



# Research Area

## Fixed Income & Alternatives Research

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# Hedging Strategies: three hedging ideas for our Portfolio

## Summary

<b>I – A Brief Introduction to Hedging Strategies</b>	2
Forward and Futures	3
Options	4
Put Options	5
Call Options	6
Exotic Instruments	7
<b>II - Hedging our Portfolio with Futures</b>	8
General Considerations About Hedging With Futures	8
Hedging Our Equity Portfolio	9
<b>III - Hedging with Forwards</b>	10
General Considerations About Hedging With Forwards	10
Hedging Our Equity Portfolio	11
<i>Analysis of the S&amp;P 500 part:</i>	12
<i>Analysis of the STOXX 600 part:</i>	16
Cash and Carry	23
<b>IV - Hedging our Portfolio with Options</b>	23
Collar Strategy	23



## I – A Brief Introduction to Hedging Strategies

Portfolio hedging is a technique for mitigating adverse market fluctuations, aiming to reduce the incurred losses in case of negative events which affect one specific investment. Although investors seek to reduce the specific risks associated with each investment by splitting their portfolio into different asset classes (stocks, bonds, commodities), geographical areas, or industries, even an efficient, well-diversified portfolio can incur significant losses if specific market conditions turn negative. These risks could come, for example, from a relevant exposure to an investment, or from a future event that might sparkle a temporary period of market volatility. In both cases, combining diversification with techniques that provide a targeted shelter for certain risks might be a winning strategy.

In its simplest form, a hedge is an investment which is expected to move in the exact opposite direction of another asset: therefore, if the hedge works correctly, any loss incurred from the underlying investment would be balanced by an equivalent gain from the hedging instrument. To provide adequate cover, this strategy requires perfect negative correlation: since it is impossible to find two distinct investments that behave this way, hedging usually involves the use of complex financial instruments known as derivatives, whose price depends on an underlying asset (collateral) that can be either a stock, a commodity, an index, an interest rate. Derivative instruments can be classified into three main categories:

- Forward contracts, by which the subscriber agrees to buy (long position) or sell (short position) a certain amount of collateral at an agreed price in the future, exposing himself to adverse price movements. Forwards are agreements between two parties and are traded OTC (Over the Counter), while Future contracts are traded in regulated markets and have standardized parameters, such as maturity and amount of collateral.
- Options, that give the subscriber the mere possibility of buying (call option) or selling (put option) the collateral, at an agreed strike price in the future. As the subscriber is not forced to exercise the option, he does not face any risk of loss: therefore, he is required to pay a premium to the option seller.
- Swaps, by which two parties exchange a volatile cash flow (usually linked to an interest rate, or an index) for a fixed one over a period of time.

A position in a derivative instrument can be structured in a way to be equivalent to physically possessing the underlying collateral. An investor who is already exposed to an asset might want to shield his investment by acquiring a derivative instrument which benefits from market movements in the opposite direction. For example, if he holds a \$100.000 stake of gold and has a \$25.000 worth short position on gold futures contracts, 25% of his investment is hedged against gold price risk: we will say that the hedge ratio is 1:4. Obviously, the closest the hedge ratio is to 1:1, the more prospective gains and losses will offset each other: it is necessary to underline that hedging is supposed to reduce the downside risks, not to make additional profits, and entails a cost in terms of lower potential gains. In addition to that, one must consider that hedging a risk means transferring it to a third party (the protection seller): the higher the potential downside risk, the costlier it will be to acquire protection. Potential risk is greater if the underlying investment is more volatile or has a longer maturity; OTC-traded instruments also include a counterparty risk. Therefore, hedging often implies costs that make it not convenient given the profits reduction.



Nevertheless, hedging a portion of an investment could be an effective way to reduce the capital at risk without excessively dampening the potential returns. One of the feasible strategies is to hedge a section of the portfolio to take more risks elsewhere without having to modify the overall composition, hence taking advantage of short-term market changes. Another, longer-term strategy is to achieve an optimal hedge ratio that, given the volatility of the underlying investment, limits downside risks to an acceptable level, leaving some space to exploit any upward shift. In the following section of this paper we will examine some of the derivative instruments that are typically used to hedge an investment, along with some of the potential strategies.

Now there will be summarized three of the most common instruments used in hedging strategies.

## Forward and Futures

These contracts are two of the most used derivatives for hedging purpose. A Forward contract is an agreement between two parties to buy or sell an asset a certain time in the future for a predetermined price. The definition of a Future contract is the same as the Forward one, but these two derivatives are deeply dissimilar and used in situations with different kind of risk to hedge. We can compare the characteristics of these contracts to identify the main differences.

