

MIMS – Diversified Passive Selection Fund

Portfolio Management Team

Report – May 2022

Fund description

The Passive Fund is composed by a number of Exchange Traded Funds selected by Minerva Investment Management Society, reflecting the output of the research of the Passive Portfolio Team. These ETFs aim to replicate as closely as possible the performance of a basket of securities with specific common properties, thus being effective instruments for investors who wish to express a certain view on industry sectors or economic trends while capturing as little idiosyncratic risk as possible. Each ETF was carefully chosen in line with the macroeconomic outlook. Our allocation is based on a diversification process achieved among geographies, asset classes and sectors.



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Allocation Breakdown

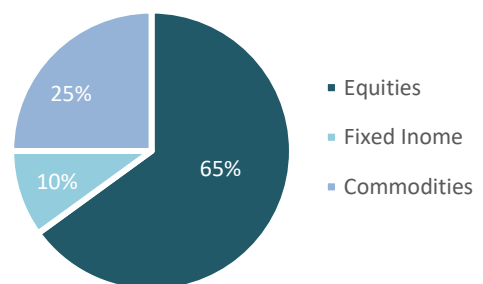
Asset Allocation

In line with the trend of the previous semesters, we have further shifted our portfolio from fixed income (10%) to equity (65%) and commodities (25%). In fact, during Q1 we experienced the greatest drawdown on record for bonds, mainly as a result of spiking inflation (at the highest level recorded in 40 years) and central banks' monetary tightening programmes. Commodities have enjoyed a booming Q1 due to geopolitical tensions and supply chain bottlenecks. Thus, we are confident that overweighting this asset class will provide potential upsides and an optimal hedge in the worst-case scenarios of an escalation of the conflict or an inflation spiral.

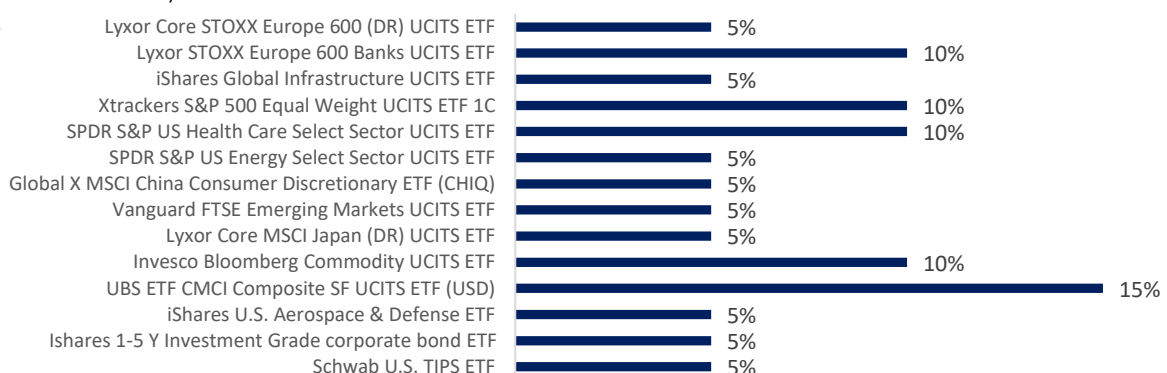
Geographical Allocation

Europe exposure has been slightly decreased due to the Russia-Ukraine conflict, which is already hurting EU economic growth with higher commodities prices and discussions about further economic sanctions to be imposed to Russia. Both EU and US exposure are skewed towards defensive and hedging sectors given the high volatility levels and uncertainty the markets are experiencing. As for EM, we underweight both China and Japan mainly because lockdowns and controversial monetary policy are worrying markets, however, we see some potential in these areas and include them to further diversify the portfolio. We are positive on other global EM because of their geopolitical neutrality and the reliance on commodities (i.e. Brasil).

