued and backed by states, municipalities, or counties instead of the federal government. Municipal bonds are used to raise capital for local expenditures and may offer tax-free benefits to investors. (iv) Corporate Bonds: These bonds enable private companies to directly borrow money from the public. They resemble Treasury bonds in that they typically pay semiannual coupons and return the face value to bondholders at maturity. However, corporate bonds carry credit risk, including the risk of not receiving promised payments in full or on time[29] and gains or losses influenced by changes in either the market's assessment of the

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[26] https://www.investopedia.com/terms/f/fixedincome.asp#

[27] OTC refers to the trading of securities between two parties outside of formal exchanges and without the oversight of an exchange regulator. OTC trading takes place in decentralized markets, which do not have a physical location. Unlike exchange-traded markets, OTC trading does not restrict the trading to standardized items that have a clearly defined range of quantity and quality

[28] The Consumer Price Index (CPI) is a metric that tracks the average fluctuation over a period of time in the prices urban consumers pay for a selection of consumer goods and services

[29] This risk represents the actual default risk

issuer's ability to meet its obligations or the market's general willingness to bear credit risk. Corporate bonds may also come with options, such as callable bonds that allow the issuer to repurchase the bond or convertible bonds that give bondholders the option to convert the bond into a specified number of shares of stock. (v) Junk Bonds (High Yield Bonds): These corporate bonds offer higher coupon payments due to the increased risk of default. Default occurs when a company fails to repay the principal and interest on a bond or debt security.[30]

Figure 3 breaks down the taxable U.S. bond market, represented by the Bloomberg Barclays Universal index, into its major components.
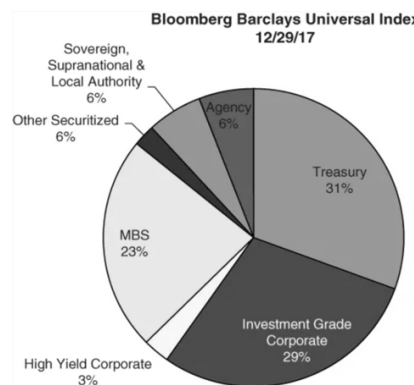
Figure 3: Bond Market Composition

Figure 3: This Figure was taken over from Stewart, Piros, Heisler, Portfolio Management (2019). It shows the composition of the U.S. Taxable Bond Market

Well over a third of the U.S. taxable bond market consists of Treasury (31%) and government agency (6%) obligations. Corporate bonds make up approximately 32% of the taxable bond market. The majority of these bonds, around 91%, are considered investment-grade as they carry one of the top four credit ratings from Standard & Poor's, Moody's, or Fitch[31]. The remaining portion, approximately 9%, is categorized as high-yield or junk bonds due to their below investment-grade ratings. Residential mortgage-backed securities (MBS) account for 23% of the U.S. market. These securities represent claims on the monthly principal and interest payments made by homeowners on their mortgages. The remaining portion of the Bloomberg Barclays Universal index consists of U.S. dollar bonds issued by mainly foreign, quasi-governmental entities (sovereign, supranational, and local authority), commercial mortgage-

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[30] https://www.investopedia.com/terms/f/fixedincome.asp#
[31] Standard & Poor's, Moody's and Fitch are all credit rating agencies. Organizations that assess and assign credit ratings. These ratings evaluate the debtor's capacity to repay debt obligations, including timely payments of principal and interest, as well as the probability of default.

backed securities (CMBS), and asset-backed and other structured securities. Asset-backed securities (ABS) are similar to MBS in that they are created by pooling payments on underlying loans.[32]

In a portfolio consisting of stocks and bonds, fixed income instruments play a different role compared to stocks. The primary reason for including fixed income instruments in the portfolio is their strong diversification power. Therefore, within the equity-bond world, fixed income instruments serve as the primary source of diversification. According to Table 1, the average return on the Barclays Capital Aggregate Bond index is 8.14% with a volatility of 5.75% from 1976 to 2010. Results from the period of 1990 to 2010 (Table 2) position fixed income at a lower level relative to the S&P 500. The monthly returns during the 1990-2010 period follow a normal distribution. The correlation coefficient between fixed income and U.S. stocks is slightly positive at 0.17 from 1976 to 2010 (Table 1) and close to zero from 1990 to 2010 (Table 2). These figures indicate that fixed income instruments exhibit weak or no correlation with U.S. stocks, thereby providing the desired diversification to the portfolio.

Swensen (2000)[33] suggests that investors should include only the necessary amount of fixed income in their portfolio to safeguard against a challenging financial environment, as holding bonds incurs relatively high opportunity costs. Additionally, Swensen emphasizes that to effectively utilize fixed income for diversification and protection in such circumstances, investors should focus on long-term, non-callable bonds with the highest quality. While high-yield bonds may yield higher returns during boom periods, they fail to provide protection during crises when their defensive qualities are most valuable. In essence, investing in lower-rated bonds entails accepting risks already present in equity investments, thus diminishing the diversification effect. Swensen (2000) further notes that fixed income offers protection against unexpected price deflation but is particularly susceptible to unanticipated inflation. This vulnerability arises primarily from the fixed nature of nominal coupon payments and the principal value. If interest rates rise unexpectedly, the bond portfolio will experience an immediate capital loss, although subsequent cash flows can be reinvested at higher rates. In the very short term, the capital loss outweighs any benefit from reinvestment. However, over extremely long periods, reinvestment opportunities dominate.

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[32] Stewart, Piros, Heisler, Portfolio Management (2019)
[33] Swensen, Pioneering Portfolio Management (2000)

2.2.c Cash and Cash Equivalents

Cash and Cash Equivalents (CCE) refers to a category of financial instruments that includes cash and highly liquid current assets[34]. These assets are easily convertible into cash and have a short-term maturity date, minimizing exposure to external factors such as changes in interest rates. Cash equivalent assets are typically low-risk and have a known value. While some of these instruments trade in large denominations and so are out of the reach of individual investors, money market mutual funds offer small investors the opportunity to participate. These funds pool resources from multiple investors and invest in a variety of money market securities on their behalf. Common examples of assets included in cash and cash equivalents, apart from cash itself and marketable securities[35] are the following: (i) Treasury Bills (T-Bills): short-term fixed income securities with maturities of one year or less which do not pay coupon returns. Investors buy the bill at a price less than its face value and investors earn that difference at maturity. (ii) Certificates of Deposit (CDs): fixed income vehicle offered by financial institutions with maturities of less than five years, offering higher interest rates than regular savings accounts and providing FDIC (Federal Deposit Insurance Corporation) or NCUA (National Credit Union Administration) protection. (iii) Commercial Papers (CPs): short-term unsecured debt notes issued by corporations to finance capital investments and working capital. (iv) Banker Acceptances: which are orders to pay a sum of money in the future, usually within six months, and are initially like postdated checks. When a bank accepts the order for payment, it assumes responsibility for the ultimate payment to the holder of the acceptance. These acceptances can be traded in secondary markets at a discount from their face value, similarly to T-bills.[363738]

2.3 Alternative Asset Classes

Alternative assets encompass various asset classes such as real estate, venture capital, private equity, hedge funds, derivatives, and commodities. While they are commonly referred to as alternative assets, there is a question as to whether they truly offer distinct features compared to traditional equities and fixed income, and whether they present new opportunities for asset allocation. An asset class is typically defined as a group of assets that are exposed to specific

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[34] Assets convertible into cash within 90 days

[35] Investment securities that can quickly be converted to cash in a short amount of time

[36] https://www.investopedia.com/terms/c/cashandcashequivalents.asp

[37] https://www.investopedia.com/terms/f/fixedincome.asp#

[38] Bodie, Kane and Marcus, Essentials of Investments (2012)

risk factors and exhibit unique responses to these factors. However, Anson (2000)[39] challenges the classification of assets, suggesting that alternative assets are often subsets of existing asset classes rather than separate classes themselves. He proposes a classification into three super classes: (i) Capital assets, which include hedge funds, private equity funds, and credit derivatives as claims on future cash flows of an enterprise. (ii) Assets used as economic inputs, such as physical commodities that serve as inputs in the production of other assets and cannot be valued through net present value analysis. (iii) Assets that serve as a store of value, such as finished products like art that cannot be valued through net present value. According to Anson (2000)[40], real estate is not an alternative asset class but rather a fundamental one that should be included in every diversified portfolio. For the purpose of this thesis, any asset class other than stocks and bonds (including cash and cash equivalents) is considered alternative, as the focus is on evaluating the validity of a 60/40 portfolio in the coming decade.

Alternative asset classes offer several potential benefits to the asset allocation process. First, they may provide opportunities to invest in assets that are fundamentally different from traditional ones, with performance driven by distinct factors. For example, commodities may respond to different risk factors or exhibit different responses compared to stocks, leading to lower correlation coefficients. Second, alternative asset markets may offer greater potential for active portfolio management. Swensen (2000)[41] suggests that the efficiency typically found in traditional marketable securities is lacking in alternative asset pricing, creating opportunities for skilled managers to add substantial value. Active management becomes crucial in alternative asset classes, as market returns are not readily available as passive options. The unique characteristics and potential differences in return-risk profiles of alternative assets can introduce new dimensions and shift the efficient frontier of a portfolio. In addition to the common characteristics of average return, standard deviation, and correlation, alternative asset classes may differ in aspects such as data reliability and relative management costs. Unlike marketable equities and fixed income, which have extensive historical data and benchmarks enabling passive portfolio management, alternative asset classes often lack sufficient data for conventional evaluation. Investing in alternative assets requires more specialized knowledge

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[39] Anson, Handbook of Alternative Assets (2000)
[40] Anson, Handbook of Alternative Assets (2000)
[41] Swensen, Pioneering Portfolio Management (2000)

and skills for reasonable active portfolio management due to the uncertainty surrounding their quantitative characteristics.

2.3.a Real Estate

Real estate refers to tangible property consisting of land and buildings. It can be categorized into commercial and residential real estate. Commercial real estate involves the ownership of income-generating properties such as industrials/warehouses, offices, and retail buildings, as well as segments like medical office and self-storage. Rental apartments, although technically residential, are also often classified as commercial real estate. Real estate can be accessed through both public and private markets. Private real estate investment involves direct purchases of real estate properties, while Real Estate Investment Trusts (REITs) are publicly or privately traded vehicles that invest in portfolios of properties.[42]

The characteristics of real estate and the reasons for including it in investment portfolios are outlined by Swensen (2000)[43]. Real estate is seen as an asset class that falls between fixed income and equity. The cash flows generated from lease obligations resemble coupon payments from bonds, making real estate properties more bond-like when fully leased with longer lease terms. On the other hand, the variable nature of the residual value of a property gives real estate holdings equity-like attributes. Short-term leases and high vacancy rates contribute to equity risk in real estate investments.

According to modern portfolio theory, excluding real estate amounts to actively betting against the asset class[44]. Including commercial real estate in a well-balanced multi-asset portfolio is beneficial for several reasons: (i) Risk-adjusted returns: Commercial real estate has delivered better risk-adjusted returns than stocks and bonds over the past two decades while exhibiting lower volatility than stocks.. (ii) Reliable income: Commercial real estate can contribute reliable income to a portfolio, generating higher yields compared to stocks and bonds. Over the past 20 years, commercial real estate has produced an annual yield of 4.3% compared to 1.9% for stocks and 3.9% for bonds. (iii) Diversification: Commercial real estate offers diversification benefits as it has shown low or negative correlations with major asset classes over the past 20 years. (iv) Potential hedge against Inflation: Commercial real estate can serve

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[42] https://www.dws.com/globalassets/institutional/research/pdfs/Real_Estate_as_an_Asset_Class_FINAL.pdf
[43] Swensen, Pioneering Portfolio Management (2000)
[44] https://www.dws.com/globalassets/institutional/research/pdfs/Real_Estate_as_an_Asset_Class_FINAL.pdf

as a potential hedge against inflation. Being a hard asset, its value tends to increase with replacement cost over the long term, providing protection against inflationary pressures.

Table 5 presented below demonstrates the lack of correlation between real estate and U.S. stocks. The correlation coefficient, computed using data from 1978 to 2010, is close to zero. Additionally, Table 5 reveals that real estate exhibits either no correlation or a very weak correlation with all other asset classes, indicating its significant potential for diversification across the entire range of asset classes. The distribution of returns, as indicated by Table 2, is characterized by negative skewness and fat tails[45], implying a higher occurrence of both very low and extreme returns.