Future	Forward
Traded on organized market and trading is coordinated by the Clearing House	Traded over the counter
Standardized agreement in size and delivery date	Taylor-made product negotiated individually between buyer and seller
Settled daily through the mark to market and the margin requirements	Settled at the expire date of the contract
Credit risk of the counterparty virtually null thanks to the Clearing House intermediation	Both parties are always exposed to credit risk
Easy to unwind the position	Difficult to unwind the position because it depends on both parties' willingness

Calling  $S$  the price of the underlining asset at maturity and  $K$  the delivery price of the contract the payoff formulas of a long or a short position on a Forward are:

- Long position:  $S - K$
- Short position:  $K - S$

For a future contract there is not a specific payoff formula because of the Clearing House margin requirements. A Clearing House is an entity that provide clearing and settlement services for transactions. The main advantages are to avoid credit risk in each transaction because the Clearing House is always the counterparty of each party, so the investors don't need to worry about their counterparties integrity and to have the possibility to unwind the position because the clearing house is always available to unwind a position and taking a contrary position with the same party.



The Clearing House avoid the credit risk through margin requirements. The margin is the amount of money that must be put into an account by a party opening up a futures position. Three different types of margin must be considered:

- The initial margin that is amount that the investor must deposit entering in the contract in order to cover any large losses
- The maintenance margin that is the minimum level by which investor's equity may fall (because of an unfavorable price movement) before he/she is asked to make an additional deposit
- The variation margin that is the amount needed to restore the margin to the initial level

The futures price at the end of each day is used to mark to market the position, so that any gain or loss is reflected in the investor's equity account.

## Options

Options are contracts that give the right, not the obligation, to the holder to take a position.

The two main option types are call and put, also called plain vanilla. A call (put) option give the right to buy (sell) an asset in a certain date for a pre-determined price by paying a premium to the seller.

The date is called expiration date and the price is called strike price. Another distinction is between American and European option: in the former, the holder can exercise it at any time in the latter only at the expiration date.

In every option contract there are two sides: the long positions (buyer) and the short one (seller/writer). It is possible to close an open position by issuing an offsetting order of the same number of options. In addition, in order to add liquidity to the market options exchanges use markets makers.

The underlying asset is usually a stock or an index. However especially in the OTC market, currency and futures options are also traded.

An option contract is defined as:

- *In the money* if the option is profitable and it should be exercised
- *At the money* if the strike price is equal to the asset value
- *Out of the money* if the option is not profitable at the evaluation date

The price of a stock option is function of six factors:

1. *Current stock price and strike price*

Call options become more valuable as the stock price increases and less valuable as the strike price increases, instead put options behave in the opposite way from call options: they become less valuable as the stock price increases and more valuable as the strike price increases

2. *Expiration date*

Both put and call American options become more valuable (or at least do not decrease in value) as the time to expiration increases. Although European put and call options usually become more valuable as the time to expiration increases this is not always the case

3. *Risk free interest rate*

As interest rates in the economy increase, the expected return required by investors from the stock tends to increase. In addition, the present value of any future cash flow received by the holder of the option decreases. The combined impact of these two effects is to increase the value of call options and decrease the value of put options

4. *Dividends*

Dividends have the effect of reducing the stock price on the ex-dividend date. This is bad news for the value of call options and good news for the value of put options

5. *Volatility*

As volatility increases, the chance that the stock will do very well or very poorly increases. For the owner of a stock, these two outcomes tend to offset each other. However, the owner of a call benefits from price increases but has limited downside risk in the event of price decreases because the most the owner can lose is the price of the option. Similarly, the owner of a put benefits from price decreases, but has limited downside risk in the event of price increases. The values of both calls and puts therefore increase as volatility increases.

## Put Options

A put option gives the holder the right to sell an underlying asset at a specified price, known as the strike price, up until a specific date, known as the expiration date. This right is purchased through the payment of a premium. On the other hand, the seller of the option earns the premium but is exposed to the possible devaluation of the underlying asset.

- *Long position*

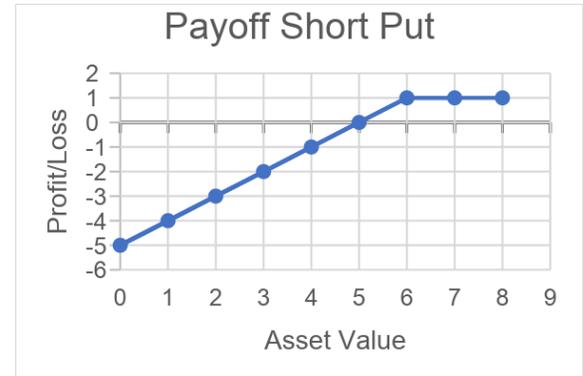
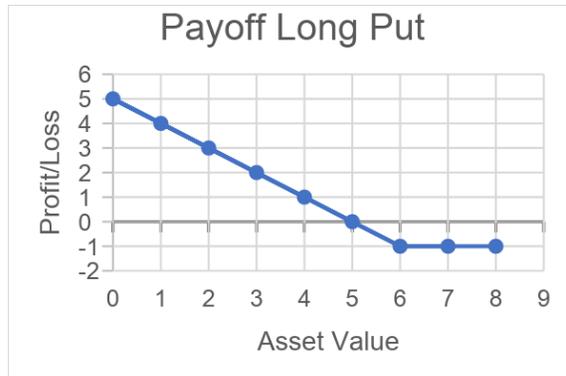
When the derivative asset value is lower than the strike price the option is in the money. Instead, if the value of the derivative asset is equal or higher than the strike price the option is out of the money and the buyer loses the premium.