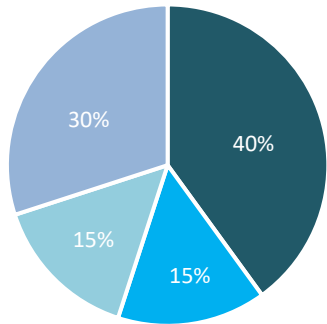
Asset Allocation



ETFs Breakdown

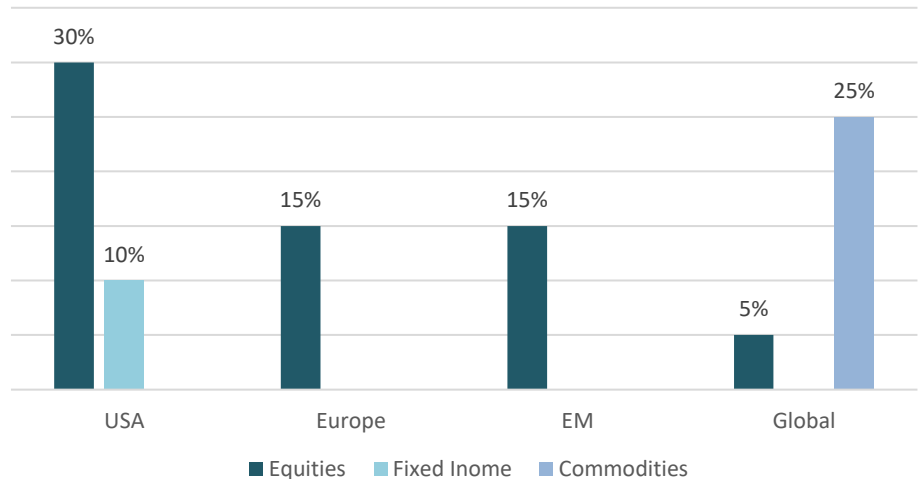


Geographical Allocation



■ USA ■ Europe ■ EM ■ Global

Allocation Breakdown

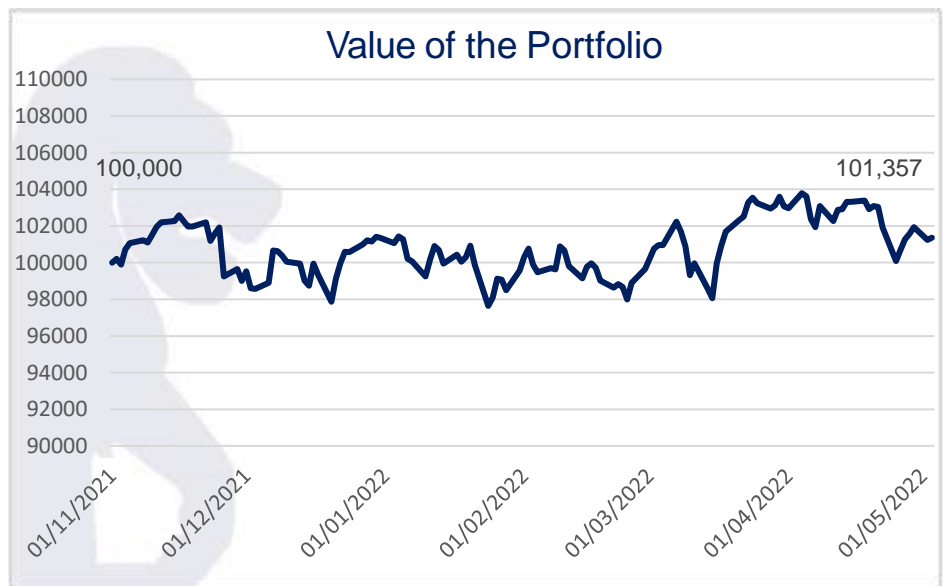


■ Equities ■ Fixed Income ■ Commodities

Performance

Period Return	1.36%
01/11/2021 - 03/05/2022	

Daily Expected Return	0.01%
Daily Volatility	0.73%
Annualized Expected Return	3.27%
Annualized Volatility	11.59%
Maximum drawdown	-4.82%



In order to evaluate the performance of our investments, we track the daily value of the portfolio over a period of time stretching from November 2021 to May 2022. At the beginning of the observed period (01/11/2021), we assume an initial investment of €100,000 and calculate the number of shares of each ETF that will be bought and held in portfolio, according to the weights chosen during the asset allocation process. Keeping track of the funds' prices, we can easily determine the value of the portfolio until the end of the period (03/05/2022). We record a final value of €101,357, with an overall return of approximately 1.36% in 6 months. Going into the details, we observe that most of the growth was driven by the commodities ETFs with the agricultural one returning an astonishing 37.5%, while within the equity component only the Fidelity Quality ETF has performed well returning 6.4% in 6 months. Specifically, the war in Ukraine has had a huge impact on commodities and the extreme inflation readings led to a small loss on the bond component of the portfolio which we anticipated. Also, the thematic ETFs on videogames and water delivered a negative performance but our outlook on both remain significantly positive for the next few years.

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Portfolio Macro-Overview

Our portfolio can be ideally divided in 3 main sections:

- “equity indexes ETFs”
- “fixed income ETFs”
- “commodities (hedging) ETFs”

Equity Indexes ETFs

The first section is the “backbone” of the portfolio. It represents 65% of the total allocation, split across 10 ETFs covering 3 different geographic areas: USA, Europe and Emerging Markets aside from global exposed funds. Equities remain the main driver of the portfolio's overall performance, as we are confident that slowing growth does not mean a recession and strong signals from the economy are still coming out frequently (i.e. tight labour market, core CPI growing at a lower-than-expected rate in April). Although the overall outlook for equity markets is not a bullish one, there are a number of sectors and trends that could provide some interesting upsides. As for EU markets, we believe that one of the sectors that could outperform is the FIGs. With inflation this high, the ECB has already announced the conclusion of the PEPP and the reduction in the purchases within the APP which is likely to end in Q3. Recently, Luis de Guindos, ECB vice-president, said that the central bank's first interest rate hike since 2011 could come as soon as July. This scenario is favourable for financial institutions and especially banks, that enjoy higher rates for their interest rate margins. Moving to US and international equities, we are overweighting sectors that can assure stable cashflows and defensive performances. Commodities, energy and infrastructure companies are cash-flow machines: in 2022 they are generating more FCFs than any other time in history. Healthcare and pharmaceutical segments are traditionally resilient to periods of slower growth or risk-off. The traditional exposure to the broad US market has been calibrated in a way that offers good exposure to the previously mentioned sectors while reducing the vulnerability of the tech (and long-duration) sector with an equally weighted fund. Emerging Markets stocks are our bet for this semester. Although being in a strict lockdown, we believe Chinese stocks can still have some upside, given that the government is implementing monetary accommodative measures to support the economy and the indexes are relatively cheap. Japanese policy-makers are still buying bonds to control the yield-curve, the Japanese Yen is very weak at the moment and

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inflation is very low, hence we see a possible entry point also there. Our thematic ETF for this semester exploits the global movement towards rebuilding inventories of Aerospace and Defensive machineries due to the recent tensions.

Fixed Income ETFs

Fixed income role in a portfolio is to lower volatility, and to contribute, although to a small extent to the performance of the portfolio. However, this year the overall sentiment is a bearish one for fixed income. This asset class has recorder the worst quarter in its history, with the Bloomberg Global Aggregate Bond Index experiencing a maximum drawdown of 6.2% YTD. Our exposure is limited to the US since rate hikes by the FED are pretty much priced-in (the market expects the FED fund rate at 2.5-3% at the end of 2022), and the tensions for the conflict are less relevant. In our view, EU bonds can suffer from surprises by the ECB and from the fact that inflation has not peaked, like it seems it has in the US, with core inflation slowing the pace in April. Inflation and rate hikes are natural enemies of Fixed Income investments. Therefore, we stick with the choices we have made in the previous semester by being exposed to low duration bonds and inflation-protected securities.

Commodities (Hedging) ETFs

Originally placed as the hedge component of the portfolio, commodities have also contributed to offer extremely good returns in the previous months. For this performance we identify several drivers. Firstly, the supply chain shortages that the Covid-induced lockdowns have triggered. In recent weeks, we have seen this shortages easing slowly, but Chinese renewed lockdowns are scaring market participants, with ships queuing up outside of Shanghai. The second driver is surely the Russia-Ukraine conflict: in the past 2 months we have experienced record highs and persistent volatility for oil, gas, coal, precious metals and wheat. Inflation has also contributed to the overperformance of food and energy commodities. Given this outlook, although our exposure to this sector is unusually high, we believe this could be an optimal hedging component in the case of escalating tensions in Europe or inflation surprising to the upside again. We don't see particular downsides since economic sanctions will stay active in the medium term and the levels of high inflation encourage investors to seek protection within commodities. We are neutral to the different types of commodities; hence we are exposed to agricultural, metals and energy.