Table 5: Correlations - Asset Classes

	T-Bill	VC	PE	HFRI	MSCI EAFE	S&P500	NCREIF	US Bond Aggragate	SPCO
T-Bill	1.00								
VC	0.24	1.00							
PE	0.08	0.62	1.00						
HFRI	0.16	0.48	0.64	1.00					
MSCI EAFE	-0.06	0.36	0.64	0.49	1.00				
S&P500	0.10	0.44	0.71	0.54	0.85	1.00			
NCREIF	0.23	0.18	0.39	0.10	0.15	0.14	1.00		
US Bond Aggragate	0.21	-0.20	-0.20	-0.24	-0.09	-0.07	-0.15	1.00	
SPCO	0.11	0.15	0.12	0.02	0.05	0.08	0.24	0.12	1.00

Table 5: This Table was taken over from Jiri Knesl, Asset Management – University Endowments (2013). This table shows the correlation coefficient among the examined asset classes. The asset classes are represented by multiple indices (Cambridge Associates U.S. Venture Capital Index, Cambridge Associates U.S. Private Equity Index, Hedge Fund Research Index, MSCI EAFE, S&P500, NCREIF, Barclays Capital U.S. Aggregate Bond Index and Goldman Sachs Commodity Index S&P GSCI, S&P/IFCI). All correlations are calculated from quarterly returns over the time period from 1990 to 2010.

The above results indicate that real estate shares several similarities with fixed income, such as comparable average returns, low volatility, and minimal correlation with U.S. stocks. This suggests that real estate could serve as a substitute for fixed income in a portfolio. However, real estate offers unique characteristics that differentiate it from fixed income. Despite the correlation coefficient between real estate and equity being similar to that of fixed income and equity, real estate exhibits distinct movements. According to Table 5, the correlation coefficient between real estate and fixed income is slightly negative at -0.15. As a result, both fixed income

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[45] A fat-tailed distribution refers to a probability distribution that displays significant skewness or kurtosis compared to a normal distribution or an exponential distribution. In a fat-tailed distribution, the tails of the distribution contain a larger proportion of data points, indicating a greater likelihood of extreme events or outliers

and real estate can diversify not only U.S. stocks and other asset classes but also each other. Allocating capital to both asset classes is likely to provide greater diversification benefits than investing in just one of them.

Additionally, Swensen (2000)[46] argues that real estate offers some level of protection against unexpected inflation, which is contrary to the protective nature of fixed income against unexpected deflation. This inflation-protective feature further distinguishes real estate from fixed income. Therefore, including both real estate and fixed income in a portfolio not only enhances diversification but also safeguards against unforeseen price movements. Other distinguishing characteristics of real estate compared to fixed income include substantial opportunities for active management and the absence of an investable benchmark. Real estate investment inherently requires active management. In summary, real estate shares many features with fixed income, particularly in terms of diversification potential. However, the absence of an investable benchmark, greater opportunities for active management, reliance on less reliable data, and unique response to inflation set real estate apart. Consequently, the primary role of real estate in a portfolio is likely to be diversification and the potential for active management.

2.3.b Private Equity and Venture Capital

Private Equity (PE) refers to investment partnerships that purchase and manage companies with the intention of selling them later.[47] These partnerships are operated by private equity firms on behalf of institutional and accredited investors. Private equity firms raise capital from clients to establish private equity funds, and they act as general partners, managing fund investments in exchange for fees and a share of profits above a preset minimum known as the hurdle rate. PE funds may acquire privately-owned companies or publicly-traded ones, either in their entirety or as part of a consortium. The acquisition of an entire company, whether it is publicly traded, closely held, or privately owned, remains a common practice in private equity deals. In cases where private equity investors acquire underperforming public companies, they often seek to reduce costs and may restructure the company's operations. Another type of private equity acquisition is the carve-out, where investors purchase a division of a larger company, typically a non-core business that is being sold by its parent corporation. In a secondary buyout, a private equity firm acquires a company from another private equity group instead of a

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[46] Swensen, Pioneering Portfolio Management (2000)
[47] https://www.investopedia.com/terms/p/privateequity.asp#

publicly listed company. Although such deals were traditionally seen as distressed sales, they have become more prevalent due to increased specialization among private equity firms. Exit strategies for private equity investments include selling a portfolio company to a competitor or conducting an initial public offering (IPO). Private equity funds typically have a fixed term of 7 to 10 years, and the invested capital is not available for withdrawals during this period. However, profits are usually distributed to investors after a certain number of years.

In contrast to private equity, venture capital (VC) is a form of private equity that focuses on investing in startup companies and small businesses with long-term growth potential.[48] Venture capital can be categorized based on the growth stage of the company receiving the investment. Generally, the younger a company is, the riskier it is for investors. The stages of VC investment include: (i) Pre-Seed: This is the earliest stage when founders are developing an idea into a concrete business plan. (ii) Seed Funding: At this point, a new business is seeking to launch its first product. Since there are no revenue streams yet, the company relies on venture capitalists to fund all its operations. (iii) Early-Stage Funding: Once a business has developed a product, it requires additional capital to scale up production and sales before it can sustain itself financially. The business will go through one or more funding rounds, typically referred to as Series A, Series B, and so on, to secure the necessary funding.

Table 1 displays the average returns for venture capital and private equity, which stand at 14.45% and 12.89% respectively, surpassing the returns of other asset classes. However, it is essential to thoroughly examine these asset classes before making any decisions, considering several key factors. While venture capital exhibits a risk of 21.54%, private equity carries a risk of 9.67%. The attractive returns of venture capital and private equity might make them appear as suitable drivers for portfolio returns. Nevertheless, a closer analysis is necessary. It is important to understand the underlying assets associated with private equity and venture capital. As mentioned earlier, these asset classes typically encompass funds specialized in leveraged buyouts, venture capital, mezzanine capital, distressed capital, and growth capital. Each of these investments represents an equity or equity-like security. Therefore, these asset classes should essentially be exposed to the same fundamental risk factors as publicly traded equities. For example, why would a privately-held beverage company be more or less successful than a publicly traded company operating in the same market segment? Both companies operate in the same market, sell the same products to the same customers, and

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[48] https://www.investopedia.com/terms/v/venturecapital.asp#

should thus be influenced by the same factors. Consequently, venture capital and private equity may offer limited diversification opportunities. Referring to Table 1, the correlation coefficient between venture capital and the S&P 500 is 0.43, while the correlation coefficient between private equity and the S&P 500 is 0.70. Both asset classes exhibit positive, albeit not complete, correlation with the S&P 500. This suggests that private equity and venture capital are at least partially exposed to different risk factors.

According to Anson (2000)[49], venture capital and private equity possess distinct attributes that differentiate them from marketable stocks. Venture capital, in particular, is highly exposed to the business risk associated with start-up companies, specifically the risk of the business plan failing. Moreover, in general, all private equity and venture capital funds are exposed to liquidity risk. Unlike marketable equities, which are traded on liquid organized markets where investors can buy or sell securities without significant price impact or negative consequences from immediate transactions, the markets for private equity and venture capital funds lack such liquidity. Another potential risk factor influencing venture capital returns is the lack of diversification. Anson (2000)[50] suggests that leveraged buyout funds may be less risky than venture capital funds since buyout targets do not entail the risk of start-up businesses, and buyout funds tend to have broader specialization, allowing for greater diversification. Mezzanine debt funds are expected to exhibit performance levels between stocks and bonds due to their characteristics as claims. Distressed debt funds, on the other hand, resemble equity-like investments to a significant degree. Bankruptcy risk represents a substantial risk factor in this context. However, Anson proposes that distressed debt funds may be less risky than venture capital funds since distressed companies typically have established products and operating histories, and their poor standing may be attributed to issues such as cash management, business plans, or management, which can potentially be rectified.

Similarly to hedge funds and real estate, the returns on private equity and venture capital investments do not follow a normal distribution. Anson (2000)[51] examines the returns of various fund types, including venture capital, leveraged buyout (LBO), mezzanine debt, and distressed debt funds, from 1990 to 2000. He observes an extremely high kurtosis of 27.16 and a significantly positive skewness of 4.28 in the distribution of venture capital returns. While

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[49] Anson, Handbook of Alternative Assets (2000)
[50] Anson, Handbook of Alternative Assets (2000)
[51] Anson, Handbook of Alternative Assets (2000)

the dot-com bubble may have influenced these results, the distribution characteristics align with the nature of venture capital investments. Leveraged buyout funds also exhibit positively skewed (1.55) returns distribution with fat tails and a kurtosis of 3.38. Mezzanine debt funds demonstrate similar characteristics with a skewness of 1.25 and a kurtosis of 3.35. However, distressed debt funds diverge from the pattern, displaying negative skewness (-0.73) and fat tails (5.63). According to the research, most fund groups have the potential to generate higher returns (positive skewness) and a higher frequency of extreme returns. In terms of correlation with other asset classes, Table 5 indicates that venture capital and private equity have positive correlations with each other, hedge funds, weak correlations with real estate, and marginal correlations with commodities.

To summarize, venture capital and private equity offer high returns and high volatility. However, their diversification potential is limited as they are fundamentally similar to equities and exhibit positive correlations with certain asset classes. The absence of an "investable" benchmark necessitates active management. Furthermore, the available data may not fully capture the true nature of these assets. As a result, the role of these asset classes in a portfolio is to increase expected returns while providing opportunities for active management.

2.3.c Hedge Funds

A Hedge Fund is an investment vehicle where private investors pool their assets to be managed by professional fund managers.[52] These managers employ various strategies, such as leveraging and trading non-traditional assets, with the aim of achieving higher-than-average investment returns. Hedge funds are often perceived as risky alternative investments and typically require a high minimum investment or net worth, primarily targeting affluent clients. Similarly to mutual funds, hedge funds enable private investors to pool assets to be invested by a fund manager. However, hedge funds are commonly structured as private partnerships, which exempts them from many regulations imposed by the Securities and Exchange Commission (SEC). They are limited to a maximum of 100 "sophisticated"[53] investors and operate with distinct investment strategies and compensation structures. Additionally, hedge funds often impose lock-up periods[54], restricting investors from withdrawing their capital for a specific duration. These funds are primarily accessible to affluent individuals and institutional

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[52] https://www.investopedia.com/terms/h/hedgefund.asp
[53] Sophisticated Hedge Fund investors are usually defined by minimum net worth and income requirements
[54] Periods as long as several years in which investments cannot be withdrawn

investors. The term "hedge fund" refers to the practice of hedging employed by fund managers, where a portion of the fund's assets is invested in the opposite direction of its main holdings. This hedged bet serves to offset potential losses in the fund's core investments. Hedge funds focus on targeted investments and portfolios of securities that are expected to yield profits.

The asset class "hedge funds" comprises a number of different strategies. Brooks and Kat (2001)[55] divide the hedge funds strategies into four main groups, namely (i) global strategies, focusing on economic changes worldwide, (ii) event-driven strategies aiming at distressed companies and company mergers, (iii) market-neutral strategies trying to exploit market opportunities by entering long and short positions, and (iv) funds of funds – hedge funds investing in other hedge funds. Therefore, hedge funds are very heterogeneous asset class and one hedge fund may be exposed to completely other risks than other hedge funds. In short, they raise the full range of issues that one might confront in active portfolio management. In fact, hedge funds aim per se at exploiting active management skills. Therefore, a selection of a hedge fund may equal to a selection of an active investment strategy pursued by the hedge fund managers. On the other hand, there are the so called funds of funds, which may cover a number of other funds and thereby provide some diversification within the asset class.

Hedge funds have experienced a significant increase in allocation within portfolios over the past two decades, making them an attractive alternative asset class. There are several reasons behind this appeal. Firstly, as indicated in Table 1, hedge funds have shown relatively high average returns (11.70%) with a relatively low level of risk (7.02%). The average return surpasses that of U.S. stocks, while the risk falls between that of U.S. bonds and U.S. stocks. These characteristics are further reflected in the high Sharpe ratio of 0.93, which is the second highest among the listed asset classes (Table 2). In terms of correlation, hedge funds tend to exhibit a positive correlation with U.S. stocks.

Assessing hedge funds can be challenging due to the limited availability of long-term data and the inadequacy of conventional quantitative measures such as mean return and standard deviation in capturing their unique characteristics. Anson (2000)[56] conducted an analysis of hedge fund data from January 1990 to June 2000, identifying three groups of hedge funds: (i) Hedge funds that exhibit market risk (e.g., global macro, short selling, and equity long/short

[55] Brooks and Kat, The Statistical Properties of Hedge Funds Index Returns and Their Implications for Investors - Journal of Alternative Investments (2001)

[56] Anson, Handbook of Alternative Assets (2000)

funds), closely resemble U.S. stocks. (ii) Hedge funds engaged in credit-risk strategies like convertible arbitrage, event-driven, merger arbitrage, and relative value arbitrage, which exhibit negative skewness and high kurtosis. Anson explains this as a result of these funds magnifying their market exposure through credit risk and being exposed to event risk, leading to downside tail behavior in their return distributions (high kurtosis and negative skewness). (iii) Hedge funds with low market and credit risk, such as market-neutral funds and market-timing funds.