- *Short position*

When the derivative asset value is higher than the strike price the option is out of the money and the seller earn the premium. Instead, if the value of the asset is lower than the strike price the option is in the money and the seller has a loss equal to the difference between the strike price and the value of the derivative asset.

The long position has lower risk, in fact, the potential loss is the premium paid in advance, but the gain of a long position in the best-case scenario is the difference between the strike price and the price of

the asset at the specific date of the contract. On the other hand, the short position is the riskiest in fact the potential loss could be elevated while the gain is equal to the premium received.



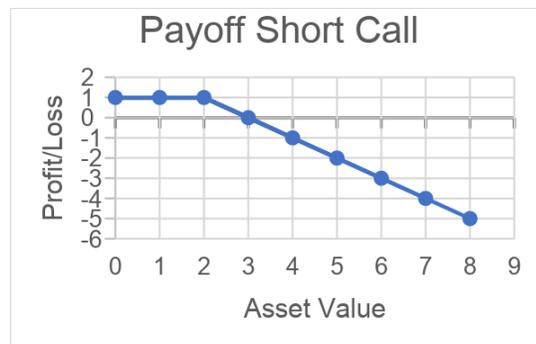
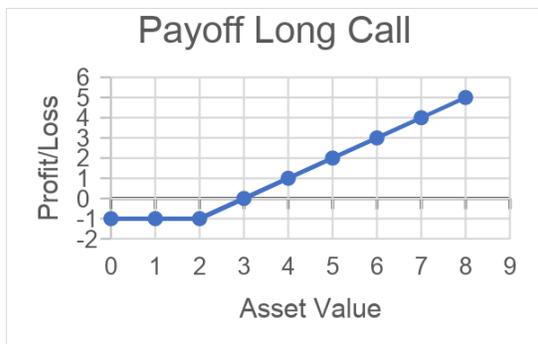
## Call Options

A call option gives the holder the right to buy an underlying asset at a specified price, known as the strike price, up until a specific date, known as the expiration date. This right is purchased through the payment of a premium.

On the other hand, the seller of the option earns the premium but is exposed to the possible increase of the value of the underlying asset.

- *Long position*  
When the derivative asset value is higher than the strike price the option is in the money. Instead, if the value of the derivative asset is equal or lower than the strike price the option is out of the money and the buyer loses the premium.
- *Short position*  
When the derivative asset value is lower than the strike price the option is out of the money and the seller earn the premium. Instead, if the value of the asset is higher than the strike price the option is in the money and the seller has a loss equal to the difference between the strike price and the value of the derivative asset.

The long position has lower risk, in fact, the potential loss is the premium paid in advance, but the gain of a long position in the best-case scenario is the difference between the price of the asset and the strike price at the specific date of the contract. On the other hand, the short position is the riskiest in fact the potential loss could be elevated while the gain is equal to the premium received.



## Exotic Instruments

Put and call options have been discussed in the precedent paragraphs. These derivatives are often named *plain vanilla derivatives* because they are the main pillars of all other derivatives. Indeed, they have standard well-defined properties and are traded actively, their prices are quoted by regular exchanges and the information about them flows on a regular basis.

Financial engineers have developed (and continue to develop) derivatives based on standard options. These products are traded in OTC (Over The Counter) markets and are usually addressed with *exotic options* or, simply, *exotics*. They play an important role on the derivatives market due to their flexibility and usability, although, in volume percentage, they are a small slice. Usually, they are way more profitable (or can generate huge losses) than plain vanilla products.

The reasons why exotics are developed are several. First, the specific needs of a firm or a hedging strategy. They can replicate or hedge every type of risk, being their construction totally arbitrary. Second, sometimes these products are designed to reflect views on potential future movements in particular market variables, that are not easy to address with simpler products. Third, trivially, they are designed by a financial engineer to appear more attractive than it is to an unwary corporate treasurer or fund manager.

Three examples of exotic options are briefly introduced in the following bullet points:

- *Chooser options*  
Sometimes referred to as an *as you like it* option, it has the feature that, after a specified period of time, the holder can choose whether the option is a call or a put. Hence, buying such type of products give the holder the possibility to choose whether, at the expiring date, have the performance of a call option or a put option
- *Binary options*  
They are options with discontinuous payoffs. An example is a *cash-or-nothing call*, that pays nothing if the asset price ends below the strike price at pre-specified time or pays a fixed amount if the asset price ends above the strike price
- *Volatility swaps*  
It is an agreement to exchange, being a swap, the realized volatility of an asset for a prespecified fixed volatility over a specific time-lapse. This way, potentially, you can choose what amount of volatility your portfolio will have over a period of time.

