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What are the Risks and Benefits of Alternative Assets?

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ABSTRACT

This paper explores the risks and benefits of alternative assets (private equity, hedge funds and cryptocurrency), and assesses whether they are worth investing in. The evaluation of the safety of the investments was done with the use of different measures of risk, such as maximum drawdown and standard deviation. I also calculated Sharpe ratio to compare different kinds of assets and correlation between them to understand how they would fit in a portfolio. The analysis shows that though cryptocurrencies (especially bitcoin) show very high returns, the risk of fall is too large to consider them as safe investments. Broadly speaking, the safest type of investment in alternative assets are hedge funds as their main goal is "to hedge risks". Private equity is much riskier than hedge funds, but its returns are more likely to be higher. Even with the safer investments, picking the right funds becomes crucial as performance of top-quartile funds and the others tend to differ significantly. Correlation is high between hedge funds, private equity and stocks, and low between bitcoin and other types of assets. In general, the market of alternative assets is very prospective and investors should consider them as possible diversifiers in their portfolios.

Introduction

Alternative assets are investments in non-traditional assets (not stocks or bonds). There are various types of alternative assets, such as real assets, crypto currency, real estate, hedge funds, private equity and others.

These days, alternative assets are gaining more popularity among investors, and PricewaterhouseCoopers (PwC 2018, p.3) suggests that these asset classes will continue to grow. It says that assets under management (AuM) for these assets will almost double from 2017 to 2025 if the interest rates remain relatively low globally and economic growth is sustained. They predict that AuM will expand from an estimated US$11.2tn in 2017 to US$21.1tn in 2025. Alternative assets are gaining popularity for several reasons. Investors are attracted to them because of a potential for diversification and excess returns. Also, in crypto currencies, one of the main drivers for investors is that they are often referenced in media, so even non-professionals are aware of their enormous growth in recent years. By investing in alternative assets, an investor can significantly increase his fortune. However, investments in alternative assets also come with significant risks. This includes the risk of an enormous loss or high volatility for cryptos. For private equity and hedge funds investments, the performance across funds can differ greatly and picking the right fund is a crucial, though tough, task for investors.

This work raises the question: "How reasonable is an investment in alternative assets?". This paper evaluates which type is the most effective based on the ratio of risk and profit. It observes three types of alternative assets–private equity, hedge funds and crypto currencies–and provides a description of their risks and benefits. The paper proceeds as follows.

Section 2 concludes that the safety of an investment in private equity funds depends on the quality of the fund. However, if the choice of fund turns out to be right, it can bring a solid profit to an investor. Section 3 observes hedge funds and infers that hedge funds might be the safest opportunity for a portfolio because their main task is to "hedge the risks". Even though profits are not always that high, they fully cope with the role of a diversifier. Section

4 shows that even though bitcoin may have been the most successful investment opportunity at its launch, it may turn out to be a bubble and lose a lot of money for its investors.

Section 5 partly confirms my theoretical conclusions by analyzing the data for the last decade. It compares the performance of alternative asset classes using different measures of risk and return. I measure the riskiness of an investment using both the standard deviation and maximum drawdown. I also compute the Sharpe ratio in order to evaluate the performance of alternative assets and stocks.

My analysis shows that bitcoin brings the biggest return to the investor but is too risky according to its maximum drawdown. On the contrary, hedge funds may have not those high returns, but are much safer regardless of the market conditions. Private equity brings insignificantly higher returns than hedge funds but is also riskier as its maximum drawdown is almost 4 times bigger than that of hedge funds. Correlation is high between hedge funds, private equity and stocks, and low between bitcoin and other types of assets. Also, there is a negative correlation between bitcoin's price and inflation, which casts doubt on the possibility of using it as a hedge against inflation.

Section 6 summarizes the analyzed information and draws the conclusion that alternative assets can play a significant role in an investor's portfolio and are likely to get even more important in the future.

Private equity funds

Private equity is an asset class that consists of equity securities and debt in operating companies that are not publicly traded on a stock exchange. There are two main ways in which investors can acquire equity in a company: venture capital and leveraged buyouts. Venture capital is a form of financing that is provided to new evolving firms. The main goal of venture funding is to get the highest possible return when the firm exits public markets through an IPO. Leveraged buyouts allow investors to take publicly traded firms into a private structure by purchasing a controlling interest. The motivation for initiating buyouts in most cases is increasing the profitability of the firm in order to later sell the firm shares at a gain (Chambers et al. 2018, p. 80-81).