In summary, research findings on hedge funds vary, with some showing attractive results while others do not. Hedge funds can offer diversification potential but are also exposed to U.S. stock risk and tightening correlation. Brooks and Kat (2001)[57] demonstrate that the mean-variance model alone fails to capture the true nature of this asset class, necessitating additional measures such as skewness and kurtosis. Nonetheless, hedge funds can play a meaningful role in a portfolio, particularly when combining strategies from all three aforementioned groups to create the desired return distribution. However, successful hedge fund investments rely heavily on skillful fund selection. Thus, the role of hedge funds in a portfolio predominantly depends on the chosen individual funds.

2.3.d Derivatives

Derivatives are intricate financial instruments that derive their value from an underlying asset. They serve multiple purposes, including speculation, hedging, and gaining access to additional assets or markets. There are four main types of derivative contracts: (i) Options: These contracts grant the buyer the right, but not the obligation, to buy or sell an underlying asset at a specified price[58] within a specific time frame. Call options provide the right to purchase an asset at a predetermined price, while put options allow the sale of an asset. Options can be traded over-the-counter (OTC) or on organized exchanges, with exchange-traded options offering standardized terms and increased market competitiveness. Lastly, american options can be exercised at any time, while European options can only be exercised upon expiration. (ii) Futures: Futures contracts are standardized agreements that oblige the contract holder to buy or sell the underlying asset at a predetermined price on a specific date. Unlike options, futures contracts come with an obligation to fulfill the contract terms. They are traded on

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[57] Brooks and Kat, The Statistical Properties of Hedge Funds Index Returns and Their Implications for Investors - Journal of Alternative Investments (2001)
[58] Referred to as the strike price

exchange markets, ensuring high liquidity and regulation. The standardized nature of futures contracts allows for easy unwinding or closing of positions before contract expiration. (iii) Forwards: Similarly to futures contracts, forwards involve both the right and obligation to fulfill the contract terms. However, forwards are OTC products, customizable to suit the requirements of the parties involved. They lack the regulation and specific trading rules of exchange-traded futures contracts. Forward contracts are often held until expiration and delivered into rather than unwound. (iv) Swaps: Swaps are derivative contracts involving two parties exchanging financial obligations. Interest rate swaps are commonly used by investors. Unlike futures and options, swaps are traded over-the-counter to accommodate customization for the involved parties. Various types of swaps have emerged, including credit default swaps, inflation swaps, and total return swaps.[59]

Overall, derivatives provide investors with the means to manage risk and speculate on price movements in underlying assets. However, they carry higher risks compared to traditional asset classes and require extensive knowledge and expertise to trade successfully. Derivatives can offer higher returns due to leverage but also amplify losses during adverse market conditions. They may have low or negative correlations with other asset classes, making them useful for diversifying portfolios and reducing overall risk. However, correlations can increase during times of financial stress, potentially leading to losses across multiple asset classes. Derivatives are considered among the riskiest asset classes due to their high leverage, complex pricing models, and potential for rapid price movements. While they offer diversification benefits and potential higher returns, they require specialized expertise and are generally less suitable for average investors.

2.3.e Commodities

Commodities are raw materials utilized in the production of various consumer goods, ranging from food and furniture to gasoline and petrol. They encompass agricultural products like wheat and cattle, energy products such as oil and natural gas, as well as metals like gold, silver, and aluminum. Additionally, there are "soft" commodities, such as sugar, cotton, cocoa, and coffee, which cannot be stored for extended periods. The need for standardized contracts for trading agricultural products drove the establishment of commodity futures exchanges. Today, futures and options contracts for a wide range of agricultural products, metals, energy products, and soft commodities are traded on exchanges worldwide. These standardized contracts enable

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[59] https://corporatefinanceinstitute.com/resources/derivatives/derivatives/

commodity producers to transfer their price risk to end users and other participants in the financial market. Typically, investors seek commodities allocations to provide three key benefits to their portfolios: inflation protection, diversification, and return potential. Unlike stocks and bonds, which are considered "financial assets," commodities, as "real assets," respond differently to changing economic fundamentals. For instance, commodities tend to benefit from rising inflation. When demand for goods and services increases, the prices of both those goods and the commodities used in their production usually rise as well. Therefore, investing in commodities can serve as a hedge against inflation by capturing the price appreciation of commodities during periods of accelerating inflation. Consequently, broad and diversified commodity indexes like the Bloomberg Commodity Index, Credit Suisse Commodities Benchmark, or the Goldman Sachs Commodity Index S&P GSCI have historically demonstrated returns that are largely independent of stock and bond returns but positively correlated with inflation. The relatively low correlation between commodities and stocks or bonds highlights one of the primary advantages of having broad exposure to commodities: diversification. In a well-diversified portfolio, asset classes tend to move independently of each other, leading to reduced overall portfolio volatility. This lower volatility diminishes portfolio risk and enhances the consistency of returns over time.[60]

According to Table 1, commodities, represented by the Goldman Sachs Commodity Index S&P GSCI, have generated a high average annual return of 11.59%. The volatility of commodities accounts for approximately 20%. However, Kat and Oomen (2007)[61] indicate that, except for energy, commodities do not yield significant risk premiums. They also find that the skewness of commodity returns is minimal and insignificant, while the kurtosis is high but not markedly different from that of U.S. large stocks. Anson (2000)[62] examines the return distribution of The Goldman Sachs Commodity Index from 1990 to 2000 and identifies a positive skewness of 0.82, suggesting upside potential, and a large positive kurtosis of 2.31. This high kurtosis implies a greater frequency of outlier returns, indicating that commodities are sensitive to global demand and supply shocks.

It is worth noting that commodities differ from other alternative asset classes in a significant way. In the case of commodities, a "passive" investment strategy can be applied. There are

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[60] https://europe.pimco.com/en-eu/resources/education/understanding-commodities
[61] Kat and Oomen, What Every Investor Should Know About Commodities - Journal of Investment Management (2007)
[62] Anson, Handbook of Alternative Assets (2000)

numerous ETFs that cover both the broad commodity market and specific subsections, such as agricultural products. This allows investors to easily achieve diversification across the commodity market and primarily bear the systematic risk of commodities. Consequently, the need for additional skills and active management is considerably lower.

In summary, commodities represent a highly diverse asset class with high volatility. They offer substantial potential for diversification, but their behavior in relation to U.S. equities does not follow a uniform pattern and depends on the type of commodity. The distribution of commodity returns appears to be lacking skewness but possesses fat tails. Therefore, commodities can be included in a portfolio to enhance diversification and potentially achieve higher returns. An advantage of commodities is the availability of commodity ETFs, making commodity investing accessible to a wide range of investors.

Section 3: Academic Review

3.1 Modern Portfolio Theory

In the previous section, I described the main asset classes, identified the main characteristics and 'determined' the possible role of each asset class in a portfolio. In the following one I will describe the Modern Portfolio Theory, introduced by Markowitz in 1952[63]. Markowitz portfolio analysis is a mathematical procedure to determine the optimum portfolios in which to invest. The objective of portfolio analysis is to find the set of efficient portfolios that maximize the expected return for any level of risk. There are multiple methods of solving for the efficient set, the graphical one will be the subject of this section.

3.1.a Asset Allocation across Risky and Risk-Free Asset

A straightforward approach to managing portfolio risk involves determining the portion of the portfolio allocated to different asset classes such as stocks, bonds, and safe assets like Treasury bills. This aspect of portfolio management is known as asset allocation and holds a significant role in determining portfolio performance. At its most basic level, asset allocation involves dividing the portfolio into risky and risk-free assets[64]. The proportion of the portfolio allocated to risky assets is referred to as the capital allocation to risky assets and directly reflects the investor's risk aversion. To analyze the risk-return combinations resulting from various capital allocations, we consider an investor who allocates funds between Treasury bills and a portfolio

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[63] Markowitz, Portfolio Selection, Journal of Finance (1952)
[64] Bodie, Kane and Marcus, Essentials of Investments (2012)

of risky assets. The risky portfolio (P) can be envisioned as a mutual fund or ETF comprising a collection of risky assets in predetermined proportions. The complete portfolio (C) includes the overall portfolio consisting of the risk-free asset and the risky portfolio (P), encompassing the entirety of the investor's wealth. Since we assume that the composition of the risky portfolio (P) has been already determined, the only concern here is with the proportion of the investment budget (y) to be allocated to it. The remaining proportion $(1 - y)$ is to be invested in the risk-free asset, which has a rate of return denoted r_f. At the same time, we denote the actual risky rate of return by r_P, the expected rate of return on P by $E(r_P)$, and its standard deviation by σ_P, with the risk premium on the risky asset as:

$$E(r_P) - r_f \qquad\qquad \textbf{Formula 1}$$

Let's start with two extreme cases. The former, as if you invest all of your funds in the risky asset, choosing y = 1, with a combination of risk and return plotted as point P in Figure 4. While the latter, at the other extreme, as if you put all of your funds into the risk-free asset, choosing y = 0, with a risk-return combination plotted as point F in Figure 4. Now consider more moderate choices. Allocating equal amounts of your complete portfolio (C) to the risky and risk-free assets, as if you choose y = 0.5, the expected return on the complete portfolio will be the average of $E(r_P)$ and r_f. Therefore:

$$E(r_c) = y \bullet r_f + y \bullet E(r_P) \qquad\qquad \textbf{Formula 2}$$

The risk premium of the complete portfolio is:

$$E(r_c) - r_f = y \bullet [E(r_P) - r_f] \qquad\qquad \textbf{Formula 3}$$

while its standard deviation will be:

$$\sigma_c = y \bullet \sigma_c \qquad\qquad \textbf{Formula 4}$$

In sum, both the risk premium and the standard deviation of the complete portfolio increase in proportion to the investment in the risky portfolio. Therefore, the points that describe the risk and return of the complete portfolio for various capital allocations of y all plot on the straight line connecting F and P, as shown in Figure 4, with an intercept of r_f and slope (rise/run) equal to the familiar Sharpe ratio of P :

$$S = \frac{E(r_P) - r_f}{\sigma_P}$$

<div align="right">**Formula 5**</div>

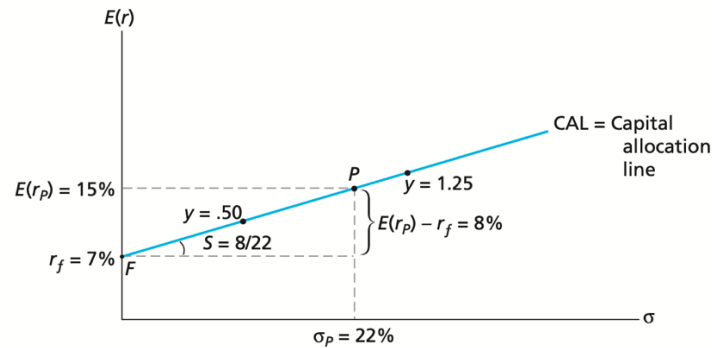**Figure 4: Investment Opportunity Set**

Figure 4: This Figure was taken over from Bodie, Kane and Marcus, Essentials of Investments (2012). It shows the investment opportunity set with a risky asset and a risk-free asset

The line plotted in Figure 4 depicts the risk-return combinations available by varying capital allocation, that is, by choosing different values of y. For this reason it is called the capital allocation line, or CAL. The slope (S) of the CAL equals the increase in expected return that an investor can obtain per unit of additional standard deviation or extra return per extra risk. It is obvious then why it is also called the reward-to-volatility ratio, or Sharpe ratio.