Xtrackers S&P 500 Equal Weight UCITS ETF 1C

Index: S&P 500 Equal Weight Index (EWI)

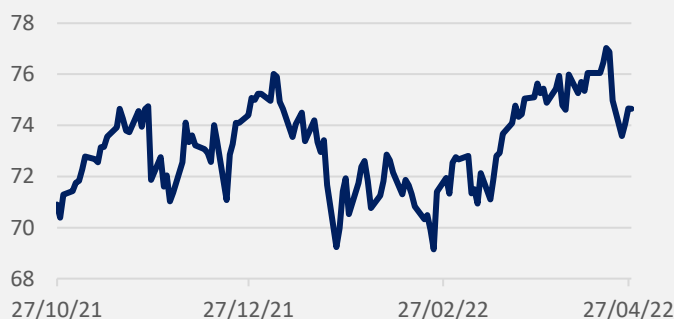
Expense Ratio: 0.25% Tracking Error Volatility: 0.03%

Overview

This ETF mimics the performance of the S&P500 Equal Weight Index. This means that it follows the American market, but the weight of each stock is the same and therefore the influence of each sector does not depend on its relative market cap but on the number of stocks that belongs to it.

Analysis

This ETF provides exposure to the US market while limiting the exposure to those sectors that are prevailing in the normal S&P 500 index, especially tech, which is more fragile in an environment of still increasing interest rates. The main sectors to which the ETF is exposed are IT, Industrials, Financials, Health Care and Consumer Discretionary (all around 10-15%). However, despite the “smoothing” effect and lowering of P/E multiple of the fund provided by the equal weighting process, we decided anyway to keep the weight at 10% in order to focus our investments in two sectors that appear very promising to us: Health Care and Energy.



Conclusion

The ETF has returned 17.00% in the last 12 months, which is a return in line with the relative-market-cap weighted S&P 500 index. Given the significant risks and uncertainty we are currently facing, we prefer this index to its most famous counterpart because we believe it to be more defensive and less exposed to growth stocks. Given the current war and the expected future interest rate hikes, a lower exposure to growth stocks seems both prudent and reasonable.

SPDR S&P US Health Care Select Sector UCITS ETF

Index: S&P Health Care Select Sector 25/20 Index

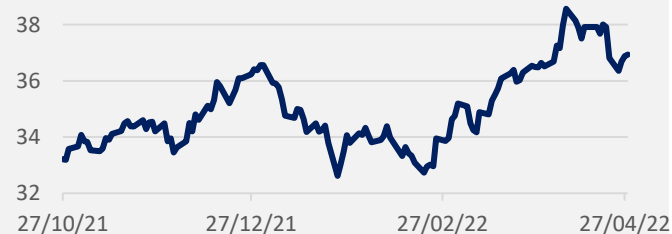
Expense Ratio: 0.15% Tracking Error Volatility: 0.05%

Overview

This ETF is exposed to the stocks belonging to the US Health Care sector. It tracks the performance of the S&P Health Care Select Sector Daily Capped 25/20 Index, where the 25/20 cap on the stocks is present to ensure diversification.

Analysis

We chose this ETF for a number of reasons. Firstly, the pandemic has shown what an important role Pharmaceutical and Health Care companies play for the economy, and we want to be positioned to capture this effect in the future. Secondly, this ETF is very well-diversified across the range of products and services of this sector, as it contains stocks belonging to the Pharmaceutical, Medical equipment, Medical services and Biotech fields, all in one index. This ensures that we can have exposure to more solid industries but also that we are able to capture the possible upside coming from a high risk – high reward sector like biotech. Lastly, the Health Care sector has usually been stable and resilient, a characteristic which is desirable in turbulent times like these.



Conclusion

The ETF has returned 17.05% in the last 12 months. The view on the sector and on this ETF remains bullish, supported by higher demand for medical goods and services given the need to prolong the Covid vaccination campaign for specific individuals and the greater attention on the importance of medical research and the Health Care sector. Finally, considering the solidity of many of the businesses populating the index, including it in our portfolio will also strengthen its resilience and stability should volatility increase again due to future sudden shocks.

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SPDR S&P US Energy Select Sector UCITS ETF

Index: S&P Energy Select Sector Daily Capped 25/20 Index

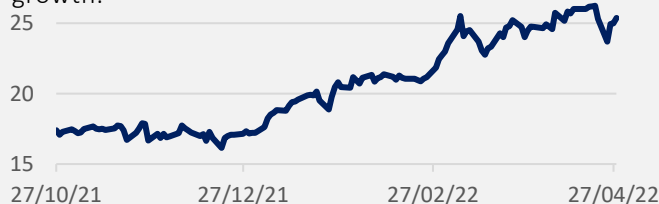
Expense Ratio: 0.15% Tracking Error Volatility: 0.48%

Overview

This ETF invests in the stocks belonging to the US Energy sector. It tracks the performance of the S&P Energy Select Sector Daily Capped 25/20 Index, with a 25/20 capping mechanism on the stocks to ensure diversification.

Analysis

This ETF is heavily exposed to Oil, Gas and fuels producers. Despite the progressive transition towards clean energy and the relevance of ESG, we decided to include this ETF in our portfolio because of the current fuel shortages we are witnessing around the globe due to the war and other geopolitical tensions. It is unlikely that the most relevant economies will be able to make up for their lack of fossil fuels with clean energy and investments in sustainable energy plants in the short term. Therefore, we wanted exposure to this trend and some hedge in case the shortages get even worse in the future because of a worsening of the current conflicts. Moreover, the P/E of the ETF is attractively low (around 12), provided the terrific FCF of the sector fueled by the high oil price. Lastly, the dividend yield at 3.27% is appreciated under the current uncertainty, especially considering the S&P 500's one which is roughly half as high. This serves also to reduce the volatility and the duration of our equity portfolio, reinforcing our shift away from growth.



Conclusion

The ETF has returned 79.62% in the last 12 months. This incredible performance has been due to the commodity rally that began after the Covid crisis and was then reinforced by the Ukrainian war. We don't see any other solution in the short term for the current fuel shortages than increasing (although temporarily) the production of fossil fuels, which should ensure the continuation of a good performance of this ETF.

Lyxor Core STOXX Europe 600 (DR) UCITS ETF Acc

Index: STOXX Europe 600 (Net Return) EUR

Expense Ratio: 0.07% Tracking Error Volatility: 0.09%

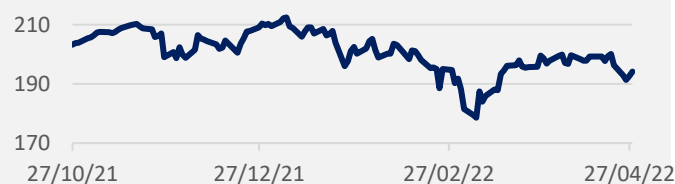
Overview

The investment objective of the Fund is to track both the upward and the downward evolution of the Stoxx Europe 600 Net Return (net dividends reinvested), representative of the stock market performance of the large European companies that pay the most dividends in their respective countries, while minimizing the volatility of the difference between the return of the Fund and the return of the Benchmark Index.