The main benefit of private equity funds is that potential profits are very high and the potential losses are limited to the amount of money invested. Private equity funds can also benefit from the tax deductibility of interest payments. Since their investments are financed with leverage, private equity funds have to make regular interest payments on their borrowed money, which reduce their profits on paper but are deductible from taxes. The other advantage of private equity funds is that the managers have more direct control over how the company in which they invested is run (Ilmanen 2012, p. 142). That allows investors to be more confident about the safety of their investments.

It is crucial for the investor to pick a good fund, even though it is hard to evaluate its quality in advance. The efficiency of a private equity fund depends on the qualifications of the managers. Successful management teams often exhibit superior performance persistence. There is a significant distinction between average performance and top-quartile performance. Empirical evidence shows clearly that both performance dispersion and performance persistence are higher among PE funds than among other funds. Thus, being a top-quartile fund implies a large degree of outperformance, and being a top-quartile fund in the past makes outperformance in the future more likely (Ilmanen 2012, p. 102). That is why wisely choosing a fund to invest in is incomparably important, and, if the choice was right, a certain return is guaranteed.

Nevertheless, investing in private equity turns out to be very risky. The key feature of private equity is illiquidity. It means that investors may not be able to sell their existing investment immediately at an attractive price. They might instead have to agree on a low selling price or will be forced to wait for a long period of time in order to find a suitable buyer (Chambers et al. 2018, p. 80). Po These potentially unattractive exit values are one of the key reasons why private equity fund investments may provide diminished benefits. Other risks include leverage for buyout funds (which amplifies losses as well as gains) and the fundamental uncertainty of immature businesses for venture capital funds (Ilmanen 2012, p. 143).

Furthermore, if managers' decisions were successful and the fund performed well, the return would be diminished by the fund fees. Typically, the fees consist of a 2% management fee and a 20% incentive fee, which is quite

a lot considering that managers usually lose nothing in case of failure. Some private equity funds are notorious for charging myriads other fees, including fees from transactions such as deal fees and ongoing fees such as advisory and directorship fees (Chambers et al. 2018, p. 86-87).

Another problem with private equity investments is the capital call risk. When investing, the investor is required to commit to a specific level of total investment, called the commitment. The commitment needs to be fulfilled through a series of payments by the investor to the fund. These payments are made in response to capital calls–demand by the fund for the investor to deliver cash in order to satisfy commitments. The total potential size of capital calls is specified before investing in a fund. However, the timing of the calls and whether all of the capital allowed to be called will actually be called are uncertain. During the financial crisis, many institutional investors experienced the financial pain of having to meet new capital calls (Chambers et al. 2018, p. 85).

One way to decrease the risks of a private equity investment is diversification. The range of sectors that private equity funds can invest in should be as wide as possible. For example, diversification helped investors succeed during the huge market downfall at the beginning of the Covid-19 pandemic, posting their second highest rolling one-year rate of return in a decade (PitchBook 2021, p. 8). The reason for such impressive results is that, although some sectors were decimated by the pandemic (particularly consumer and energy), others such as IT and business services thrived, helping sponsors ameliorate portfolio performance.

To conclude, although private equity investing contains some risk, it can bring significant profit to the investors if it is done wisely. Private equity offers a potential source of returns to investors with a tolerance for illiquidity and the ability to access funds with attractive prospects. Investment in private equity is an important and perhaps necessary part of achieving the highest possible combination of risk and return.

Hedge funds

A hedge fund is a pooled investment fund that trades in relatively liquid assets and can make extensive use of more complex trading, portfolio construction and risk management techniques in an attempt to improve performance. Their main feature is that they are trying to make money by "hedging the risks"–they use various strategies to outperform the market and to guarantee the safety of the investments (Ilmanen 2012, p. 123). This comes at a certain cost; unlike private equity funds, hedge funds' work is secretive, investors usually are not able to control the money they invested, and they face certain hardships when trying to take money from the fund. Furthermore, there is a high minimum investment required to access the fund, which does not allow ordinary people to invest in hedge funds. This distinguishes hedge funds from other investments like, for example, stocks, bonds or bitcoin. There are four major types of hedge funds: 1) macro and managed, 2) event driven, 3) relative value and 4) equity funds. All of these types use different strategies and have differences in their behavior in the markets (Chambers et al. 2018, p. 28-29).