3.1.b Asset Allocation with two Risky Assets

Previously we examined the capital allocation decision, determining the allocation between risk-free securities and a portfolio of risky assets. However, investors also need to consider the specific composition of the risky portfolio. Now, let's examine the asset allocation between two risky assets, assuming a bond fund and a stock fund. Once we have a clear understanding of portfolios consisting of two risky assets, we will reintroduce the choice of the risk-free asset. This will allow us to address the asset allocation problem across the three primary asset classes: stocks, bonds, and Treasury bills. Expanding the exercise to construct efficient portfolios comprising multiple risky securities is a natural extension of this asset allocation process.[65]

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[65] Bodie, Kane and Marcus, Essentials of Investments (2012)

Suppose a proportion denoted by w_b is invested in the bond fund and the remainder $1 - w_b$, denoted by w_s , is invested in the stock fund. The properties of the portfolio are determined by the following three rules governing combinations of random variables[66]:

(i) Rule 1: The rate of return on a portfolio is the weighted average of returns on the component securities, with the investment proportions as weights:

$$r_p = w_b r_b + w_s r_s \qquad \text{Formula 6}$$

(ii) Rule 2: The expected rate of return on a portfolio is the weighted average of the expected returns on the component securities, with the portfolio proportions as weights:

$$E(r_P) = w_b E(r_b) + w_s E(r_s) \qquad \text{Formula 7}$$

(iii) Rule 3: The variance of the rate of return on a two-risky-asset portfolio is:

$$\sigma_p^2 = (w_b \sigma_b)^2 + (w_s \sigma_s)^2 + 2(w_b \sigma_b)(w_s \sigma_s)\rho_{bs} \qquad \text{Formula 8}$$

where ρ_{bs} is the correlation coefficient and equals:

$$\rho_{bs} = 2w_b w_b \bullet \text{Cov}(r_b, r_s) \qquad \text{Formula 9}$$

The variance of a portfolio is the sum of the contributions of the component security variances plus a term that involves the correlation coefficient (and hence, covariance) between the returns on the component securities. When the correlation between the component securities is small or negative, there will be a greater tendency for returns on the two assets to offset each other, hence portfolio variance is lower. This will reduce portfolio risk. Perfect positive correlation is the only case in which there is no benefit from diversification. Whenever asset returns are less than perfectly positively correlated there are benef its to diversification.

As for the Mean Variance Criterion, asset managers while constructing portfolios should show investors the entire investment opportunity set. This is the set of all attainable combinations of risk and return offered by portfolios formed using the available assets (stocks and bonds in this case) in differing proportions. Investors desire portfolios that lie to the "northwest" in Figure

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[66] https://webpage.pace.edu/pviswanath/notes/investments/assetalloc.html

5. These are portfolios with high expected returns (toward the "north) and low volatility (to the "west"). These preferences mean that we can compare portfolios using a mean-variance criterion in the following way: Portfolio A is said to dominate portfolio B if all investors prefer A over B. This will be the case if it has higher mean return and lower variance or standard deviation.[67]
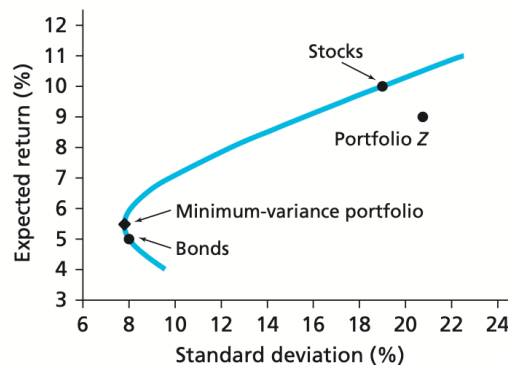
Figure 5: Investment Opportunity Set

Figure 5: This Figure was taken over from Bodie, Kane and Marcus, Essentials of Investments (2012). It shows the investment opportunity set with the stock and bond funds

3.1.c The Optimal Risky Portfolio with a Risk-free Asset

Now we can expand the asset allocation problem to include a risk-free asset. Suppose then that we are still confined to the risky bond and stock funds but now can also invest in T-bills.[68]

When we add the risk- free asset to a stock plus bond risky portfolio, the resulting opportunity set is the straight line that we called the CAL. We now consider various CALs constructed from risk-free bills and a variety of possible risky portfolios, each formed by combining the stock and bond funds in alternative proportions. We start in Figure 6 with the opportunity set of risky assets constructed only from the bond and stock funds. The lowest-variance risky portfolio is labeled MIN[69]. CAL_{MIN} is drawn through it and shows the risk-return trade-off with various positions in T-bills and portfolio MIN. It is immediately evident from the figure that we could do better (i.e., obtain a higher Sharpe ratio) by using portfolio A instead of MIN as the risky portfolio. CAL_A dominates CAL_{MIN}, offering a higher expected return for any level of volatility.

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[67] Bodie, Kane and Marcus, Essentials of Investments (2012)
[68] Bodie, Kane and Marcus, Essentials of Investments (2012)
[69] MIN denotes the minimum-variance portfolio
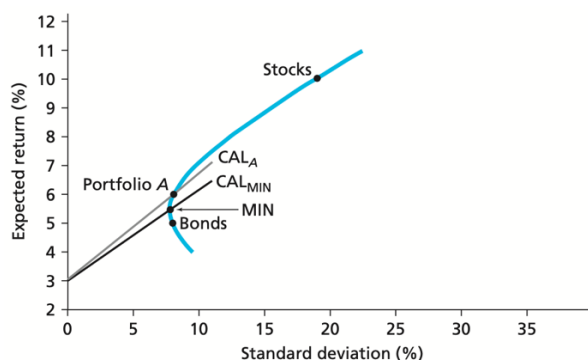
Figure 6: Investment Opportunity Set

Figure 6: This Figure was taken over from Bodie, Kane and Marcus, Essentials of Investments (2012). It shows the opportunity set of stocks, bonds, and a risk- free asset with two capital allocation lines

We can continue to ratchet the CAL upward until it reaches the ultimate point of tangency with the investment opportunity set. This must yield the CAL with the highest feasible reward-to-volatility (Sharpe) ratio. Therefore, the tangency portfolio (O) in Figure 7 is the optimal risky portfolio to mix with T-bills, which may be defined as the risky portfolio resulting in the highest possible CAL.
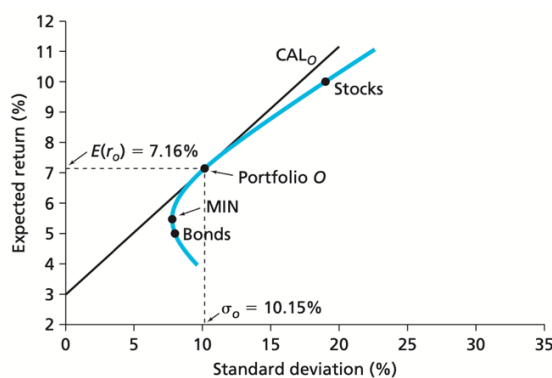
Figure 7: Optimal CAL

Figure 7: This Figure was taken over from Bodie, Kane and Marcus, Essentials of Investments (2012). It shows the optimal capital allocation line with bonds, stocks, and T-bills

Figure 7 clearly shows the improvement in the risk-return trade-off obtained with CAL_O. For any portfolio standard deviation, CAL_O offers a higher expected return than is attainable from the opportunity set constructed only from the risky bond and stock funds.

To find the composition of the optimal risky portfolio, *O*, we search for weights in the stock and bond funds that maximize the portfolio's Sharpe ratio. With only two risky assets, we can solve for the optimal portfolio weights using the following formula:

$$w_b = \frac{[E(r_b)- r_f]\sigma_s^2 - [E(r_s)- r_f]\sigma_b\sigma_s\rho_{bs}}{[E(r_b)- r_f]\sigma_s^2 + [E(r_s)- r_f]\sigma_b^2 - [E(r_b)- r_f + E(r_s)- r_f]\sigma_b\sigma_s\rho_{bs}}$$
$\qquad$ **Formula 10**

$$w_s = 1 - w_b$$
$\qquad$ **Formula 11**

Using these weights we can easily find the optimal portfolio expected return $E(r_O)$, its standard deviation σ_O and therefore its Sharpe ratio. This Sharpe ratio is significantly higher than those provided by either the bond or stock portfolios alone. However, the preferred complete portfolio (C) formed from a risky portfolio and a risk-free asset depends on the investor's risk aversion. More risk-averse investors prefer low-risk portfolios despite the lower expected return, while more risk-tolerant investors choose higher risk, higher-return portfolios. Both investors, anyways, will choose portfolio *O* as their risky portfolio since it results in the highest return per unit of risk, that is, the steepest capital allocation line. Investors will differ only in their allocation of investment funds between portfolio *O* and the risk-free asset.[70]

3.1.d The Efficient Diversification with many Risky Assets

We can now extend the two-risky-assets portfolio methodology to the case of many risky assets and a risk-free asset in three steps. First, we extend the two-risky-assets opportunity set to many assets. Next we determine the optimal risky portfolio that supports the steepest CAL, that is, maximizes its Sharpe ratio. Finally, we choose a complete portfolio on CAL_O based on the investor's risk aversion by mixing the risk-free asset with the optimal risky portfolio.[71]

To get a sense of how additional risky assets can improve investment opportunities, look at Figure 8 below. Points A, B, and C represent the expected returns and standard deviations of three stocks. The curve passing through A and B shows the risk-return combinations of portfolios formed from those two stocks. Similarly, the curve passing through B and C shows portfolios formed from those two stocks. Now observe point E on the AB curve and point F on the BC curve. These points represent two portfolios chosen from the set of AB and BC combinations. The curve that passes through E and F in turn represents portfolios constructed

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[70] http://web.thu.edu.tw/wichuang/www/Investments/Lectures/CHAPTER%208.pdf
[71] Bodie, Kane and Marcus, Essentials of Investments (2012)

from portfolios E and F. Since E and F are themselves constructed from A, B, and C, this curve shows some of the portfolios constructed from these three stocks. Notice that curve EF extends the investment opportunity set to the northwest, which is the desired direction.
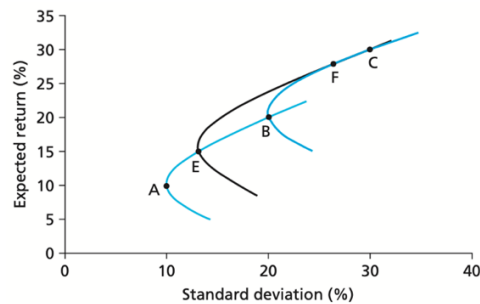
Figure 8: Portfolio Construction

Figure 8: This Figure was taken over from Bodie, Kane and Marcus, Essentials of Investments (2012). It shows portfolios constructed with three stocks (A, B, and C)

Now we can continue to take other points (representing portfolios) from these three curves and further combine them into new portfolios, thus shifting the opportunity set even farther to the northwest. You can see that this process would work even better with more stocks. The analytical technique to derive the efficient set of risky assets was developed by Harry Markowitz in 1952 and ultimately earned him the Nobel Prize in Economics. We sketch his approach here. First, we determine the risk-return opportunity set. The aim is to construct the northwestern-most portfolios in terms of expected return and standard deviation from the universe of securities. The inputs are the expected returns and standard deviations of each asset in the universe, along with the correlation coefficients between each pair of assets. The graph that connects all the northwesternmost portfolios is called the efficient frontier of risky assets. It represents the set of portfolios that offers the highest possible expected rate of return for each level of portfolio standard deviation. These portfolios may be viewed as efficiently diversified. One such frontier is shown in Figure 9.
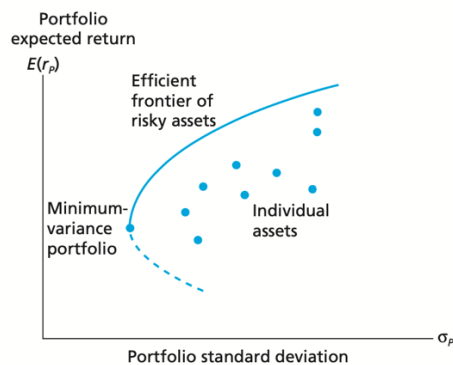
Figure 9: Efficient Frontier

Figure 9: This Figure was taken over from Bodie, Kane and Marcus, Essentials of Investments (2012). It shows the efficient frontier of risky assets and individual assets

The second step of the optimization plan involves the risk-free asset. Using the current risk-free rate, we search for the capital allocation line with the highest Sharpe ratio (the steepest slope), as shown in Figures 6 and 7. The CAL formed from the optimal risky portfolio (O) will be tangent to the efficient frontier of risky assets discussed above. This CAL dominates all feasible CALs. Portfolio O, therefore, is the optimal risky portfolio. Because we know that an investor will choose a point on the CAL that mixes the optimal risky portfolio with T-bills, there is actually no need to either provide access to or derive the entire efficient frontier. Therefore, as a practical matter, rather than solving for the entire efficient frontier, we can proceed directly to determining the optimal portfolio. The "global" maximum Sharpe ratio portfolio is the optimal portfolio O. The ray from the origin to O and beyond is the optimal CAL. Finally, in the third step, the investor chooses the appropriate mix between the optimal risky portfolio (O) and T-bills. More risk-averse clients will invest more in the risk-free asset and less in the optimal risky portfolio O than less risk-averse clients, but both will use portfolio O as the optimal risky investment vehicle[72].