Analysis

This low-cost ETF provides exposure to the European Market overall. The Fund is incredibly diversified in both sectors and geographic exposure, thus minimizing the risk of a sudden shock.

Moreover, the ETF focuses more on financials, industries and healthcare stocks, with tech being the third lowest weighted sector. As a result, it contributes to the strategy of moving towards more defensive and value stocks and 'hedging' against future rate hikes. Furthermore, the inclusion of dividend-paying stocks in the portfolio gives a reliable stream of income which is mostly appreciated in uncertain macroeconomic scenarios where inflation is at historical highs and won't show slowing signs until the whole effects of the supply chain disruption are reflected on the businesses.



Conclusion

The ETF has returned -7.26% YTD, this negative return is mostly due to the outbreak of the Ukrainian War which has caused many European companies to halt their business in Russia and caused significant damage to the European economy. However, with the ECB keeping low interest rates, with the rumours of a possible diplomatic solution of the conflict and with governments spendings for their energy independence from Russia, we want to be positioned to catch any positive trend in the following months.

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Lyxor STOXX Europe 600 Banks UCITS ETF - Acc

Index: STOXX Europe 600 Banks Net Return EUR

Expense Ratio: 0.30% Tracking Error Volatility: 0.15%

Overview

The ETF is passively managed and mimics the STOXX Europe 600 Banks Net Total Return index, constituted with the largest stocks of the bank industry in Europe. While minimizing the volatility of the difference between the return of the Fund and the return of the Benchmark Index.

Analysis

This ETF provides exposure to the financial sector and especially to the banking industry. The main drivers of this choice are:

First, financials historically have strong performance in a rising rate environment when economies are expanding. Moreover, European banks stocks in particular, slumped steeply after communicating their losses due to their businesses in Russia following the outbreak of the war: we think that these are set to stabilize in a relatively short term and that the market could have overreacted causing these stocks to (momentaneously) fall under their fair value.

Finally, a high inflation macroeconomic scenario, makes this sector even more attractive.



Conclusion

The YTD return of the ETF has been negative, however this is in line with the economic consequences of the war in Europe and makes this ETF priced more enticing.

Lastly, the expense ratio is relatively low, which is something to always take into consideration.

iShares Global Infrastructure UCITS ETF

Index: FTSE Global Core Infrastructure Index

Expense Ratio: 0.65% Tracking Error Volatility: -

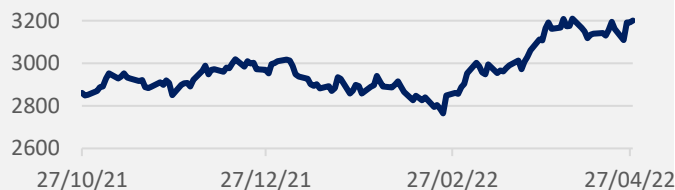
Overview

The Fund seeks to track the performance of the FTSE Global Core Infrastructure Index, composed of international infrastructure companies from both developed and emerging countries that derive a minimum of 65% of their revenue from core infrastructure activities.

Analysis

This ETF is heavily exposed to the largest and most liquid infrastructure companies across the globe.

We believe that this is one of the most intriguing sectors now, driven by several factors. Considering the current inflationary environment and the fact that different infrastructure assets have an explicit link to inflation built into returns - such as utilities returns and road concession agreements - the profitability of these firms and their returns are guaranteed and stable. Moreover, we are seeing the urge for governments to keep investing in infrastructure if not enhancing it in order to create more independent economies especially in Europe, which is trying to decrease its imports from Russia. The US passed its US\$1trn Infrastructure bill in Nov. 2021, with the US\$1.75trn 'Build Back Better' bill. The UK government promised £27.5bn investment in English roads until 2025, A new £7.1bn National Home Building Fund, £23bn funding for HS2 until 2025 and a £4bn fund to improve cities outside of London. Similar laws were introduced in several countries.



Conclusion

The ETF returned 7.84% YTD and has a 3Y total return of 29.02%. The ETF is performing strongly reinforcing our thesis and traced back less than 5% during the pandemic. We believe that the macroeconomic environment is favourable to this sector, and we want to be positioned to profit from it.

In conclusion, the Fund is well diversified among more than 200 companies capped at around 5%.

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Global X MSCI China Consumer Discretionary ETF

Index: MSCI China Consumer Discretionary 10/50 Index

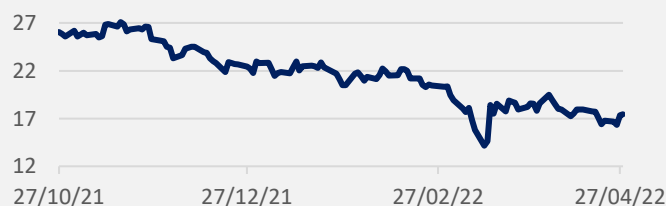
Expense Ratio: 0.65% Tracking Error Volatility: -

Overview

This ETF seeks to provide investment results that correspond generally to the price and yield performance of the MSCI China Consumer Discretionary 10/50 Index by targeting (> 80%) the Consumer Discretionary Sector in China – the world’s second largest economy by GDP. It tracks mid- and large-cap Chinese stocks involved in non-essential purchases.

Analysis

We know the Chinese market is currently a risky one to get exposed to, nonetheless the choice of this ETF is in line with a precise investment objective: exploit the potentiality of such a volatile index by allocating a small portion of the fund, predicting an improvement of the Chinese economy in the upcoming months. China’s economy was the first to be hit by the pandemic, and it could be the first to fully recover. As it does so, consumers will have their essential bills paid and be more open to non-essential purchases. Following the remarkable losses of the following months, the prices are at their lowest and we see this as an abeyant entry point, also in light of our conviction that the Chinese government will support businesses in order to address the slowdown of the economy. China recently loosened monetary policy and has room to ease further after promptly tightening for the past year. This should help stabilize the economic backdrop and support corporate earnings.



Conclusion

The ETF has registered an astonishing -39.31% return during the last year, reflecting the high volatility of the underlying index and highlighting the effects of the COVID-19 pandemic in the Chinese economy. Nevertheless, we believe this to be a good entry point, since the main stocks of the index are at their lowest among the last years.