Macro and managed funds are similar in the sense that they invest at the "big picture" level. Macro funds' managers analyze market conditions to anticipate global money flows which may cause large directional market moves and trade according to their analysis. One of their common trades is to short a currency they think is overvalued, earning money on its devaluation. They are trying to increase potential gains and reduce potential risk as much as possible. However, macro hedge funds tend to be risky for the investors as they trade in a discretionary way, making it nearly impossible to predict what the positions of a given hedge fund may be (Chambers et al. 2018, p. 30-31).

Managed funds are trying to accomplish almost the same: they aim to foresee global money flows. However, instead of managerial opinion, they tend to use technical analysis. They make decisions based on "black box trading systems" that use computer analysis based on historical data to predict the behavior of the markets. The greatest risk to managed funds is that markets will somehow change their behavior in comparison to the past. There is also the risk that other funds use similar analytic systems, which can distort market prices. Lastly, there can always be mistakes in the code itself. Despite all the risks, both macro and managed hedge funds tend to be more efficient during crisis markets, and, because of that, they are considered a great fit to reduce the total risk in a portfolio (Chambers et al. 2018, p. 29-31).

Event-driven hedge funds aim to earn money by trading assets which are about to undergo major changes. These funds may focus on mergers, spinoffs, distressed debt situations, or other changes in the equity or debt composition of a firm. They profit when these changes happen as they anticipated. Obviously, the main risk of event-driven investing is that prospective events may not happen. If so, the trades can become highly ineffective and the invested capital will diminish significantly (Chambers et al. 2018, p. 31-33). Another major problem is that event-driven funds tend to benefit when there are massive fluctuations in the markets, but, in recent years (except for the beginning of the Covid-19 pandemic), markets are steadily rising without much volatility, causing event-driven funds' performances to look less impressive. However, they are a great tool for increasing the diversification of a portfolio. By allowing a fund manager to invest across the full event-driven space, an investor is likely to receive reduced volatility of returns and a more consistent level of activity across the business cycle.

Relative-value hedge funds focus on trading on the convergence in prices of highly correlated securities. A common strategy for them is to initiate a long and short position for a pair of similar assets. They can buy and sell different but highly correlated securities at the same time with almost no risk. This strategy is based on the assumption that prices of these assets will move towards their historical average. So, if one of the pair of similar assets is trading below its historical average level and the other one above it, these two assets will be considered as the long and short candidates respectively. Similar to event-driven funds, relative-value funds can make money slowly and lose money quickly. That happens because relative value funds can experience extreme losses during times of market turbulence (Chambers et al. 2018, p. 33-35).

Losses can be especially severe during a crisis. A market downfall results in diminishing investor's capital. If the investor is using leverage and the amount of money falls below the broker's required amount, the broker will demand that the investor deposits additional money or securities into the account so that it is brought up to the required amount. In such a situation, called a margin call, the investor can use his own money to satisfy the broker's demand. But if he doesn't do it, the broker will start closing his positions so that losses will not exceed the amount of the initial deposit, which will cause markets to keep falling. The broker does this so he will not have to cover this difference at his own expense. However, absent crisis market conditions, relative-value funds can post solid profits with quite low volatility (Chambers et al. 2018, p. 33-35).

Equity hedge funds focus on the evaluation of equities. If managers think the stocks are overvalued, they take short positions; when they think the stocks are undervalued, they take long positions. The main difference between different kinds of equity hedge funds is their amount of net market exposure. Long-short funds are typically net long, market-neutral funds that are generally fully hedged against market moves. Short-selling funds are generally net short (or only short) and thus perform relatively well in declining stock markets. When evaluating long-short equity funds, investors should inquire about the manager's process and demonstrated skill on both net long and short security selections, because the process of working with them is very different. Long positions can be held for very long periods of time and the potential gain can be much larger than the potential losses, which are limited to a 100% loss. Short positions are the opposite. The maximum possible gain are the proceeds of the short sales or 100% of the current stock price; potential losses, in contrast, are unlimited (Chambers et al. 2018, p. 36-37).

To conclude, although there are a great number of hedge fund strategies, they can each be highly efficient in different market conditions. In order to get the best results, an investor may consider adding different types of hedge funds to his portfolio to diversify risks and make a positive balance almost guaranteed.