3.1.e Diversification and Portfolio Risk

But what are the sources of risk affecting a portfolio? We can identify two broad sources of uncertainty. The first is the risk from general macroeconomic conditions, and it is called market or systematic risk. Then you must add firm-specific influences, factors that affect a company without noticeably affecting other firms, called firm-specific or non-systematic risk.[73] Diversification by adding multiple securities to your portfolio reduces your exposure to firm-

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[72] Separation Property
[73] Bodie, Kane and Marcus, Essentials of Investments (2012)

specific factors, consequently reducing portfolio volatility, as shown in Figure 10. However, even extensive diversification cannot eliminate all risk since market risk remains.

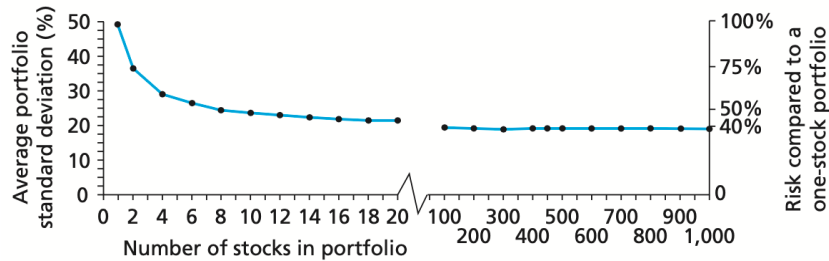**Figure 10: Diversification Effects**

Figure 10: This Figure was taken over from Journal of Financial and Quantitative Analysis (22/09/1987). It shows how Portfolio risk decreases as diversification increases

3.1.f Single Index Model

Index models are statistical models designed to estimate the two components of risk for a particular security or portfolio. They separate the realized rate of return on a security into macro (systematic) and micro (firm-specific) components. The popularity of index models is due to their practicality. To construct the efficient frontier from a universe of securities, using Markowitz portfolio theory, we would need to estimate multiple expected returns, variances and thousands of covariances. Assuming that one common factor is responsible for all the covariability of stock returns, with all other variability due to firm-specific factors, dramatically simplifies the analysis.[74]

Let us use R_i to denote the excess return on a security, that is, the rate of return in excess of the risk-free rate:

$$R_i = r_i + r_f \qquad\qquad \textbf{Formula 12}$$

Then we can express the distinction between macroeconomic and firm-specific factors by decomposing this excess return in some holding period into three components:

$$R_i = \beta\, R_M + e_i + \alpha_i \qquad\qquad \textbf{Formula 13}$$

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[74] Bodie, Kane and Marcus, Essentials of Investments (2012)

The first two terms on the right-hand side of Formula 13 reflect the impact of two sources of uncertainty. R_M is the excess return on a broad market index[75], so variation in this term reflects the influence of economywide or macroeconomic events that generally affect all stocks to greater or lesser degrees. The security's beta (β_i) is the typical response of that particular stock's excess return to changes in the market index's excess return. As such, beta measures a stock's comparative sensitivity to macroeconomic news. A value greater than 1 would indicate a stock with greater sensitivity to the economy than the average stock, known as cyclical stocks. Betas less than 1 indicate below-average sensitivity and therefore are known as defensive stocks. The term e_i in Formula 13 represents the impact of firm-specific risk. The expected value of e_i is zero, as the impact of unexpected events must average out to zero. Both residual risk and systematic risk contribute to the total volatility of returns. Finally, the term α_i in Formula 13 is not a risk measure. Instead, α_i represents the expected return on the stock beyond any return induced by movements in the market index. This term is called the security alpha. A positive alpha is attractive to investors and suggests an underpriced security, since among securities with identical sensitivity (beta) to the market index, securities with higher alpha values will offer higher expected returns. Conversely, stocks with negative alphas are apparently overpriced, since for any value of beta, they offer lower expected returns.

Because the firm-specific component of the stock return is uncorrelated with the market return, we can write the variance of the excess return of the stock as the sum of the variance attributable to the uncertainty of the entire market and the variance of the firm-specific return (independent of market performance):

$$\text{Variance } (R_i) = (\alpha_i + \beta_i R_M + e_i) = \text{Variance } (\beta_i R_M) + \text{Variance } (e_i) = \beta_i^2 \sigma_M^2 + \sigma^2 (e_i)$$

$$= \text{Systematic risk} + \text{Firm specific risk} \qquad \textbf{Formula 14}$$

Formula 14 may be interpreted as a single-variable regression equation of R_i on the market excess return R_M. The excess return on the security (R_i) is the dependent variable that is to be explained by the regression. On the right-hand side of the equation are the intercept (α_i), the regression (slope) coefficient beta (β_i), multiplying the independent (explanatory) variable (R_M), and the residual return (e_i). Regression analysis uses a sample of historical returns to

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[75] S&P500 is commonly used for this purpose

estimate the coefficients (alpha and beta) of the index model. The analysis finds the regression lines, shown in Figure 11, that minimize the sum of the squared deviations around them. Hence, we say the regression lines "best fit" the data in the scatter diagram. The lines are called the security characteristic line (SCL).
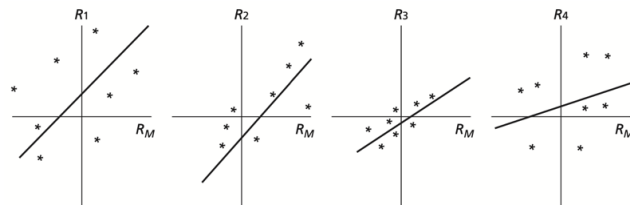
Figure 11: SCL

Figure 11: This Figure was taken over from Bodie, Kane and Marcus, Essentials of Investments (2012). It shows various scatter diagrams

Within a portfolio that is divided equally among securities whose returns follow the single-index model of Formula 13, what are its systematic and nonsystematic variances?

The beta of the portfolio is a simple average of the individual security betas. The market variance (σ_M^2) and the beta of the portfolio determine its market risk. The systematic component of each security return, $\beta_i R_M$, is driven by the market factor and therefore is perfectly correlated with the systematic part of any other security's return. Hence, there are no diversification effects on systematic risk no matter how many securities are involved. It is quite different with firm-specific risk. Because the firm-specific terms (e_i) are uncorrelated, the portfolio nonsystematic variance is the weighted sum of the individual firm-specific variances:

$$\sigma_{ep}^2 = \sum_{i=1}^{n} W_i^2 \, \sigma_{ei}^2 \qquad \textbf{Formula 15}$$

Each individual nonsystematic variance is multiplied by the square of the portfolio weight. With diversified portfolios, the squared weights are very small and so the impact of nonsystematic risk becomes negligible. In sum, when we control the systematic risk of the portfolio by manipulating the average beta of the component securities, the number of securities is of no consequence. But for non- systematic risk the number of securities is more important than the firm-specific variance of the securities. Sufficient diversification can virtually eliminate firm-specific risk.

3.1.g The Capital Asset Pricing Model

The Capital Asset Pricing Model (CAPM) offers a precise prediction regarding the relationship between the risk of an asset and its expected return. This relationship serves two important purposes. Firstly, it provides a benchmark return rate for assessing potential investments. Secondly, the model assists in estimating the expected return on assets that have not yet been traded in the market. For instance, it helps address questions such as how to price an initial public offering of stock or how a major new investment project may impact the required return on a company's stock.

The CAPM begins by laying down the necessary, albeit unrealistic, assumptions that are necessary for the validity of the model. The conditions that lead to the CAPM ensure competitive security markets and investors who choose from identical efficient portfolios using the mean-variance criterion. Given these assumptions we elaborate on these implications in this hypothetical world of securities and investors: (i) All investors will choose to hold the market portfolio (M), which includes all assets of the security universe[76]. (ii) The market portfolio will be on the efficient frontier. Moreover, it will be the optimal risky portfolio, the tangency point of the capital allocation line (CAL) to the efficient frontier. As a result, the capital market line (CML), the line from the risk-free rate through the market portfolio (M) is also the best attainable CAL. All investors hold M as their optimal risky portfolio, differing only in the amount invested in it as compared to investment in the risk-free asset. (iii) The risk premium on the market portfolio will be proportional to the variance of the market portfolio and investors' typical degree of risk aversion. Mathematically:

$$E(r_M) - r_f = \overline{A}\sigma_M^2 \qquad \textbf{Formula 16}$$

where σ_M is the standard deviation of the return on the market portfolio and A represents the degree of risk aversion of the average investor. When investors purchase stocks, their demand drives up prices, thereby lowering expected rates of return and risk premiums. But when risk premiums fall, investors will move some of their funds from the risky market portfolio into the risk-free asset. In equilibrium, the risk premium on the market portfolio must be just high enough to induce investors to hold the available supply of stocks. The equilibrium risk premium

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[76] For simplicity, we shall refer to all assets as stocks. The proportion of each stock in the market portfolio equals the market value of the stock (price per share times the number of shares outstanding) divided by the total market value of all stocks

of the market portfolio is therefore proportional both to the risk of the market, as measured by the variance of its returns, and to the degree of risk aversion of the average investor, denoted by A in Formula 15. (iii) The risk premium on individual assets will be proportional to the risk premium on the market portfolio (M) and to the beta coefficient of the security on the market portfolio. Formally, beta is the regression (slope) coefficient of the security return on the market return, representing sensitivity to fluctuations in the overall security market.

The CAPM implies that a passive strategy, using the CML as the optimal CAL, is a powerful alternative to an active strategy. A passive investor who takes a free ride by simply investing in the market portfolio benefits from the efficiency of that portfolio. In fact, an active investor who chooses any other portfolio will end on a CAL that is inferior to the CML used by passive investors. [77]

The CAPM is built on the insight that the appropriate risk premium on an asset will be determined by its contribution to the risk of investors' overall portfolios. Portfolio risk is what matters to investors, and portfolio risk is what governs the risk premiums they demand. We know that nonsystematic risk can be reduced to an arbitrarily low level through diversification, therefore, investors do not require a risk premium as compensation for bearing nonsystematic risk. They need to be compensated only for bearing systematic risk, which cannot be diversified. We know also that the contribution of a single security to the risk of a large diversified portfolio depends only on the systematic risk of the security as measured by its beta. Therefore, it should not be surprising that the risk premium of an asset is proportional to its beta. Thus, the ratio of risk premium to beta should be the same for any two securities or portfolios.

If we equate the ratio of risk premium to systematic risk for the market portfolio, which has a beta of 1, we find that :

$$\frac{E(r_M) - r_f}{1} = \frac{E(r_D) - r_f}{\beta_D} \qquad \textbf{Formula 17}$$

Rearranging results in the CAPM's expected return–beta relationship:

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[77] http://web.thu.edu.tw/wichuang/www/Investments/Lectures/CHAPTER%209.pdf

$$E(r_D) = r_f + \beta_D[E(r_M) - r_f] \qquad \qquad \textbf{Formula 18}$$

In words, an asset's risk premium equals the asset's systematic risk measure (its beta) times the risk premium of the (benchmark) market portfolio. This expected return (or mean return) - beta relationship is the most familiar expression of the CAPM. in this hypothetical world of securities and investors The mean-beta relationship of the CAPM makes a powerful economic statement. It implies, for example, that a security with a high variance but a relatively low beta of 0.5 will carry one-third the risk premium of a low-variance security with a beta of 1.5. Formula 17 quantifies the conclusion we reached before: only systematic risk matters to investors who can diversify, and systematic risk is measured by beta. The expected return–beta relationship is a reward-risk equation. The CAPM states that the security's risk premium is directly proportional to both the beta and the risk premium of the market portfolio (risk premium equals $\beta[E(r_M) - r_f]$). The mean-beta relationship is called the security market line (SML) in Figure 10. Its slope is the risk premium of the market portfolio.
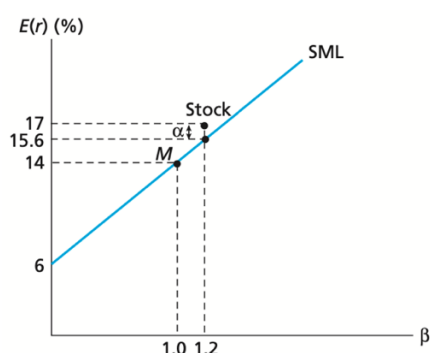
Figure 12: SML

Figure 12: This Figure was taken over from Bodie, Kane and Marcus, Essentials of Investments (2012). It shows the security market line and a positive-alpha stock

It is useful to compare the SML to the CML. The CML graphs the risk premiums of efficient complete portfolios[78] as a function of portfolio standard deviation. This is appropriate because standard deviation is a valid measure of risk for portfolios that are candidates for an investor's complete portfolio. The SML, in contrast, graphs individual-asset risk premiums as a function of asset risk. The relevant measure of risk for an individual asset[79] is not the asset standard deviation but rather the asset beta. The SML is valid both for individual assets and portfolios.