Vanguard FTSE Emerging Markets UCITS ETF

Index: FTSE Emerging index

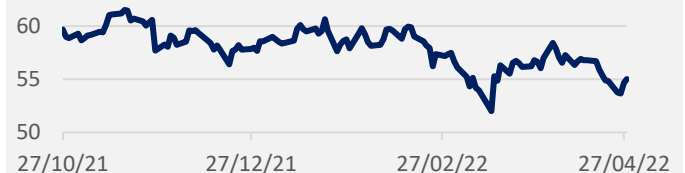
Expense Ratio: 0.22% Tracking Error Volatility: 1.09%

Overview

The ETF mimics the performance of the FTSE Emerging Index, a free-float-adjusted market-capitalisation index that is designed to measure equity market performance of large- and mid-cap companies in emerging markets. In particular, the fund has a global exposure, including prominent portions allocated in India, Brasil, South Africa, Mexico and Saudi Arabia.

Analysis

Emerging markets endured a challenging 2021, dragged down mostly by China and South Korea, which represent close to half the index. Nevertheless, the developing world is not homogeneous, and many individual countries had positive results. We selected this specific ETF due to its relevant exposures on particular geographies we believe will perform well in the next semester. We expect improvements on several fronts in the upcoming months, and the outperformance of EM over developed markets in the next semester. Similar to the analysis made for the Chinese market, we believe that most of last year’s negative sentiment is now priced into the emerging markets, with the index trading at a price/trailing earnings ratio of 13x, a 35% discount to developed market stocks. In our view, current low valuations provide an attractive entry point into EM stocks compared to developed markets, based on historical ranges.



Conclusion

The objective is akin to the previously analyzed Chinese ETF: we believe this to be a promising buy moment, compared to developed markets due to the recent sharp selloff and the improving outlook. The ETF registered a YTD return of -6.89% and we believe this trend will reverse in the next semester, due to improvements in the management of the pandemic and ease in regulations in EM markets.

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Lyxor Core MSCI Japan (DR) UCITS ETF

Index: MSCI Japan Net Total Return Index

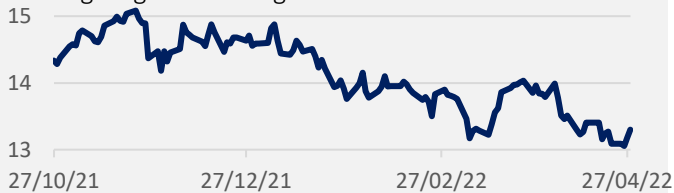
Expense Ratio: 0.65% Tracking Error Volatility: -

Overview

The ETF aims to track the MSCI Japan Net Total Return Index. The index is designed to represent the performance of the large and mid cap segment of the Japanese equity market, and it covers approximately 85% of the free float-adjusted market capitalisation in Japan.

Analysis

To complete our overall analysis of the Asian region, we decided to include an exposure in the Japanese market through what we believe to be a “Plain Vanilla” ETF of the eastern nation. Our views for the Japanese economy in the next semester are mixed but we see a possible entry point in light of the weakening of the Yen. Japan is gradually reopening, with Tokyo, Osaka, and 16 other prefectures ending the country’s COVID-19 quasi-state of emergency on 21 March and - as far as we are concerned - the recent conflicts between Russia and Ukraine will not have prominent impacts on the Japanese economy, by the time Japanese companies have little direct exposure to the region. In Addition, Russian aggression in Ukraine strengthens the case for Japan to increase its defence spending, as Germany and other European powers have already pledged to do. In addition to benefiting companies that directly manufacture defence systems (such as Toyota or Mitsubishi which occupy relevant portions of the index), the spending should also boost the outlook for a wide range of parts suppliers supporting strategic, leading-edge technologies.



Conclusion

Whereas we continue to believe that Japan is still in a recovery cycle from its post-pandemic lows, we are convinced Japanese management teams will use the current geopolitical backdrop to issue relatively cautious outlook statements for the new fiscal year that began in April.

iShares U.S. Aerospace & Defense ETF

Index: Dow Jones U.S. Select Aerospace & Defense Index

Expense Ratio: 0.42% Tracking Error Volatility: 0.6%

Overview

The iShares U.S. Aerospace & Defense ETF seeks to track the investment results of an index composed of U.S. equities in the aerospace and defense sector (Dow Jones U.S. Select Aerospace & Defense Index).

Analysis

The conflict’s outbreak between Russia and Ukraine has been having dramatic geopolitical consequences and most of the Countries across the World are responding by increasing their total military expenditures. United States have historically been the first largest spender and we expect them to authorize unprecedented national military spending on top of the Russian recent actions.

The War has also raised the question of whether supplying weapons for defensive purposes is a social good and Europe’s policymakers started to take this aspect into consideration. Our view on the topic is that just a small portion of investors and ESG funds will continue to use exclusionary policies in their investment strategy with respect to the companies operating in the defense sector. As a consequence, we expect important inflows from sustainability investors into the defense industry despite its sensitivity to social matters.



Conclusion

Although the ETF has already gained momentum since the start of the War, we believe there are important reasons to believe it will continue to perform well in the future, mainly thanks to the previously mentioned shift for defense to ESG.

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Schwab u.s. tips etf

Index: Bloomberg Barclays US Treasury Inflation-Linked Bond

Expense Ratio: 0.05% Tracking Error Volatility: 0.01%

Overview
 The fund aims to track, before fees and expenses, the total return of the Bloomberg Barclays US Treasury Inflation-Linked Bond Index, which measures the performance of the US Treasury Inflation-Protected Securities (TIPS) market.

Analysis
 The biggest themes in 2022 within financial markets have been the global inflation surge and the consequent monetary tightening. As reported in the latest CPI report, the annual US rate of inflation from 2021 to April 2022 was 8.5%, and even after excluding the more volatile categories of food and energy, prices are running higher than they have been in more than 30 years. Central Banks have started to hike rates plan to reduce the liquidity they have been injecting into the system since the start of the pandemic crisis. Given the current situation and the Q1 performance, we think fixed income should still be underweighted since bonds usually suffer with higher rates and high inflation. To partially hedge our position, the Inflation-protected US treasury is one of the best options available, especially now that real rates have reached positive territory. This ETF is by definition less sensitive to higher rates of inflation and shall overperform in periods of rising prices contributing to the overall portfolio performance.



Conclusion
 Given the very low cost of 0.05%, the relative safety of this ETF and the potential protection against higher-than-expected inflation, the fund has been included in the portfolio.

Ishares 1-5 year investment grade corporate bond etf

Index: ICE BofA 1-5 Year US Corporate

Expense Ratio: 0.06% Tracking Error Volatility: 0.36%

Overview
 The iShares 1-5 Year Investment Grade Corporate Bond ETF seeks to track the returns of the ICE BofA 1-5 Year US Corporate Index, which is composed of USD denominated investment-grade corporate bonds with maturities between one and five years.