Crypto currencies

Crypto currencies are the fastest evolving type of alternative assets. The first and also the most popular crypto currency is bitcoin. First established in 2009, bitcoin has risen in 9 of the 11 calendar years since it has had traded prices, and it has posted triple-digit or greater returns in 6 of those years. These high returns make bitcoin the best-performing investment of the past decade and, to this point, arguably the best-performing publicly available investment opportunity of all time over a decade-long period (Hougan & Lawant 2021, p.22).

Even though crypto remains at the early stage of the adoption cycle, interest in it from credible investors is rising. Some institutional investors argue that crypto is here to stay. They consider crypto currencies a way to hedge against inflation and currency debasement and a way to diversify portfolios. For example, during the beginning of the Covid-19 pandemic, asset prices fell across a wide range of asset classes, but bitcoin prices kept rising. "The world has voted that they believe" is how Michael Novogratz, Co-founder and CEO of Galaxy Digital Holdings, answers the question about the reliability of investments in crypto (Goldman Sachs 2021, p. 3).

It is easiest to observe the main tendencies of crypto currency through bitcoin, which has been around the longest even though its sample period is still short compared to other asset classes. The reason why bitcoin is considered a good investment as a part of a portfolio is that it has low correlations with traditional assets. Bitcoin remains an early-stage investment opportunity and the core drivers of bitcoin's value are distinct from the core drivers of other assets. Unlike them, bitcoin is mainly driven by market adoption, network security, liquidity, inflation risks, supply changes, regulatory developments and technological developments. Some experts predict that its use as a hedge against inflation will lead to an increase of its correlation with the assets which play a similar role in a portfolio, such as gold. However, since bitcoin prices have many diverse drivers, it is questionable if its role as an inflation hedge will increase its correlation with other assets significantly. (Hougan & Lawant 2021, p. 23-24).

Nevertheless, there is no doubt that bitcoin is an incredibly risky investment. The most obvious risk is that bitcoin lacks the backing of any major central bank and is not secure as a result. In most countries bitcoin is not a legal tender, so retailers can't be forced to accept it. It's not a scalable means of payment; the Bitcoin network can only complete seven transactions per second, versus the Visa network that can conduct 65,000. It's not a stable store of value for goods and services because a downfall in its price can wipe out any profit margin overnight, which will significantly harm the venders. Bitcoin and other crypto currencies have no income or utility, so there's just no way to arrive at a fundamental value. That is why it seems an unreliable investment to some (Goldman Sachs 2021, p. 8).
Moreover, the volatility of bitcoin is higher than that of many other assets. A major pullback occurred after bitcoin hit its (at that moment) highest daily closing price of $19,396 on 16 December 2017. From that point, the price of bitcoin retreated rapidly until bottoming on 14 December 2018, when it traded for $3,177, an 84% drop (Houghan & Lawant 2021, p. 22). There were also other huge drops: the most recent happened in May 2021. Even though we know some factors that affect its price, literally no one can foresee its behavior in the future. The reason why its price rose so high and also why it is so volatile is the enthusiasm of newer crypto investors, who tend to drive values up. People who are responsible for such volatility include younger, less-experienced and less-educated investors who are not used to the tendencies of the market and, as a result, make crypto currency pricing sentiment-driven. Apparent simplicity and accessibility of investments inflates the price of "popular" assets, increasing their risk of becoming bubbles (Chicago Booth Review, 2021).

Bitcoin also faces political risks. Since it is not attached to a central bank and cannot be controlled by any government, it can pose a threat to the economy and security of a country. Governments may therefore consider limiting the use of bitcoin within their jurisdiction. Since it is impossible to trace bitcoin transactions, it can be used by criminals to hide their illegal trade deals. Also, as was said by Ray Dalio, Bridgewater Associates founder, "[bitcoin's] own biggest risk is its success, because … no government wants to have an alternative currency" (The Wall Street Journal, 2021). Thus, there are various reasons why it may be banned (as was done in China recently), and that prospect is a large menace to its stability.

To conclude, even though bitcoin has been performing exceptionally well for the past decade, a huge downfall in its price is likely to happen. As Nouriel Roubini, a professor of economics at New York University's Stern School of Business, said, "A bubble occurs when the price of something is way above its fundamental value. But we can't even determine the fundamental value of these crypto currencies, and yet their prices have run up dramatically" (Goldman Sachs 2021, p. 8).