This is only a small, if not particle, part of the exotic options environment.



## II - Hedging our Portfolio with Futures

### General Considerations

Futures are financial instruments often used to hedge either a specific risk or the market risk. In general, a long position on a future contract is taken in order to hedge an asset that will be purchased in the future or is in a short position in an equity portfolio. A short position, instead, is taken in order to hedge an asset that will be sold in the futures or is in a long position in equity portfolio.

Other general but useful considerations about hedging with futures that should be taken in account are:

- Effects on the profits
- Basis risk
- Cross hedging

The first consideration is common for all the hedging strategies. In fact, when pursuing all hedging strategies the two main result neutralizing a risk and offsetting losses and gains on the underlying asset. It is common that the gains on the underlying asset make up for the negative performance in the hedging futures contracts. Conversely, losses on the underlying asset are balanced by gains on the futures contract.

The basis risk is a unique dynamic in the futures contract. The basis is the difference between the spot price of the underlying asset and the futures price. Basis tend to zero with the narrowing of the expiry date of the futures contracts. However, basis risk is a main factor when hedging with futures as often hedgers close their position before the expiry date in order not to fiscally deliver the underlying asset; this strategy is called stack and roll.

The last general consideration regards cross hedging. Cross hedging is used when an asset does not have a related futures contract. In this case, the hedger uses a futures contract built on the most correlated asset available on the market. In order to calculate the number of contacts to purchase it is used, as a factor, the minimum variance hedge ratio. This is calculated as the ratio between the standard deviation of the spot price of the asset and of the standard deviation of the future price multiplied for the coefficient of correlation.

$$h = \rho * \frac{\sigma_s}{\sigma_f}$$

The number of contract than is easily obtained:

$$N = h * \frac{V_a}{V_f}$$

$V_a$  = Value of the asset

$V_f$  = Value of the futures contract

The coefficient  $h$  is replaced by the beta ( $\beta$ ) when the asset is an equity portfolio and the futures are built on a stock index. Therefore, the hedger can modify the number of contracts in order to change the beta between the equity portfolio and the stock index. This strategy, for example, can lead to be long on futures in order to



benefit more of a rally on a particular market. Vice versa if there is a slowdown in the market, a short position can minimize losses or even bring gains.

## Hedging Our Equity Portfolio

The process of hedging an equity portfolio is composed of two main parts:

- Choice of delivery month
- Choice of underlying asset
- Choice of beta

The delivery date that we chose in this case is three months with an expiry date on the 19<sup>th</sup> of June. In order to have a longer hedge it is either possible to choose another contract or to use the stack and roll strategy. If you choose the first option usually contracts with multiples expiry dates are available on the market. The second option consist of closing the position on the futures contract before the expiry date and open, at the same time, a new one. This second option is, however, exposed to the basis risk.

Our portfolio is composed of stocks from Standard and Poor's 500 and Eurostoxx 600. These segments have both stocks in long and short positions. In order to have an effective hedge we split the portfolio in four parts as it is shown. In addition, we calculated the average of the betas on the underlying index of each part of the portfolio. The results we obtained are these:

Standard and Poor's 500		Eurostoxx 600	
Active	Passive	Active	Passive
0,969895	0,990158	0,9939	1,245

Than we established two different type of hedging with two different objectives. In the first one, we established a target beta of zero in order to hedge the market risk. In the second one the target beta is 1 in order to achieve a perfect correlation with the underlying index.

To calculate the number of contracts we used this formula:

$$N = (\text{Portfolio Beta} - \text{Target Beta}) * (\text{Value of the portfolio} / (\text{value of the contract} * \text{multiple}))$$

*Multiple* in the formula stand for the number of index points underlying each contract. While for Standard and Poor's each contract count 250 index points, for Eurostoxx600 the points are 200.

These are the eight outputs ordered by segment and hedging objective:



Portfolio / Target Beta	0	1
Spx long	0,138665	-0,0043
Spx short	0,141562	-0,00141
Sxxp long	1,356305	-0,00832
Sxxp short	1,698963	0,334334

As a result of this analysis it is clear that the Standard and Poor's part of the portfolio does not require any hedging. In fact, it is almost perfectly correlated to the index. In addition, it does not suffer of a compelling market risk.

On the other hand, the Eurostoxx part of the portfolio needs more attention. In fact it is less correlated to the Eurostoxx index but, at the same time, does not require any contract to be purchased, as the figures show. Regarding the market risk, the Europeans segments of the portfolio clearly require a hedging strategy. In order to hedge the market risk we implement these two action:

1. Short position on one Eurostoxx 600 futures contract currently traded at 366.4 index points.
2. Long position on one Eurostoxx 600 futures contract, currently traded at 366.4 index points.