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[78] Efficient complete portfolios are made up of the market portfolio and the risk-free asset
[79] The individual is held as part of a well-diversified portfolio

The security market line provides a benchmark for evaluation of invest- ment performance. The SML provides the required rate of return that will compensate investors for the beta risk of that investment, as well as for the time value of money. Because the SML is the graphical representation of the mean-beta relationship, "fairly priced" assets plot exactly on the SML. The expected returns of such assets are commensurate with their risk. Whenever the CAPM holds, all securities must lie on the SML in equilibrium. Underpriced stocks plot above the SML, since for any given beta, their expected returns are greater than is indicated by the CAPM. Overpriced stocks plot below the SML. The difference between fair and actual expected rates of return on a stock is the alpha, denoted α. The expected return on a mispriced security is given by:

$$E(r_s) = \alpha_s + r_f + \beta_s[E(r_M) - r_f]$$
<div align="right">**Formula 19**</div>

The CAPM has two limitations: It relies on the theoretical market portfolio, which includes all assets (such as real estate, foreign stocks, etc.), and it applies to expected as opposed to actual returns. To implement the CAPM, we cast it in the form of an index model[80] and use realized, not expected, returns.[81]

3.2 Portfolio Performance Evaluation

Individual households as well as institutional money managers must decide whether to use passive or active management. Passive management involves capital allocation between cash (almost-risk-free vehicles such as money market funds) and the chosen risky portfolio constructed from one or more index funds or ETFs. Alternatively, households and institutional endowments may choose active management, in which case they usually become clients of professional portfolio managers. The dividing line between passive and active management is the forecasting of future rates of return on asset classes and/or individual assets.

Both clients and professionals are interested in performance evaluation. Clients need to know whether their chosen professionals produce adequate net of fee returns. Professionals need to shore up their methodology and maintain qualified staff with adequate compensation to compete in the market for these services. Performance evaluation of a portfolio is difficult because of the great volatility of asset returns. A portfolio's average return over an evaluation

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[80] An index model replaces the theoretical all-inclusive portfolio with a market index such as the S&P500
[81] Bodie, Kane and Marcus, Essentials of Investments (2012)

period is inadequate to measure performance. To begin with, the average return realized over any particular period may not represent the expected return, but even when the average return does approximate expected return, it still would be invalid as a measure of performance because it ignores risk, since we expect higher-risk investments to outperform lower-risk ones in average to boom markets and to underperform in bear markets. Hence, we must estimate portfolio risk to determine the adequacy of the average return. Since volatility generates statistical errors in estimates of both expected return and risk, we must remain skeptical of the evaluation process. The simplest and most popular way to adjust returns for portfolio risk is to compare rates of return with those of other investment funds with similar risk characteristics. For example, high-yield bond portfolios are grouped into one "universe", growth stock equity funds are grouped into another universe, and so on. Then the average returns of each fund within the universe are ordered, and each portfolio manager receives a percentile ranking depending on relative performance within the comparison universe.

3.2.a Basic Performance Evaluation Statistics

Performance evaluation relies on the index model and CAPM discussed before[82]. The single-index model equation applied to a portfolio P is:

$$R_{Pt} = \beta_P R_{Mt} + \alpha_P + e_{Pt}$$ **Formula 20**

where R_{Pt} ($R_{Pt} = r_{Pt} - r_{ft}$) is portfolio P's excess return over cash equivalents during period t, r_{ft} is the return on cash, and R_{Mt} is the excess return on the market index. β_P is the portfolio's sensitivity to the market index, hence its measure of systematic risk, and $\beta_P R_{Mt}$ is the component of return that is driven by the market. The extra-market or nonsystematic component, $\alpha_P + e_{Pt}$, includes the portfolio alpha plus zero-mean noise (e), called the residual, which is uncorrelated with R_M. Thus, the expected excess return of the portfolio for some evaluation period is:

$$E(R_P) = \beta_P E(R_M) + \alpha_P$$ **Formula 21**

We measure expected returns over the period by average return.

The CAPM hypothesis is that the market portfolio is mean-variance efficient. The index model uses an index portfolio (M) to proxy for the theoretical market portfolio, and hence it is the

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[82] Bodie, Kane and Marcus, Essentials of Investments (2012)

benchmark passive strategy against which competing portfolios are measured.The CAPM hypothesis is that the alpha of all securities and competing portfolios is zero. A professional who claims to outperform the index must produce a positive alpha. The validity of the CAPM doesn't preclude some professionals from doing so, as long as the totality of investments that exhibit positive alpha is not large relative to aggregate wealth in the economy.

But what about portfolio risk? As noted above, beta measures systematic risk since the variance of the market-driven return component is:

$$\text{Var}\left(\beta_p R_{Mt}\right) = \beta_P^2 \sigma_M^2 \qquad \textbf{Formula 22}$$

And the term σ_M^2 is the same for all portfolios.The extra-market component of return contributes the quantity $\text{Var}(e_P)$ to portfolio variance.The standard deviation of the residual return e, which we will denote here as σ_e, is called residual risk or residual SD . The variance of the return on P is thus the sum of the variances (since the systematic and residual components are uncorrelated):

$$\sigma_p^2 = \beta_P^2 \sigma_M^2 + \sigma_e^2 \qquad \textbf{Formula 23}$$

Overall, Table 6 presents performance-evaluation statistics for two professionally managed portfolios, P and Q, the benchmark, M, and cash.

Table 6: Portfolio Performance

	Portfolio *P*	Portfolio *Q*	Benchmark	Cash
Average return	13.6	9.5	10.4	4
Average excess return (%)	9.60	5.50	6.37	0
Standard deviation (%)	24.1	18.0	18.5	0
Beta (pure number)	1.25	0.50	1.0	0
Alpha (%)	1.6	2.3	0	0
Residual SD (%)	6.79	15.44	0	0
Correlation with benchmark	0.96	0.51	1	0
Sharpe ratio	0.398	0.306	0.344	0
M-square (%)	1.00	−0.72	0	0
Treynor measure	7.68	11.00	6	0
Information ratio	0.24	0.15	0	0

Table 6: The Table was taken over from Bodie, Kane and Marcus, Essentials of Investments (2012). It shows the performance of two managed portfolios, P and Q, the benchmark portfolio, M, and cash equivalents

3.2.b Performance Evaluation using the Sharpe Ratio and M-Square

Consider you have to choose in which fund to invest among the three shown in Table 6. In that case, the familiar Sharpe ratio, which measures risk by total volatility (SD), must determine the choice:

$$S = \frac{\overline{R}}{\sigma}$$ **Formula 24**

The Sharpe ratio has a clear interpretation, namely, the incremental return an investor may expect for every increase of 1% of standard deviation. It is the slope of the capital allocation line supported by that portfolio. But should investors consider the difference in Sharpe ratios between portfolio P and the benchmark portfolio M large? That is harder to interpret and leads us to a variant on the Sharpe ratio. Imagine a portfolio with the same standard deviation as the benchmark, σ_M. Then the difference between the Sharpe ratios of the portfolio and the benchmark would be the difference in their risk premiums divided by that common standard deviation. Put differently, ranking portfolios with a common volatility by Sharpe ratio will be equivalent to ranking them very simply by risk premium. This makes comparison of portfolios with equal standard deviation easy to interpret. Can we transform P to an equivalent portfolio with the same standard deviation as the benchmark, σ_M , without affecting its Sharpe ratio? Recall that the slope of P 's CAL is the Sharpe ratio of all portfolios on that line. Therefore, we just choose the portfolio on CAL_P that has standard deviation σ_M . All portfolios on CAL_P are mixtures of portfolio P with risk-free borrowing or lending. When we invest a weight w in P and 1 - w in the risk-free asset, we just slide up (when w > 1) or down (when w < 1) the CAL. Call P * the portfolio created by mixing P with the risk-free asset in just the right proportion to make the standard deviation match that of the benchmark. In other words, portfolio P * is portfolio P with just the right amount of leverage to make the standard deviation match that of the benchmark. We form P* by choosing $w = \frac{\sigma_M}{\sigma_P}$ because this makes the SD of P* equal to $w\sigma^P = \sigma_M$. The risk premium of portfolio P* therefore can be written in terms of the Sharpe ratio of P:

$$\overline{R}_{P^*} = w\overline{R}_P = \frac{\sigma_M}{\sigma_P}\overline{R}_P = \sigma_M S_P$$ **Formula 25**

Similarly, the risk premium of the benchmark can be written in terms of its Sharpe ratio:

$$\overline{R}_M = \sigma_M \frac{\overline{R}_M}{\sigma_M} = \sigma_M S_M \qquad \textbf{Formula 26}$$

The difference between the risk premium of P *, the leverage-adjusted version of P, and the benchmark is known as M-square (after Leah and Franco Modigliani) and is written M^2:

$$M^2 = \overline{R}_{P*} - \overline{R}_M = \sigma_M (S_P - S_M) \qquad \textbf{Formula 27}$$

M-square is the rate-of-return differential between P* and M, a legitimate and easy-to-interpret performance measure because the portfolios are volatility-matched. [83]

3.3 Investment Strategies

Asset managers have a range of investment strategies to choose from, so it's important to carefully consider the manager's investment style when selecting an investment fund that aligns with your risk-reward preferences. The investment style plays a crucial role in the investment process, as both risk and return are connected to the chosen style. According to modern portfolio theory, it is possible to optimize a combination of styles to achieve diversification while balancing reward and risk. The most common investing strategies that suit most investors are: (i) Value Investing: Value investing is a long-term strategy where investors use fundamental analysis to identify undervalued assets or stocks. By purchasing these assets at a discounted price, investors take advantage of market overreactions and anticipate a return to normal valuation over time. (ii) Growth Investing: Growth investing aims to generate wealth through capital appreciation over the long or short term. Investors focus on assets or stocks with significant growth potential. This strategy is not ideal for investors seeking a steady income, as growth companies often reinvest their earnings into expansion rather than paying dividends. Growth stocks do tend to outperform during periods of falling interest rates, as newer companies can find it less expensive to borrow in order to fuel innovation and expansion. It's important to keep in mind, however, that at the first sign of a downturn in the economy, growth stocks are often the first to get hit. Investors looking for shorter investing horizons with greater potential than value companies are best suited for growth investing. (iii) Income Investing: Income investing involves building a diversified portfolio that generates regular income. This income can come from various sources such as dividends, bond yields, or interest payments from real estate holdings or mutual funds. Investors consider factors like yield, past performance consistency, and earnings growth when selecting income-generating investments.

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[83] Bodie, Kane and Marcus, Essentials of Investments (2012)

(iv) Top-Down and Bottom-up Investing: Top-down investing involves selecting assets based on a macroeconomic or thematic approach. For example, if the manager predicts economic growth, they may invest broadly or selectively in specific sectors. Bottom-up investing focuses on individual company analysis, regardless of the overall economic or sector trends. (v) Contrarian Investing: Contrarian investing is a strategy that involves going against the prevailing investor sentiment. It can be applied to individual stocks, entire industries, or even entire markets. Contrarian investors enter the market when others are pessimistic, believing that the market or stock is undervalued and presents an opportunity for growth. Contrarian investing shares similarities with value investing, as both strategies seek stocks that are priced below their intrinsic value. (vi) Dividend Growth Investing: Dividend growth investing is a popular strategy where investors buy shares in companies with a track record of regular and increasing dividend payments. Investors may reinvest these dividends in the company's shares or in other companies with similar dividend growth records, aiming for the growth of their investment portfolio. While dividend growth investments are generally considered less volatile, it's important to note that no investment or dividend payment is guaranteed. Investors seeking diversification, protection against market downturns and inflation, or potential passive income often consider dividend growth investments. (vii) Momentum Investing: Momentum investors focus on shorter investment horizons and seek companies or assets with strong growth potential. They defy the efficient-market hypothesis and heavily rely on technical analysis, using data-driven approaches and looking for patterns in stock prices to guide their buying and selling decisions. Momentum investors need to be agile and ready to make timely trades. (viii) Multi-Asset Investing: Multi-asset investing involves diversifying investments across various asset classes such as stocks, bonds, real estate, or cash. This strategy aims to create a well-rounded and diversified portfolio that can adapt to different market conditions. Multi-asset fund managers make strategic decisions and balance asset classes to achieve specific investment goals, such as growth, income, or risk mitigation. (ix) Sustainable Investing (ESG Investing): Sustainable investors focus on making investments that have positive social and environmental impacts. They may choose to invest in funds or companies that prioritize social justice and environmental sustainability, avoiding those involved in activities like gambling and addiction. Sustainable investing recognizes that companies addressing global challenges are often well-positioned for growth. However, sustainable investors must also assess the

financial outlook of their investments in addition to their social value, as financial performance remains an important consideration.[8485]