Data Analysis

Methods

This section conducts a statistical analysis to contrast the risks and benefits of the different asset classes discussed above. Using data on the average IRR (internal rate of return) for each of the assets over the past decade, I calculate the mean IRR, the standard deviation, and the Sharpe ratio for each of the assets.

The IRR is the rate of return, R, that equates the left and right sides of the following equation:

$$0 = CF_0 + [CF_1/(1 + R)] + [CF_2/(1 + R)^2] + \ldots + [CF_n/(1 + R)^n] \quad (1)$$

The IRR may be viewed as the rate, R, that equates the present value of an investment's future cash inflows (the right-hand side after CF_0) to its cost (CF_0, a negative number) (Chambers et al. 2018, p. 76).

To measure the risk of an investment, I compute the standard deviation. It is used to see how stable an asset was during the sample period and to estimate the probability of large fluctuations in future. Standard deviation has the following formula:

$$\sigma = \sqrt{\sum_t (R_t - \bar{R})^2/(n-1)}, \quad (2)$$

where σ is standard deviation, R_t is a value from given sample, $\bar{R}$ is a mean value and n is the sample size. Standard deviation here is the square root of the variance, which is the average squared deviation from the sample mean. For example, if there is no variation in the data, all values equal the sample average, and the standard deviation is zero.

The Sharpe ratio is one of the most popular measures of an asset's risk-return trade-off in traditional investments. The Sharpe ratio measures the expected excess return of an asset per unit of volatility (standard deviation of returns). Its formula is:

$$\frac{E(R) - Rf}{\sigma}, \quad (3)$$

where E(R) is the expected return (or alternatively, the mean realized return) of the asset, Rf is the riskless return or rate of interest, and σ is the volatility of the returns of the asset (Chambers et al. 2018, p. 143). The Sharpe ratio is a great tool for an investor in case he wants to estimate the risk of his investment. However, the Sharpe ratio does not consider the role of an asset as a diversifier in a portfolio. Moreover, it doesn't make distinctions between movements up and down when measuring risk, it just uses the standard deviation concept. So, even though the Sharpe ratio is a convenient tool, investors should also consider other factors while making their decisions. However, this paper focuses on using the Sharpe ratio to evaluate the previously discussed theoretical conclusions.

Maximum drawdown (MDD) is a specific measure of drawdown that looks for the greatest movement from a high point to a low point before a new peak is achieved. Its advantage in comparison to other risk measures is that it helps to estimate how much money an investor can possibly lose. Also, it is an important addition to the measurement of an asset's volatility and Sharpe ratio, which doesn't consider whether deviations occur to the upside or the down-side. MDD's formula is:

$$MDD = \frac{Through\ value - Peak\ value}{Peak\ value} \quad (4)$$

where the through value is an asset's price at the low point and the peak value is its price at the high point.

It may be useful to know the correlation between assets because it can show how well these assets would fit in a portfolio. The goal of portfolios is to diversify risks, so correlation can be applied as a measure of diversification (the lower the correlation between assets the higher is the diversification of the portfolio). The formula for correlation is:

$$\rho_{xy} = \frac{cov(x,y)}{\sigma_x * \sigma_y}, \quad (5)$$

where ρ_{xy} is the correlation between assets x and y, σ_x is standard deviation of asset x, σ_y is standard deviation of asset y and cov(x,y) is their covariance. The covariance can be calculated using the following formula:

$\text{cov}(x,y) = \sqrt{\sum_t (x_t - \bar{x})(y_t - \bar{y})/(n-1)}$
(6)

where x_t and y_t are values from given sample, $\bar{x}$ and $\bar{y}$ are mean values and n is the sample size.

Results

This paper considers private equity funds, hedge funds and crypto currency as examples of alternative investments. I compare their performance to the S&P 500 index as a measure of stock market behavior and to US Treasury Securities as an example of a safe investment. All data belongs to time period from October 2011 until September 2021 and is at a monthly frequency.

Bitcoin and S&P 500 historical data were provided by Investing.com. I use the S&P index of publicly listed private equity companies as an index for private equity. This index approximates the performance of the private equity industry by looking at the returns of those private equity companies that are themselves listed on stock market indices. 1y rate and inflation data is from FRED (Federal Reserve Economic Database) and Hedge Funds' data is by hfr.com. Table 1 shows the mean, volatility (standard deviation) and Sharpe ratio for the different assets. All calculations are based on monthly rates of return.