Analysis
 The main driver of this choice is the short duration that characterizes the investment horizon of this ETF, indeed shorter duration bonds are less affected by an inflation and the following rises in interest rates. Shorting duration is a basic strategy that bond investors should implement when facing rates hike and monetary loosening conditions. As stated before, during 2022 the markets expect several increases in interest rates implemented by Central Banks to reduce the pressure of rising prices. Exploiting the inverse relationship between bonds' prices and interest rates we think reducing the duration of a fixed-income investment is the right way to minimize our exposure to this outlook. With an effective duration of 2.79 years and convexity of 0.08 (a complementary measure to better describe how much prices are affected by interest rates), this ETF provides an optimal opportunity in terms of risk-adjusted return. Additionally, the focus of this ETF is on US blue chips investment-grade companies, with easy access to credit and a high level of creditworthiness.



Conclusion
 Although the recent return of the ETF has been low, it has not been a bloodbath especially looking at the overall fixed income market. We are not substantially worried about widening credit spreads especially in US Investment Grade. Since the inclusion of this fund is mainly focused on reducing the duration of the portfolio and providing some sort of diversification, we include it in the portfolio.

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Invesco Bloomberg Commodity UCITS ETF

Index: Bloomberg Commodity Index

Expense Ratio: 0.34% Tracking Error Volatility: -

Overview

This fund aims to replicate the performance of the Bloomberg Commodity Index, which tracks prices of future contracts on physical commodities on the commodity markets. The index itself is designed to minimize concentration in one sector and currently includes 23 commodities futures in six sectors (energy, grains, industrial and precious metals, softs and livestock).

Analysis

Due to the current geopolitical and economic contexts, characterized respectively by the ongoing war in Ukraine and a skyrocketing inflation, we decided to include this highly diversified ETF, which provides exposure to a variety of different commodities and enables us to benefit from the present situation. In particular, the significant presence of gold and silver (weight of 17.8% of the total) hedges us against inflation. Moreover, the considerable exposure to grains and softs (weight of 28.6% of the total) allows us to take advantage of the current agricultural context, dominated by heavy supply shocks, high fertilizer prices and in general serious challenges on the ability of the supply to satisfy demand. .



Conclusion

We believe this ETF will provide a strong hedge against inflation while allowing us to benefit from the unstable current economic and geopolitical outlook thanks to its high degree of diversification.

UBS ETF CMCI Composite SF UCITS ETF (USD) A-acc

Index: UBS Bloomberg CMCI Composite Total Return

Expense Ratio: 0.34% Tracking Error Volatility: 0.02%

Overview

This ETF aims to track UBS Bloomberg CMCI Composite Global Total Return, which is a diversified index across 29 commodities in five sectors (energy, industrial metals, precious metals, agriculture and livestock).

Analysis

The distinctive feature of this ETF is that the index it tries to replicate, unlike traditional commodity indices, expands commodity investment beyond short-dated future contracts and gives access to various constant maturities. In doing so, it reduces the impact of rolling futures and may diminish volatility compared to traditional indices. Moreover, it maximizes the tracking of spot commodity prices.

On top of that, the fund is highly diversified and characterized by a lower exposure to gold compared to the ETF previously analyzed, Invesco Bloomberg Commodity UCITS ETF. This aspect could protect us in case gold's price faltered due to an increase in US real yields: indeed, despite its reputation as an inflation hedge, the precious metal tends to perform poorly when positive US real yields climb. Given their ongoing march upwards, they could enter the positive territory before the summer, which may lead to a decrease in gold's price.



Conclusion

Considering the current environment and the distinctive features of this ETF, we believe that its inclusion in our portfolio would help take advantage of the present situation, while tackling some of the issues that could have arisen given the exposure of the other commodities' ETF we selected.

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Quantitative Research Team

Risk Report – May 2022

Introduction

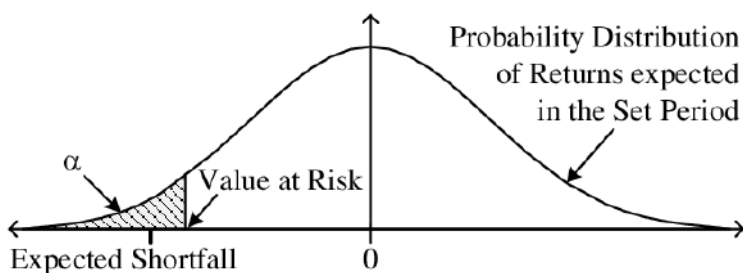
The main objective of this section is to assess and quantify the risk embedded in the Minerva IMS diversified passive selection fund built by the portfolio team. We use a daily perspective on the potential extreme behavior of a basket of assets selected by the portfolio analysts. The analysis will include three VaR and ES models (two parametric and one non-parametric) and the Black-Litterman optimization algorithm to inform the choice of component's weights.

As the Investment Risk division, our focus is the estimation of the two main risk indicators:

- The daily Value at Risk (VaR): the maximum portfolio loss that occurs with $\alpha\%$ of probability over a time horizon of 1 day. For instance, if the VaR ($\alpha=5\%$) = -3.00%, it means that tomorrow there is a 5% probability of encountering a loss in the interval [-100%, -3.00%] potentially;

- The daily Expected Shortfall (ES): the expected return on the portfolio in the worst $\alpha\%$ of cases. So, it is just a mean of the returns lower than the VaR.

A simple technique to estimate these two measure is based on a historical approach: given a time series of returns of a financial security, we can easily compute the desired quantile of the historical distribution to estimate the VaR, and, after that, estimate the ES just by averaging the values below this threshold.



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However, this naive approach is not well suited for our purpose: in fact, by considering our portfolio as a single financial asset, we are losing all the information that comes from all the components; moreover, with this approach we are simply focusing on the past behavior of the fund, while our main goal is to retrieve a risk metric for the future possible trends.

In order to overcome these issues, we propose two alternative techniques that provides better risk estimates:

- Parametric approach (simple approach and time-series modelling approach)
- Bootstrapping

The first method is very well suited for understanding the main vulnerabilities in the portfolio composition, while with the second one it is possible to observe how the metrics varied in the past quarters.

All the analysis has been conducted with Python.

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In this section we propose to analyze VaR and ES separately for each ETF included in the portfolio and then, to estimate the VaR and ES for the whole fund by taking into account the correlation between portfolio constituents.

Parametric approach is based on the assumption that returns of a financial security follow some theoretical distribution. Thus, VaR and ES can be expressed as an α -percentile of the distribution. The crucial step to accurately estimate VaR and ES is to select the appropriate distribution of returns and estimate its parameters.