Section 4: Current Macro-Economic Regime

4.1 Overview

Today, due to widespread vaccination and the presence of less lethal strains of Covid-19, the fatality rates have decreased. This has allowed most populations around the world, who were tired of the pandemic, to gradually return to their normal activities. However, there are several factors causing concerns. Supply chain disruptions, the prolonged impact of fiscal stimulus, and Russia's invasion of Ukraine have led to a surge in inflation, reaching its highest level in 40 years. As a result, central banks, including the Federal Reserve [86](Fed), have implemented aggressive tightening measures, leading to significant sell-offs in fixed income and equity markets. The recent mid-term elections have resulted in a divided government, indicating limited prospects for addressing long-term issues or providing fiscal support in case of an economic downturn. The current global conditions, as well as anticipated future conditions, resemble those that have historically signaled global recessions. Factors such as energy supply and demand concerns, reduced capital flows, declining trade volumes, and decreasing output per person suggest that the global economy is likely to enter a recession in the upcoming year. From a financial standpoint, there is a shift in the monetary regime, transitioning from one that supports global markets to one that focuses on controlling inflation.[8788]

According to BlackRock[8990], the period of stable economic activity and inflation known as the Great Moderation, which lasted for four decades, is now behind us. We have entered a new regime characterized by persistent inflation and volatility in output, where central banks are raising policy rates to levels that harm economic activity, leading to higher bond yields and ongoing pressure on risky assets. Unlike in the past, central bankers will not intervene as aggressively to support growth in this new regime, contrary to investor expectations. Market participants hope that central banks will change their course and steer the economy toward a

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[84]https://www.investors.asn.au/magazine/8-common-investment-strategies-to-help-you-achieve-your-financial-goals/

[85] https://www.investopedia.com/investing/investing-strategies/

[86] The Federal Reserve System (FRS) is the central bank of the United States

[87] Vanguard Group, Economic and Market Outlook, 2023

[88] JP Morgan Asset Management, Investment Outlook 2023

[89] BlackRock Investment Institute (BII), Global Outlook 2023

[90] BlackRock Investment Institute (BII), Weekly Commentary 2023

smooth landing, but a harsh landing involving recessions is the most probable outcome in 2023. The previous normal practice of central banks intervening extensively, as seen during the financial crisis and the pandemic, is disappearing or has already disappeared. This makes a recession predictable. Eventually, central banks will retreat from rate hikes as the detrimental economic effects become evident. Fidelity Investments (Fidelity)[91] points out that until the markets fully grasp this reality, we may witness significant market rallies based on expected actions by the Fed, only to see them reverse when those actions do not materialize as expected. Interest rates are likely to stabilize eventually, but if inflation remains persistently above 2%, they are unlikely to decrease rapidly even if banks implement other measures to maintain liquidity and manage the increasingly challenging levels of debt. Fidelity[92] further suggests that a crucial factor to monitor is the future trajectory of the US dollar. In 2022, the strong dollar had adverse effects on other economies, both in developed and emerging countries that rely on hard currency debt. If the Fed continues to raise rates, a stronger dollar could expedite the onset of recession in other parts of the world. Conversely, a notable change in the dollar's direction, potentially stemming from concerns about its relative strength and confidence in monetary and fiscal policymaking, could bring widespread relief and enhance liquidity in economies facing difficulties.

4.2 Macro

In the United States, the Federal Reserve (Fed) is determined to raise interest rates significantly beyond neutral levels in order to bring inflation under control. Fidelity[93] believes that the Fed will not change its approach until there is a noticeable decline in concrete data, particularly in terms of inflation and the job market. The housing market in the US is already displaying signs of strain, with higher mortgage rates and reduced affordability hampering property transactions. However, inflation and the job market remain robust, compelling the Fed to persist in its course, as it focuses on current data points while considering its underestimation of inflationary pressures last year.

At present, a key concern is that the Fed places too much emphasis on lagging data, particularly in relation to the job market. By the time signs of weakness emerge, it might already be too late for the US economy to react effectively. Real interest rates have been positive for a

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[91] Fidelity Investments, Annual Outlook 2023
[92] Fidelity Investments, Annual Outlook 2023
[93] Fidelity Investments, Annual Outlook 2023

considerable period, and in some segments of the yield curve[94], they are approaching levels seen before the Global Financial Crisis (GFC). Fidelity[95] also highlights that the financial system cannot endure positive real rates[96] for any material length of time[97] without encountering issues of financial stability. Given that liquidity and assets are already facing significant pressure, the system could begin to show signs of vulnerability. There is a risk that if the Fed remains committed to its current stance and does not halt until inflation returns close to 2%, a "typical" recession could escalate into something more severe.

Figure 13: Global Financial Conditions
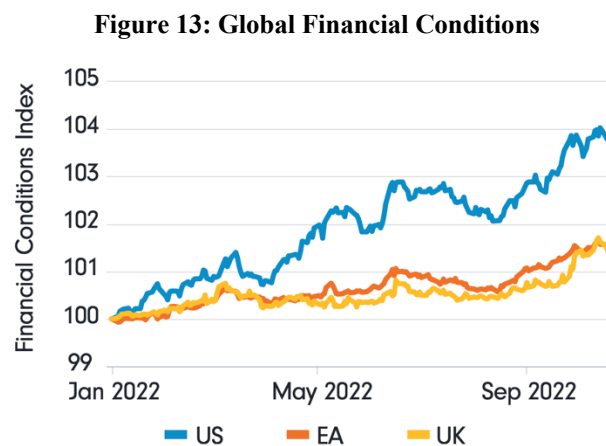
Figure 13: This Figure was taken over from Fidelity International, Bloomberg, November 2022. It shows the Financial Conditions Index rebased to 100 at 31 December 2021. Higher values indicate tighter financial conditions, while lower values indicate looser financial conditions

In addition to central banks, governments will play a crucial role in shaping the macroeconomic outlook for 2023. The events of 2022, such as market fluctuations caused by UK fiscal policies and political uncertainty, highlighted the potential risks to financial stability when a combination of monetary tightening and ill-advised fiscal decisions occur.

Regardless, it is expected that inflation will moderate, albeit gradually, according to experts at Fidelity. However, structural trends like decarbonization, deglobalization, and managing high levels of debt are likely to exert inflationary pressures in the years ahead. This could restrict central banks' ability to stimulate growth through monetary measures, marking a shift from the post-GFC era when real interest rates consistently entered negative territory to support economic expansion. As mentioned earlier, the market's response to the UK government's

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[94] The yield curve is a graph which depicts how the yields on debt instruments, such as bonds, vary as a function of their years remaining to maturity. The yield curve is a way to measure bond investors' feelings about risk.

[95] Fidelity Investments, Annual Outlook 2023

[96] Real rates are interest rates adjusted for inflation

[97] Due to high levels of debt

recent fiscal expansion plans illustrates the challenges faced by policymakers worldwide in supporting growth while simultaneously controlling inflation.

Europe faces its own set of challenges. The trajectory of energy prices, the nature of fiscal support for consumers, and weather conditions will significantly impact Europe's prospects in 2023. A milder winter would reduce the likelihood of gas rationing or blackouts due to lack of supply[98]. Energy security, along with the ongoing human tragedy of the Russia-Ukraine conflict, will remain a top priority for Europe and the UK, potentially influencing capital flows in the future.

China will also be a significant determinant of the economic landscape in 2023. There are preliminary indications that stringent anti-Covid measures will be relaxed[99], which would have a positive effect on economic growth. Monetary and fiscal policies are expected to remain accommodative, providing a foundation for an economy that has been under substantial pressure. However, uncertainties persist regarding the future trends of the renminbi[100] exchange rate. Fidelity experts believe that the PBoC[101] is willing to accept some depreciation to support export growth, particularly given the relatively low inflation levels.

In conclusion, it is important to recognize that markets rarely follow a linear path aligned with economic factors. Assessing the emergence of "value" across asset classes, particularly in fixed income and certain parts of equity markets, will be an important trend to consider alongside macroeconomic developments.

4.3 Regime Drivers

According to analysts at BlackRock[102][103], the defining characteristic of the current economic landscape is the presence of supply-driven dynamics that involve difficult trade-offs. Repeated instances of unexpected inflation have caused bond yields to surge, resulting in significant downturns in both equities and fixed income. This heightened volatility sharply contrasts with the stability observed during the period known as the Great Moderation.

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[98] Early indications are that this might be the case based on Europe's Weather Centre (ECMWF) and UK Met Office forecasts

[99] Though slower than expected

[100] The Renminbi (RMB) is the official name of China's currency. The principal unit of RMB is called the Chinese Yuan (CNY)

[101] PBoC stands for People's Bank of China which is the central bank of mainland China

[102] BlackRock Investment Institute (BII), Global Outlook 2023

[103] BlackRock Investment Institute (BII), Weekly Commentary 2023

The new regime is primarily shaped by production constraints. The shift in consumer spending from services to goods during the pandemic has created shortages and bottlenecks in the supply chain. Additionally, aging populations have contributed to labor shortages. As a result, DMs[104] are unable to produce as much as they did before without exerting inflationary pressure. This explains why inflation remains high despite economic activity still being below its pre-Covid trajectory. Given this situation, central banks cannot rely on policy rates as a tool to alleviate production constraints since their influence is limited to managing demand within their respective economies. Consequently, central banks are faced with a challenging trade-off. They must choose between suppressing demand to match the economy's current production capacity, thereby bringing inflation back to their 2% targets (as indicated by the dotted green line in the chart) or accepting higher levels of inflation. Currently, central banks are fully committed to the former option, which is why a recession is anticipated. While signs of an economic slowdown are emerging, BlackRock[105] believes that central banks will halt their rate hikes once the actual damage materializes, even if inflation does not fully align with the 2% target.
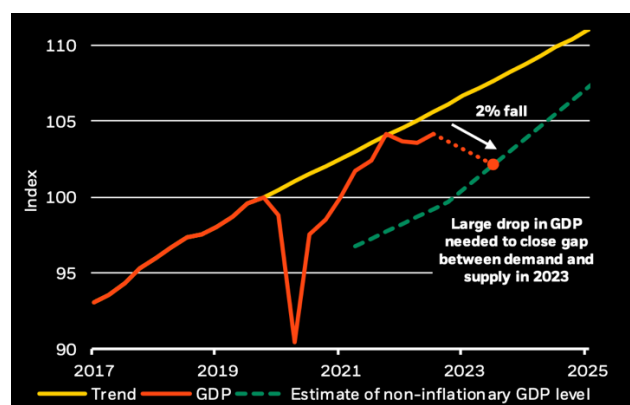
Figure 14: U.S. GDP and Potential Supply, 2017-2025

Figure 14: This Figure was taken over from BlackRock Investment Institute and U.S. Bureau of Economic Analysis, November 2022. It shows demand in the economy, measured by real GDP (in orange) and the estimate of pre-Covid trend growth (in yellow). The green dotted line shows the estimate of current production capacity, derived by how much core PCE inflation has exceeded the Federal Reserve's 2% inflation target

Some production constraints could ease as spending normalizes. But, as for the largest asset manager in the world[106], three long-term trends are contributing to the constraints on production capacity and solidifying the current economic regime: (i) Firstly, the aging

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[104] DMs stands for Developed Markets
[105] BlackRock Investment Institute (BII), Global Outlook 2023
[106] BlackRock Investment Institute (BII), Global Outlook 2023

populations in many major economies are leading to ongoing shortages of workers. This demographic trend has a negative impact on economic growth. As a larger proportion of the population reaches retirement age and exits the labor force[107], production capacity will grow at a slower pace in the future. This reduced capacity struggles to keep up with demand, leading to continued inflationary pressure. (ii) Secondly, persistent geopolitical tensions are reshaping globalization and supply chains, ushering in a new world order. Geopolitical cooperation and globalization are giving way to a fragmented landscape with competing blocs emphasizing self-reliance. This shift comes at the expense of economic efficiency. Local sourcing may become costlier for firms, and there will be mismatches in supply and demand as resources are reallocated. These factors contribute to the new regime characterized by greater macroeconomic and market volatility, as well as consistently higher inflation. (iii) Thirdly, the transition towards achieving net-zero carbon emissions is creating imbalances between energy supply and demand. BlackRock's research[108] suggests that the global transition could accelerate due to significant climate policy actions, technological advancements reducing the cost of renewable energy, and evolving societal preferences as the physical damages and costs of climate change become more apparent. However, this transition also adds to the constraints on production capacity. It involves a substantial reallocation of resources, and while oil and gas will still be necessary to meet future energy demands during the transition, if high-carbon production declines more rapidly than the phased-in adoption of low-carbon alternatives, shortages could arise, driving up prices and disrupting economic activity. The pace of the transition will determine the extent of the mismatch, leading to more volatile inflation and economic activity.