Futures are standardized contracts, so we will not achieve a perfect hedging.

These hedges will have the effect of minimizing the volatility of the portfolio, but also partially offset the portfolio performance in case of favorable market trends. For example, if the European stock market will perform badly in the next three months, the stocks in long position will perform poorly as well, but the short future contract will compensate the losses. On the other hand, the short part of the European segment that, without hedging, would perform well, on average, would offset the negative performance of the futures contract.

A last useful observation is the liquidity risk that is implicit in every futures contract. The hedging that we have implemented will require a deposit or some liquid assets. In fact, in case of negative performance of the contract, the maintenance margin needs to be honored.

## III - Hedging with Forwards

### General Considerations

Contrary to futures, forwards do not have a standardized value and can be tailor-made to fit for a specific purpose. Therefore, there is no need to calculate an optimal number of contracts to buy: we can create a single contract to hedge a certain proportion of the investment in each single stock. We will discuss two strategies:

- The first one aims at minimizing risk and volatility. We will create a specular portfolio made of forward contracts, which will partially offset the losses incurred by the actual portfolio. By analyzing single

stocks and sectors, we will identify optimal hedge ratios to rebalance exposure while benefiting from upward market movements. This should be a solid alternative to liquidating certain investments and opening new positions.

- The second strategy aims at exploiting riskless profit opportunities. Looking at each stock’s current and forward prices, it is possible to spot market inefficiencies and to perform cash-and-carry (as well as reverse cash-and-carry) arbitrages.

To hedge single stocks, we analyzed potential upward market movements based on analyst consensus, and potential downside movements based on historical volatility and sectorial risks. We chose lower hedge ratios for stocks with fewer downside risk or higher potential gains; on the other hand, we suggested hedging completely other stocks which we expect might incur higher losses. What we called “worst-case scenario” prices do not actually reflect the most severe loss expectable within the given timeframe: that would have required complex calculation with VaR models that go beyond our scope. We assumed one standard deviation below the current price as a measure for possible downward market movements. To calculate target prices, we relied on analyst consensus and market sentiment on a three-months timeframe.

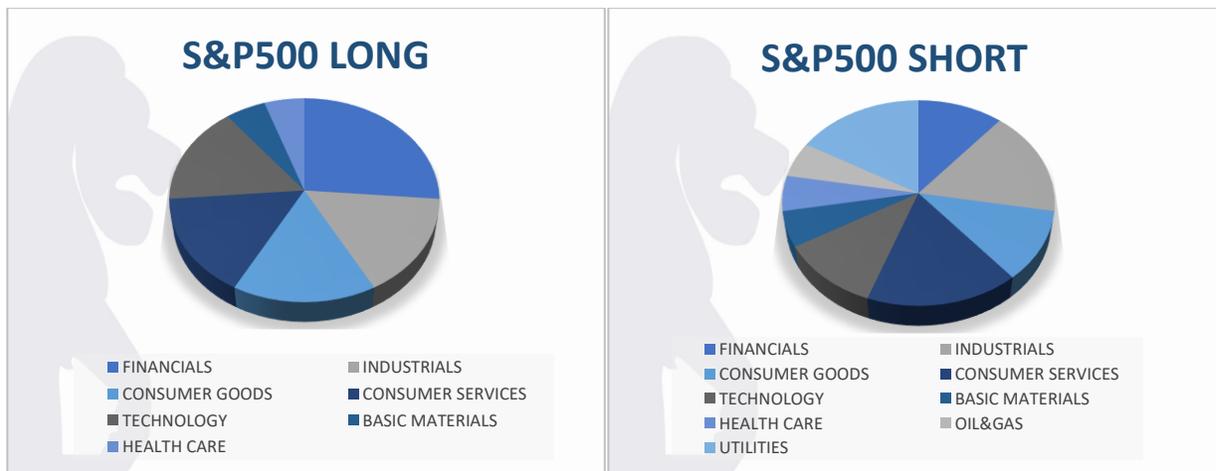
## Hedging Our Equity Portfolio

To effectively hedge our portfolio, we need to analyze its structure. As we know, the portfolio is composed of two parts: 38 stocks from the U.S S&P500 index (19 in a long position, and 19 short), and 40 stocks from the European Stoxx600 index (20 long and 20 short). Each one of the 78 stocks has the same weight (equal to 1/78). Thus, our specular portfolio will be made of 78 forward contracts (one for each stock), whose weights reflect our rebalancing suggestions. The first steps are:

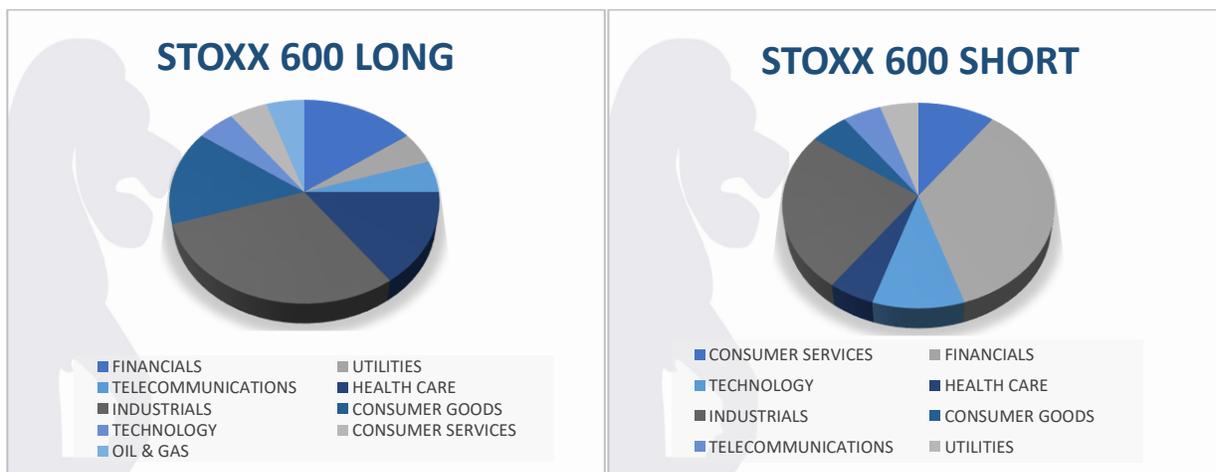
- Pricing the derivative instruments.
- Identifying the optimal hedge ratio for each stock.

As we did for futures, we chose a timeframe of three months for our strategy; we selected forward contracts with expiration date set to June 2019, priced by Bloomberg. Since exposure is the same for every stock, we proceed to analyze sectorial exposure.

The U.S. section of the portfolio is composed as follows:



As we can see, the portfolio is most exposed to the Financial sector (26%), followed by Industrials, Consumer Goods, Consumer Services and Technology (16% each). Short positions are concentrated in the Industrials, Utilities and Consumer Services (17% each), followed by Consumer Goods, Financials and Technology (11% each).



On European side, the portfolio is most exposed to the Industrial sector (30%), followed by Financials, Consumer Goods and Health Care (15% each). Short positions are concentrated in the Financials (35%) and Industrials (25%), while Technology and Consumer Services (10% each). Even though the portfolio seems well-balanced, key risks appear to be concentrated in the Financial, Consumer Services and Industrials sectors; we will now proceed to a more in-depth analysis.

### *Analysis of the S&P 500 part:*

**FINANCIALS:** 26% of the U.S long section of the portfolio is made of stocks from the financial sector. These include Bank of New York Mellon, Comerica, Assurant, Principal Fin.L.P., and T. Rowe Price Group. The short positions include Weyerhaeuser and Avalonbay. The financial sector has stabilized since the beginning of the year, thanks to the dissipating fears of global tensions.

Financials should benefit from a gradual increase in interest rates from the FED; on the other hand, trade tensions (along with renewed fears of a global recession) would significantly harm the sector. Financial stocks have slightly underperformed the market during the last month; for the next quarter, we do not see the potential for significant gains (apart from Assurant), so we suggest hedging completely against any risk of recession. Regarding the two short positions, even though they both have low expected upward movements, we suggest at least a partial hedging (especially for Weyerhaeuser).



	SPOT PRICE (March 26 <sup>th</sup> , 2019)	3-MONTHS TARGET PRICE	WORST-CASE SCENARIO PRICE	SUGGESTED HEDGE RATIO	FORWARD PRICE	FORWARD POSITION
Bank of New York Mellon	\$50.38	\$51.17 (+1.56%)	\$48.172 (-4.4%)	100%	\$51.524	Short
Comerica	\$71.79	\$75.97 (+5.8%)	\$65.845 (-8.3%)	100%	\$83.32	Short
Assurant	\$94.56	\$101.64 (+7.5%)	\$90.557 (-4.23%)	40%	\$100.009	Short
Principal Fin. Group	\$49.01	\$49.6 (+1.21%)	\$46.357 (-5.41%)	100%	\$49.685	Short
T Rowe Price Group	\$98.22	\$99.11 (+0.9%)	\$94.53 (-3.75%)	100%	\$96.697	Short
Weyerhaeuser	\$25.49	\$26.489 (+3.92%)	\$24.178 (-5.14%)	80%	\$24.483	Long
Avalonbay	\$199.17	\$200.24 (+0.54%)	\$189.85 (-4.67%)	20%	\$196.168	Long