It is possible to state that stock returns do not follow Gaussian distribution due to the presence of "fat tails": unexpected events might have a huge impact on the stock prices, so it is possible to observe extreme values more frequently than a Normal distribution would predict. For this reason, we assume that stock returns follow a Student-t distribution, thus, the parameters to be estimated are the mean μ , volatility σ and number of degrees of freedom ν .

To obtain more valid and robust results, we proceed with two alternative parameter estimation approaches – (a) simple approach, and (b) time-series modelling approach.

Simple approach

Under the simple approach, we estimate the above-mentioned parameters in the following way:

1. We assume that the mean historical daily return of each security are a good estimate for the expected future return. Thus, μ is estimated as a simple average of daily returns.
2. Volatility of returns σ is calculated as a simple standard deviation of returns.
3. Number of degrees of freedom ν is selected in a way that it best approximates the empirical distribution of returns. In order to do that, we used the Kolmogorov-Smirnov statistic that, for a given empirical cumulative distribution function F and a proposal F_n , is:

$$D_n = \sup x |(F_n - F)|$$

Ideally it should be equal to 0 for a perfect fit, so our goal is to minimize it by proposing different ν for Student-t distribution.

Time-series modelling approach

Because the volatility of returns is not constant over time, it is often modelled by conditional heteroscedasticity processes. The most common way to model volatility is through a Generalized Autoregressive Conditional Heteroscedasticity model GARCH(p,q), where the forecast of the next-period volatility depends on the previous p shocks to stock returns (derived from some mean model) and previous q forecasts of volatility:

$$\sigma_{t+1|t}^2 = \omega + \sum_{i=1}^p \alpha_i \epsilon_{t-i}^2 + \sum_{j=1}^q \beta_j \sigma_{t-j+1|t-j}^2$$

The advantage of GARCH model is that it allows to better estimate the current forecast of return volatility by putting more weight on more recent information. Thus, in the periods of market turbulence GARCH model will produce higher volatility forecasts than the simple average of squared deviations from the mean (see the graph at the bottom).

Because the portfolio is composed exclusively of passive instruments traded on liquid markets, we can assume that prices are efficient, and thus returns can be described by a constant mean model for GARCH(p,q) process, which implies that current mean estimates do not depend on previous returns or shocks. GARCH(p,q) then is estimated by Maximum Likelihood (MLE), which optimizes the distribution parameters. We subsequently use MLE estimates of distribution to derive VaR and ES.

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Parametric approach (continued)

Value-at-risk

Once the parameters of stock returns are known, it is possible to calculate VaR. We estimate the VaR for 95% and 99% confidence level by applying the following formula:

$$VaR_{\alpha} = \sigma * T_{\nu}^{-1}(\alpha) + \mu$$

where σ is the estimated volatility of a security, $T_{\nu}^{-1}(\alpha)$ is the α -percentile of a Student-t distribution with ν degrees of freedom, and μ is the expected return of a stock.

Expected shortfall

Expected shortfall is defined as a conditional expectation of loss, given that the loss occurred. If we introduce the assumption of a continuous distribution of returns of a security, then parametric expected shortfall is simply defined as a tail conditional expectation, and thus can in general be defined by the following formula for any security X :

$$ES_{\alpha}(X) = -\frac{1}{\alpha} \int_0^{\alpha} VaR_{\gamma}(X) d\gamma$$

Under the assumption of Student-t distribution with ν degrees of freedom it can be proven that the expected shortfall would be given as:

$$ES_{\alpha}(X) = \sigma * \frac{\nu + (T_{\nu}^{-1}(\alpha))^2}{\nu - 1} \frac{\tau_{\nu}(T_{\nu}^{-1}(\alpha))}{\alpha} + \mu$$

where σ is the estimated volatility of a security, $T_{\nu}^{-1}(\alpha)$ is the α -percentile of a Student-t distribution with ν degrees of freedom, $\tau_{\nu}(\cdot)$ is the probability density function of Student-t distribution with ν degrees of freedom and μ is the expected return of a stock.

We estimate the ES for 95% and 99% confidence level.

Simple approach

	VaR 95	VaR 99	ES 95	ES 99
ISHARES 1-5 YEAR INVESTMENT GRADE CORPORATE BOND ETF	-0.39%	-0.56%	-0.49%	-0.64%
SCHWAB U.S. TIPS ETF	-0.54%	-0.77%	-0.68%	-0.86%
Invesco Bloomberg Commodity UCITS ETF	-1.33%	-1.92%	-1.69%	-2.22%
Lyxor Core MSCI Japan (DR) UCITS ETF	-1.47%	-2.10%	-1.86%	-2.42%
UBS ETF (IE) CICI Composite SF UCITS ETF (USD) A-acc	-1.47%	-2.11%	-1.87%	-2.44%
iShares Global Infrastructure UCITS ETF	-1.55%	-2.23%	-1.97%	-2.58%
SPDR S&P US Health Care Select Sector UCITS ETF	1.68%	2.43%	2.18%	2.82%
Lyxor Core STOXX Europe 600 (DR) UCITS ETF Acc	-1.73%	-2.51%	-2.21%	-2.93%
Xtrackers S&P 500 Equal Weight UCITS ETF 1C	-1.84%	-2.69%	-2.35%	-3.09%
Vanguard FTSE Emerging Markets UCITS ETF	-2.04%	-2.82%	-2.58%	-3.37%
iShares U.S. Aerospace & Defense ETF	2.54%	3.63%	3.21%	4.19%
Lyxor STOXX Europe 600 Banks UCITS ETF - Acc	2.68%	4.13%	3.65%	4.78%
Global X MSCI China Consumer Discretionary ETF (CHIQ)	-3.09%	-4.43%	-3.91%	-5.12%
SPDR S&P US Energy Select Sector UCITS ETF	-3.19%	-4.59%	-4.05%	-5.32%

Portfolio VaR and ES

Considering the correlation between the stocks, we estimate the VaR and ES of the whole portfolio for 95% and 99% confidence level by applying the following formulas:

$$VaR_{\alpha,ptf} \approx \sqrt{VaR_{\alpha} * \rho * VaR_{\alpha}'} \\ ES_{\alpha,ptf} \approx \sqrt{ES_{\alpha} * \rho * ES_{\alpha}'}$$

where VaR_{α} and ES_{α} are column vectors of individual stock VaR and ES, respectively and ρ is the correlation matrix between securities

The approximation arises because of the assumption of Student-t distribution of returns – the formulas above become an equality the closer the distribution of returns is to the Gaussian.

Results

GARCH results appear to be slightly higher than the simple approach ones. Indeed, while simple approach equally weights all observations, GARCH puts more weight on the most recent observations, thus, it better estimates the future volatility and allows to produce more reliable risk metrics.