Table 1: Performance measures across asset classes

	HF	Bitcoin	PE	S&P 500	1y rate
Mean	0.5%	13.4%	0.9%	1.2%	0.7%
Volatility	1.5%	50.9%	4.8%	3.8%	0.8%
Sharpe Ratio	-0.16	0.25	0.03	0.12	-

From these results, we can see that bitcoin has both the highest Sharpe ratio and the highest mean return. This is because it has been evolving extremely strongly over the last decade. However, the high returns go hand in hand with very high volatility, which is also the highest of the five assets studied here. Furthermore, the high Sharpe ratio may be an indication of potentially large downfalls in the future.

Hedge funds tend to have the lowest volatility, which is logical, because one of their main purposes is to hedge the risks. However, they have a negative Sharpe ratio, which can be partly explained by the hardships they had after 2008 financial crisis. Private equity funds have higher mean IRR and Sharpe ratio than hedge funds, but their performance does not seem impressive either. This may be caused by the difference in the quality of the funds, because not all the funds are successful enough to show stable good results on a long-term scale. If we had access to data on only the top quartile, the results would have differed significantly.

If we compare the results of alternative assets to those of S&P 500, we can see that the only alternative asset that outperforms stocks is bitcoin, but the volatility of the S&P 500 is incomparably lower. Hedge funds have much smaller mean IRR and slightly lower volatility, while private equity funds have even greater volatility than that of S&P 500. From this comparison, it is obvious that investing in stocks can be more profitable than investing in average hedge or private equity funds. It seems to me that, at the moment, alternative assets are not yet ready to compete with stocks in terms of both profit and safety.

Even though the results of alternative assets do not look that impressive, they can be used as diversifiers in a portfolio. For example, during the Covid-19 pandemic, when a great number of investors lost their money, those who invested in hedge funds and crypto currency saved. So, when investing, every investor should consider the opportunities presented by alternative investing.

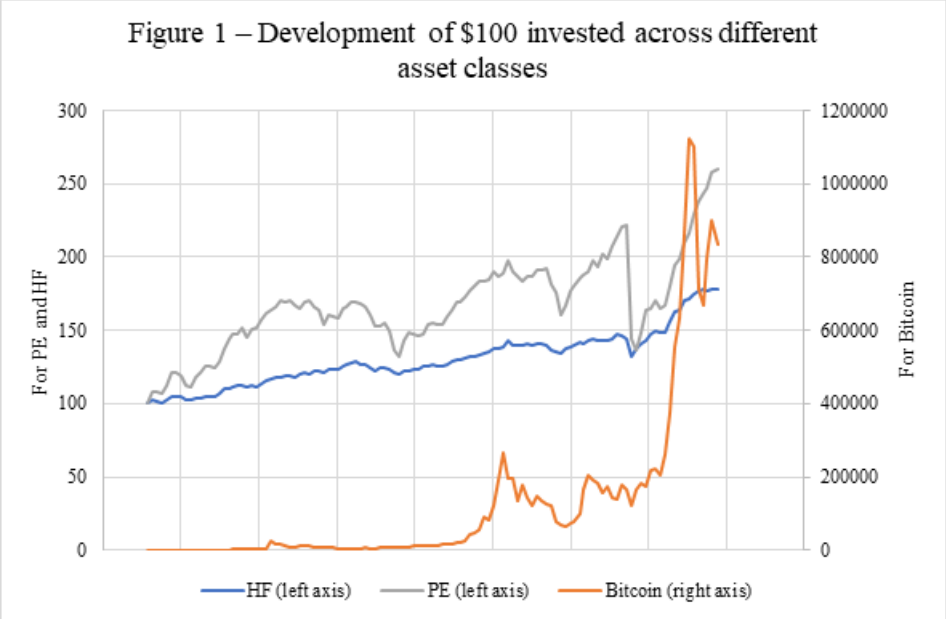

Figure 1 shows that a 100$ investment in each of the assets in September 2011 would result in 178$ for hedge funds, 836,770$ for bitcoin, 259.65$ for private equity funds by September 2021. It is obvious that bitcoin outperforms other assets, even though both hedge and private equity funds tend to show a solid profit. The fact that private equity funds gain more profit can be connected not only with higher risks in that field, but also with constant growth of the market, which harms certain types of hedge funds. Also, it is important to mention that there is a huge gap between successful and unsuccessful funds, so the data is not always representative.