**INDUSTRIALS:** our portfolio has a long position in three stocks from the industrial sector: Lockheed Martin, Boeing and Keysight Technology. Short positions include General Electric, PerkinElmer and Waters. The outlook for the Industrial sector is less optimistic: potential threats come from both a FED rates hike, increasing the cost of capital and thus reducing critical investments, and from trade tensions that would greatly harm exports. Considering recent events, it also seems reasonable to hedge completely against specific risks associated with stocks from the Aerospace industry (such as Boeing and Lockheed Martin); following its recent surge in value (+50% in the last three months), we strongly suggest hedging Keysight Technology stock to protect the profits from the risk of a fallback. Due to its volatility, GE might either increase or decrease in price during the next month, so we suggest hedging at least 50% of the investment against upward movements. On the other hand, we do not see potential adverse movements from PerkinElmer and Waters, but a partial hedging seems a reasonable idea, especially if the sector will continue to perform well as it did in the last quarter.

	SPOT PRICE (March 26 <sup>th</sup> , 2019)	3-MONTHS TARGET PRICE	WORST-CASE SCENARIO PRICE	SUGGESTED HEDGE RATIO	FORWARD PRICE	FORWARD POSITION
Lockheed Martin	\$294.12	\$305.74 (+3.95%)	\$278.59 (-5.27%)	100%	\$300.67	Short
Boeing	\$370.46	\$386.07 (+4.2%)	\$334.23 (-9.78%)	100%	\$423.122	Short



<b>Keysight Technology</b>	\$84.78	\$86.5 (+2.03%)	\$76.04 (-10.31%)	<b>100%</b>	\$84.52	Short
<b>General Electric</b>	\$9.88	\$10.545 (+6.73%)	\$8.92 (-9.7%)	<b>50%</b>	\$9.6365	Long
<b>PerkinElmer</b>	\$94.53	\$95 (+0.5%)	\$88.01 (-6.89%)	<b>20%</b>	\$92.384	Long
<b>Waters</b>	\$246.27	\$240.71 (- 2.25%)	\$224.56 (-8.8%)	<b>20%</b>	\$240.091	Long

**TECHNOLOGY:** the worst-case scenario for the tech sector would be a combination of increased regulation and trade tensions. Nevertheless, the industry is expected to experience a moderate growth, especially if the geopolitical scenario does not deteriorate. U.S Technology stocks performed well during the last quarter, slightly outperforming the S&P500 index. Thus, we do not suggest hedging completely the long positions, to leave some space for upward shifts. Motorola Solutions and Symantec are exceptions, since they have already grown significantly during the last quarter (+28% and +30%, respectively), so we suggest a 100% hedge to protect the gains.

	<b>SPOT PRICE (March 26<sup>th</sup>, 2019)</b>	<b>3-MONTHS TARGET PRICE</b>	<b>WORST-CASE SCENARIO PRICE</b>	<b>SUGGESTED HEDGE RATIO</b>	<b>FORWARD PRICE</b>	<b>FORWARD POSITION</b>
<b>Autodesk</b>	\$154.69	\$161.1 (+4.15%)	\$143.05 (-7.52%)	<b>70%</b>	\$153.343	Short
<b>Motorola</b>	\$138.64	\$139.89 (+0.9%)	\$126.47 (8.78%)	<b>100%</b>	\$139.1928	Short
<b>Symantec</b>	\$22.88	\$22.99 (+0.5%)	\$21.29 (-6.95%)	<b>100%</b>	\$22.0108	Short
<b>Red Hat</b>	\$181.46	\$182.43 (+0.54%)	\$178.33 (-1.72%)	<b>80%</b>	\$181.9756	Long
<b>Qualcomm</b>	\$56.64	\$58.39 (+3.1%)	\$54.127 (-4.4%)	<b>100%</b>	\$53.2084	Long

**CONSUMER GOODS/CONSUMER SERVICES:** these broad sectors combined comprise the majority of stocks in our portfolio. Outlook on these industries is too diverse, so we will proceed to analyze companies one by one. Lamb Weston Holding and McDonald’s have grown recently but have still the potential to move further upwards: despite that, we suggest a complete hedge, since there is no clear price trend. Autozone has gained almost +20% in the last quarter, so we suggest hedging completely as the room for further growth is restricted and volatility is potentially high; same applies to D.R Horton, which has already delivered a quarterly performance of +25%, and Philip Morris (+35%). We recommend a lower hedge ratio for CBS “B”, as it has still the potential to grow as much as 7% in the next quarter, according to analyst consensus. Short positions include Under Armour “A” and “C”: they both have lost more than 5% in the last week, so we might want to



hedge against a possible rebound. Darden Restaurants, on the contrary, has gained as much as 8% in the last ten days, so we suggest going long on forward contracts worth less than half of the investment, to protect from an eventual further raise and benefit from the likely correction. Finally, we advise on a 100% long position for McKesson forwards, considering the title's high volatility.