	Simple approach	GARCH
VaR_{95%}	-1.28%	-1.75%
VaR_{99%}	-1.84%	-2.96%
ES_{95%}	-1.62%	-2.54%
ES_{99%}	-2.13%	-3.96%

GARCH

	VaR 95 (GARCH)	VaR 99 (GARCH)	ES 95 (GARCH)	ES 99 (GARCH)
ISHARES 1-5 YEAR INVESTMENT GRADE CORPORATE BOND ETF	-0.49%	-0.89%	-0.76%	-1.28%
SCHWAB U.S. TIPS ETF	-0.83%	-1.33%	-1.15%	-1.68%
iShares Global Infrastructure UCITS ETF	-1.76%	-2.84%	-2.45%	-3.60%
SPDR S&P US Health Care Select Sector UCITS ETF	-1.92%	-3.09%	-2.66%	-3.90%
Xtrackers S&P 500 Equal Weight UCITS ETF 1C	-2.01%	-3.42%	-2.93%	-4.58%
Lyxor Core STOXX Europe 600 (DR) UCITS ETF Acc	-1.08%	-3.47%	2.96%	-4.74%
UBS ETF (IE) CICI Composite SF UCITS ETF (USD) A-acc	-2.41%	-4.02%	-3.45%	-5.20%
Invesco Bloomberg Commodity UCITS ETF	-2.29%	-4.05%	-3.46%	-5.09%
Vanguard FTSE Emerging Markets UCITS ETF	-2.81%	-4.24%	-3.85%	-5.44%
iShares U.S. Aerospace & Defense ETF	-3.00%	-5.07%	-4.34%	-6.74%
Lyxor Core MSCI Japan (DR) UCITS ETF	-2.54%	-5.17%	-4.43%	-6.59%
Lyxor STOXX Europe 600 Banks UCITS ETF - Acc	3.55%	-5.98%	5.13%	-7.97%
SPDR S&P US Energy Select Sector UCITS ETF	-5.08%	-8.33%	7.17%	10.81%
Global X MSCI China Consumer Discretionary ETF (CHIQ)	-5.65%	-8.92%	-7.72%	-11.15%

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Bootstrapping

When estimating a certain metric, one of the main problems in Statistics is the lack of the whole population data and the consequent use of only a sample. In our case the population data is the complete historical price data of the securities that are part of our portfolio, in which we only have the data of recent years.

Bootstrapping is a statistical technique that by having only a sample of the population data, provides estimates of statistical metrics that are closer to the ones obtained from the population data.

Given a sample of size n , implementing bootstrap is very simple:

- Sample with replacement n times from the original sample (note that one observation could be selected more than once);
- Compute the metric of interest (in our case the VaR or ES) on this newly created sample and save it;
- Repeat the previous steps M times with $M \rightarrow +\infty$ (we have selected $M=100.000$ for instance);
- Average and compute the standard error of the metrics estimated in each step.

With this method, by estimating the expected shortfall and the standard errors, we can retrieve a more insightful view of our portfolio, but in this case, we are losing the risk contribution of each stock that we had in the previous case. Here, you can find the following estimates:

	Estimate	Standard error
VaR_{95%}	-1.08%	0.09%
VaR_{99%}	-2.48%	0.26%
ES_{95%}	-1.99%	0.17%
ES_{99%}	-3.76%	0.50%

Black-Litterman model

Introduction

The Black-Litterman asset allocation model, created by Fischer Black and Robert Litterman, is a sophisticated portfolio construction method. The main trait that distinguishes the model is the Bayesian approach that is embodied in the inclusion of investors' expectations on future returns in building an optimal portfolio. Unlike the Markowitz optimization, in which return is maximized for a given level of risk, the Black-Litterman model combines the subjective views of an investor regarding the expected returns of one or more assets with the market equilibrium vector of expected returns to form a new estimate of expected returns. The resulting new vector of returns leads to intuitive portfolios with sensible portfolio weights.

Inputs

To compute the portfolio composition, the model requires specific inputs. Some of them are common to other optimization models, like the expected excess returns and the variance-covariance matrix. In addition, we have:

- **VIEWES:** each investor has its own expectations about excess returns, which may deviate from the implied market ones. Views can be expressed in either absolute terms (Disney will have an absolute excess return of 5.25%) or in relative terms (Microsoft will outperform Apple by 2%). On the mathematic perspective, views are represented by a column vector with each element corresponds to a absolute/relative returns.
- **PICKING MATRIX:** this crucial element allows us to link each view to its corresponding asset. Mathematically, we have a matrix whose rows express the different views: absolute views have a single 1 in the column corresponding to the ticker's position, whereas relative views have positive numbers in the nominally outperforming asset columns and negative numbers in the nominally underperforming asset columns. All the other values are set to 0.

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Procedure

The Black-Litterman optimization process can be summarized in four parts:

- Estimate the (prior) implied expected returns using relative market capitalization weights and implied risk-aversion;
- Based on the investor views, build the view vector, the picking matrix and the (diagonal) matrix with the variance of each scenario;
- Use all of the previous inputs to compute the (posterior) “Black-Litterman” vector of expected excess returns;
- Use the vector of Black-Litterman posterior returns to compute the new weights for the portfolio.

Key formulas and equations

The starting point is the computation of the implied excess returns via a reverse optimization method:

$$\mathbf{\Pi} = \lambda \mathbf{\Sigma} \mathbf{w}_{\text{market}}$$

Where:

$\mathbf{\Pi}$ is the Implied Excess Equilibrium Return Vector ($N \times 1$ column vector),

$\mathbf{\Sigma}$ represents the covariance matrix of excess returns ($N \times N$ matrix),

λ is the risk aversion coefficient,

$\mathbf{w}_{\text{market}}$ is the market capitalization weight.

The conversion from the prior return vector to the posterior Combined Return Vector ($E[R]$) is done according to:

$$E[R] = [(\tau \mathbf{\Sigma})^{-1} + \mathbf{P}' \mathbf{\Omega}^{-1} \mathbf{P}]^{-1} [(\tau \mathbf{\Sigma})^{-1} \mathbf{\Pi} + \mathbf{P}' \mathbf{\Omega}^{-1} \mathbf{Q}]$$

Where:

τ is a scalar,

\mathbf{P} is a matrix that identifies the assets involved in the views ($K \times N$ matrix),

$\mathbf{\Omega}$ is a diagonal covariance matrix of error terms from the expressed views representing the uncertainty in each view ($K \times K$ matrix),

\mathbf{Q} is the View Vector ($K \times 1$ column vector).

This formula can be intuitively interpreted as a weighted average between the (prior) implied returns and our views, with weights that depend on how much we are uncertain regarding every single view.

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