It is also important to emphasize that bitcoin has had large fluctuations over the analyzed period of time. So, for example, if you invested 100$ in March 2021 in each of the assets, the profit for bitcoin would be negative (approximately -25$), unlike for hedge funds (+4$) and private equity (+20$).

Next, I measure correlation and MDD for these types of assets.

Table 2: Correlation across asset classes

Correlation	HF	Bitcoin	PE	S&P 500	1y rate	Inflation
HF	1					
Bitcoin	0,16	1				
PE	0,76	0,11	1			
S&P 500	0,83	0,13	0,59	1		
1y rate	-0,14	-0,10	-0,07	-0,11	1	
Inflation	-0,05	-0,08	0,11	0,00	0,13	1

From the correlation measurements, we can draw the conclusion that bitcoin may not be a good opportunity to hedge the inflation risk. The weakly negative correlation between bitcoin and inflation means that when inflation increases, bitcoin tends to decrease, making investments in it as a hedge useless. However, its coefficient of correlation isn't very low, and there is still not enough data to be sure in the safety of this investment. Due to theoretical reasons discussed above, it may still be a hedge opportunity during a period of high inflation. Also, we can see that bitcoin's correlation with other assets is one of the lowest. The other asset with low correlation is the US security bond (1y rate), which can be explained by its relatively stable performance regardless of market conditions. Hedge funds, private equity and stocks are highly correlated with each other.

Table 3: Maximum drawdown of each of the asset classes

Asset	Maximum drawdown
HF	-10.53%

Bitcoin	-89.29%
PE	-39.96%
S&P 500	-21.02%
1y rate	-2.58%

Table 3 shows the results for maximum drawdown across asset classes. The results indicate that bitcoin is way too risky an investment opportunity, which is not completely captured by the standard deviation as a risk measure. Even though it demonstrates very high returns, an 89.29% drawdown should dissuade most institutional investors from it. In contrast, hedge fund investment turns out to be one of the safest (it even outperforms stocks). Hedge funds seem to be good at hedging risks (as they should), which makes them a great portfolio opportunity. Private equity is considerably riskier than hedge funds. The 1y rate has unsurprisingly low MDD considering it is generally thought of as a safe investment. The S&P 500 index, which represents stocks' behavior, turns out to be a good benchmark for risky assets.

There are certain data limitations we need to consider when interpreting the results. For example, the sample for bitcoin is too short to make long-term conclusions. Its usage as a hedge is questionable because we have not experienced large inflation since its launch. Also, there is nothing to indicate that it will continue its rapid growth in the future, so at the moment its behavior is unpredictable. These limitations apply to other types of assets as well. The decade after the financial crisis of 2008 was relatively quiet, and all the markets (except a few months in the beginning of the Covid-19 pandemic) were steadily growing. This harms private equity and especially hedge funds, certain types of which make money from market fluctuations.

To conclude, from the analysis we can see that hedge funds offer a stable, if relatively small, profit. The risks there are also small and because of hedging, which makes them safe even during crisis. An investment in hedge funds would be a great diversifier for a portfolio. Private equity is a bit riskier, but the profits there are also higher, so it should be taken into consideration when deciding where to invest. Bitcoin is significantly riskier than others, and there are no guarantees at all, but the data shows that it has been the most profitable asset for the past decade by a wide margin.

Conclusion

This paper evaluates private equity, hedge funds and crypto currencies, analyzes their behavior during the past decade, and compares them to the US one-year government bond yield and S&P 500 index.

The results show that bitcoin rose significantly in the last decade. An investor who invested in it in October 2011 would have made an 836,770% profit. It also has low correlation with the conditions of the market, and the drivers which define its price are different from those of other assets. Private equity in general has a larger return rate than hedge funds, but hedge funds remain the most stable asset of those three.

My research has shown that there is space to develop the market for alternative assets. Hedge and private equity funds are yet not as stable as we want them to be, but they may benefit from the development of computer science, which will allow them to predict future market behavior more precisely. Furthermore, the behavior of alternative assets such as bitcoin will probably become clearer in the future and more predictable for professional investors. This will be possible when they see how these assets adapt to the modern market and experience crises and market drawdowns. Then, we will get a better understanding of certain tendencies shown by these types of assets, and investors can make better decisions since there will be more information available in the future. It is hard to predict how the economies will develop in the next ten, twenty, or one hundred years, but it is clear that alternative assets will play a more important role than they do at the moment. However, even now they have become increasingly important and can benefit an investor's portfolio depending on his needs.

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