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[107] Meaning in work or looking for work
[108] BlackRock Investment Institute (BII), Global Outlook 2023

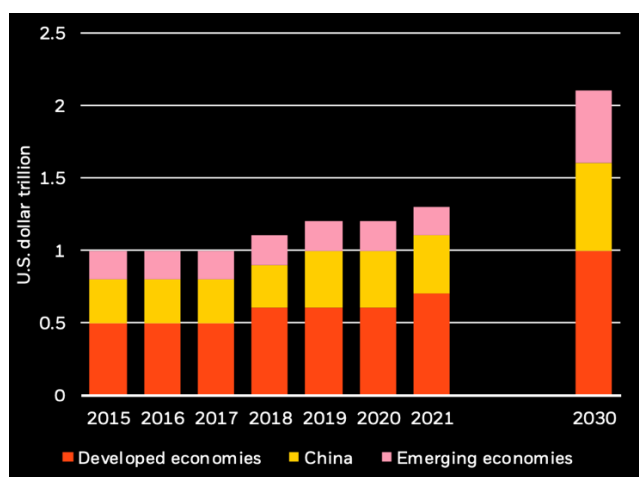**Figure 15: Total Annual Green Investment, 2015-2030**

Figure 15: This Figure was taken over from BlackRock Investment Institute and International Energy Agency (IEA), November 2022. It shows IEA estimates of past and planned annual green investment, in trillions of U.S. dollars

Bottom line: what worked in the past will not work now, the new macro-economic regime we are in needs a new portfolio approach which differs from the traditional 60/40 allocation.

Section 5: New Portfolio Approach

5.1 Investment Themes

Considering the current macroeconomic regime and the expected levels of inflation (BlackRock's forecast suggests a cooling down but with persistently higher levels than central bank targets of 2%), the key factor in constructing an optimal portfolio, as highlighted by both BlackRock[109][110] and Fidelity[111], is assessing the extent to which market prices already reflect the economic damage. At present, equity valuations have yet to fully incorporate the forthcoming damage. The expectation of supportive policies to aid risk assets, as mentioned earlier, is not applicable in this environment of heightened trade-offs and increased macroeconomic volatility. The traditional approach of simply "buying the dip" does not align with this new regime. The new strategy necessitates an ongoing evaluation of how much of the economic damage caused by central banks is factored into market prices. This damage is accumulating, particularly evident in rate-sensitive sectors within the United States. The surge in mortgage rates has had a detrimental impact on the sales of new homes (see Figure 16).

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[109] BlackRock Investment Institute (BII), Global Outlook 2023

[110] BlackRock Investment Institute (BII), Weekly Commentary 2023

[111] Fidelity Investments, Annual Outlook 2023

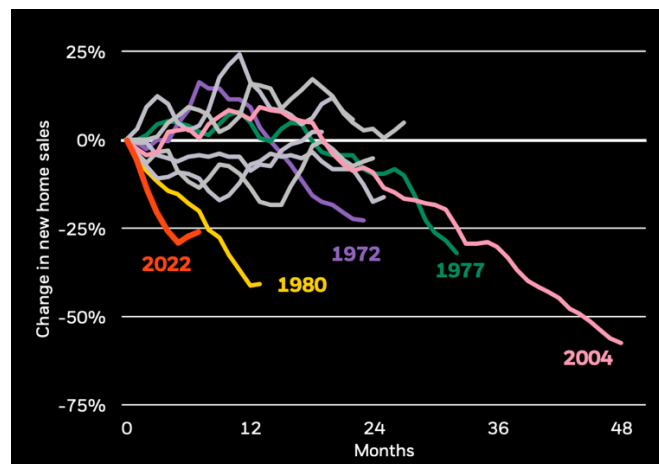**Figure 16: U.S. new home sales during policy rate tightening cycles, 1972-2022**

Figure 16: This Figure was taken over from BlackRock Investment Institute and U.S. Census Bureau, November 2022. It shows how quickly in months sales of new family houses changed during policy rate tightening cycles between 1972 and 2022. The colored lines highlight 2022 and the years when housing sales fell most quickly

The extent of economic damage hinges on the measures central banks take to reduce inflation. The market's perspective on equities will shift either when the damage is reflected in prices or when market risk sentiment undergoes a change. However, this shift should not be interpreted as a precursor to another prolonged bull market in stocks and bonds.

Additionally, according to BlackRock[112], the current macroeconomic regime prompts a reassessment of bonds. Higher yields present an opportunity for investors who have long been seeking income. Fortunately, investors don't need to venture far up the risk spectrum to access higher yields. Short-term government bonds and mortgage securities are considered favorable options in this context. High-grade credit is also preferred as it offers compensation for recession risks. Conversely, long-term government bonds will not fulfill their traditional role as portfolio diversifiers, primarily due to persistent inflation. Consequently, investors will demand higher returns to hold them, especially as central banks tighten monetary policy amidst record debt levels.

Lastly, as the world's largest investment management firm suggests[113], it is crucial to adapt to the new regime and accommodate high inflation. Factors such as aging workforces and other long-term drivers of the current regime will likely sustain inflation levels above those seen

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[112] BlackRock Investment Institute (BII), Global Outlook 2023
[113] BlackRock Investment Institute (BII), Global Outlook 2023

before the pandemic. Therefore, overweighting inflation-linked bonds may become key in investment strategies.

5.2 Short-Term Approach

BlackRock[114][115] advises adopting a risk-off approach in the current short-term portfolio construction, prioritizing income over equities and long-term bonds. To secure income, the recommended option is to invest in short-term government bonds. The significant rise in yields eliminates the necessity of assuming additional risk by seeking higher yields in longer-dated bonds. Notably, U.S. two-year Treasury yields have surged above 10-year yields (see Figure 17).

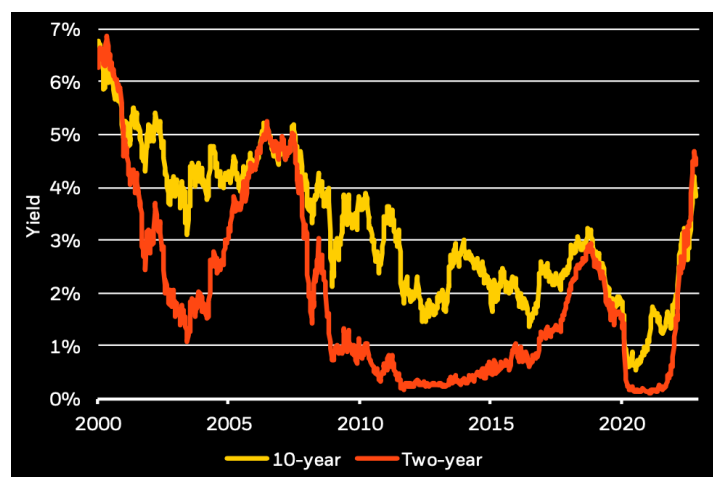**Figure 17: U.S. Treasury Yields, 2000-2022**

Figure 17: This Figure was taken over from BlackRock Investment Institute, November 2022. It shows the chart shows U.S. 10-year and two-year Treasury yields

Given the higher yields and robust balance sheets, investment-grade credit appears to be in a more favorable position than equities to withstand recessions. There are other attractive options as well. U.S. agency mortgage-backed securities (MBS) are favored for their higher income potential and the added credit protection stemming from the government's ownership of their issuers. Additionally, inflation-linked bonds are recommended due to expectations of persistent inflation. However, in the case of equities, analysts believe that corporate earnings expectations and valuations do not fully account for the impending recession. Despite identifying sectoral

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[114] BlackRock Investment Institute (BII), Global Outlook 2023
[115] BlackRock Investment Institute (BII), Weekly Commentary 2023

opportunities arising from structural transitions[116], the general suggestion is to maintain an overall underweight position in equities.

5.3 Long-Term Approach

The Great Moderation, characterized by relatively stable long-term portfolios, is no longer applicable in the current regime. According to BlackRock[117][118], agility and adaptability will be crucial. Analysts do not anticipate a return to conditions that would sustain a simultaneous bull market in both stocks and bonds, as witnessed in the previous decade. The composition of assets has always been significant, and BlackRock's analysis suggests that making the wrong asset mix choices, such as sticking with a 60/40 portfolio, could be up to four times more costly compared to the Great Moderation (see Figure 18). With zero or even positive correlation between stock and bond returns, achieving similar levels of return as before will require higher portfolio volatility.

Figure 18: Estimated Returns, New Regime vs Great Moderation
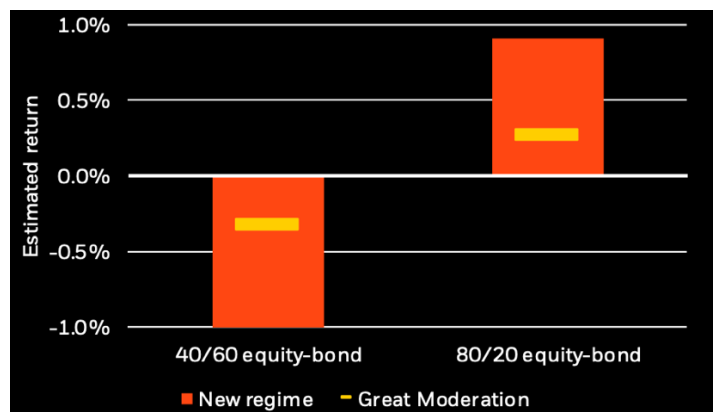

Figure 18: This Figure was taken over from BlackRock Investment Institute, November 2022. It shows the contrast between estimated average annual relative performance of two hypothetical portfolios against a 60/40 portfolio over the coming decade where we see a regime of higher macro and market volatility (orange) and estimated performance over the Great Moderation era (1990-2019) of stable growth and inflation (yellow).

Furthermore, BlackRock maintains a modest overweight position on developed market (DM) equities in their long-term views. This stance is driven by the expectation that stocks will generate higher returns compared to fixed-income assets over the next decade, and it allows for a more granular approach to capture the effects of structural trends on specific sectors. As

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[116] Such as healthcare amid aging populations
[117] BlackRock Investment Institute (BII), Global Outlook 2023
[118] BlackRock Investment Institute (BII), Weekly Commentary 2023

for the short-term, inflation-linked bonds and short-term maturities are considered favorable options. These choices aim to capitalize on income generation and mitigate interest rate risk.

Conclusions

According to the new macro-economic regime we are sliding in, investors should move away from broad allocations to public equities and bonds (the 60/40 portfolio), which used to work in the past when both assets trended up and bonds offset equity slides. Nowadays, sticky inflation and higher volatility have changed this relationship (see Figure 19).

Figure 19: Average U.S. Treasury return when equities fall, 2000-2023
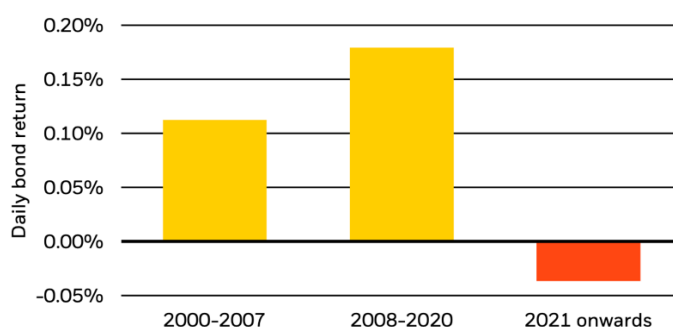

Figure 19: This Figure was taken over from BlackRock Investment Institute, April 2023. It shows the chart shows the average daily return of 10-year U.S. Treasuries on days when equity prices fall. The yellow bars show these daily returns for the period 2000-2007 and 2008-2020. The red bar shows 2021 and onwards.

To construct more resilient portfolios, it is crucial to adopt a more granular approach in both long-term and short-term views. This entails actively selecting companies that possess quality characteristics, such as stronger earnings and cash flow that can withstand a recession, resilient supply chains, strong market share, and the ability to pass on higher prices. Within the fixed income space, overweighting inflation-linked bonds is advisable considering the expectations of persistent inflation.

In summary, the new economic regime necessitates more frequent portfolio adjustments and encourages taking more granular views by focusing on specific sectors, regions, and sub-asset classes rather than broad exposures. The key to success lies in being more nimble, as relying solely on strategic allocations can prove to be costly.

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