	SPOT PRICE (March 26 <sup>th</sup> , 2019)	3-MONTHS TARGET PRICE	WORST-CASE SCENARIO PRICE	SUGGESTED HEDGE RATIO	FORWARD PRICE	FORWARD POSITION
Lamb Weston Holdings	\$72.59	\$74.607 (+2.78%)	\$71.043 (-2.13%)	100%	\$70.254	Short
McDonald's	\$188.33	\$190.627 (+1.22%)	\$184.74 (-1.9%)	100%	\$179.441	Short
CBS "B"	\$46.91	\$50.27 (+7.16%)	\$44.962 (-4.15%)	50%	\$49.1295	Short
Autozone	\$993.89	\$996.611 (+0.27%)	\$938.64 (-5.5%)	100%	\$940.604	Short
D R Horton	\$41.25	\$42 (+1.8%)	\$39.342 (-4.62%)	100%	\$40.514	Short
Philip Morris	\$88.87	\$89.18 (+0.35%)	\$80.42 (-9.51%)	100%	\$86.85	Short
Under Armour "A"	\$21.12	N.A.	N.A.	100%	\$16.424	Long
Darden Restaurants	\$119.35	\$120.78 (+1.2%)	\$115.1 (-3.56%)	40%	N.A.	Long
News "B"	N.A	N.A	N.A	N.A	N.A	
Under Armour "C"	\$18.76	N.A.	N.A.	100%		Long
McKesson	\$116.35	\$121.935 (+4.75%)	\$109.01 (-6.3%)	100%	\$112.173	Long

**OTHER SECTORS:** our portfolio has a minor exposure to Health Care (Humana), which is a sector that underperformed the market in the last quarter. Humana delivered a performance of -12% in the last month, but the company's solid fundamentals should trigger a rebound in the long term. Thus, we recommend hedging around half of the investment, considering the negative market sentiment. LyondellBasell (Basic Materials) shows a highly volatile price trend, so it is advisable to hedge a large portion of the investment; same for the other title from the sector, DowDuPont. Short positions are significantly exposed to the Utilities, which slightly underperformed the market in the last quarter. FirstEnergy is in an upward trend since the beginning of the year, so we suggest opening a long position on the forward; NRG Energy grew almost 20% in the last quarter, thus further price movements should be managed. Nisource has recently soared in price, even beyond analyst targets; we suggest a long position anyways, because the favorable conditions in the natural gas industry might



trigger another rise. The last two stocks from the Health Care industry show opposite behavior: Nektar Therapeutics comes from a year of consistent losses (it has lost more than 60% in a year), so it might be wise to hedge all the profits made by the portfolio's short position; Vertex Pharm. does not show a clear price trend, so we suggest a partial hedge in order to seize potential gains.

	SPOT PRICE (March 26 <sup>th</sup> , 2019)	3-MONTHS TARGET PRICE	WORST-CASE SCENARIO PRICE	SUGGESTED HEDGE RATIO	FORWARD PRICE	FORWARD POSITION
<b>Humana</b>	\$265.49	\$287.03 (+8.11%)	\$252.65 (-4.8%)	<b>50%</b>	\$269.47	Short
<b>LyondellBasell</b>	\$83.6	\$87.77 (+4.95%)	\$81.692 (-2.3%)	<b>70%</b>	\$86.7	Short
<b>FirstEnergy</b>	\$41.9	\$42.22 (+0.7%)	\$40.5 (-3.3%)	<b>100%</b>	\$40.78	Long
<b>DowDuPont</b>	\$53.18	\$56.28 (+5.84%)	\$51.56 (-3.04%)	<b>70%</b>	\$54.885	Long
<b>NRG Energy</b>	\$43.36	\$44.16 (+1.86%)	\$42.04 (-4.8%)	<b>70%</b>	\$41.691	Long
<b>Nisource</b>	\$28.82	N.A.	N.A.	<b>80%</b>	\$27.39	Long
<b>Vertex Pharm.</b>	\$189.91	\$194.37 (+2.35%)	\$182.05 (-4.14%)	<b>50%</b>	\$178.41	Long
<b>Nektar Therapeutics</b>	\$32.32	\$32.37 (+21.8%)	\$28.04 (-13.23%)	<b>100%</b>	\$35.35	Long
<b>Marathon Oil</b>	\$17.11	\$18.11 (+5.84%)	\$16.228 (-5.15%)	<b>100%</b>	\$16.3193	Long

*Analysis of the STOXX 600 part:*

**INDUSTRIALS:** our portfolio has a long position in five stocks from the industrial sector: Volvo B, Securitas B, ADP, Dassault Aviation, Balfour Beatty. Short positions include Lafargeholcim, Wirecard, Osram Licht, Melrose Industries, Sartorius Pref. The outlook for the Industrial sector is less optimistic: a potential threat could be a consequence of trade tensions that would greatly harm exports. It seems reasonable to hedge completely against specific risks associated with stocks from Volvo B, Securitas B and ADP, while it seems useless trying to hedge the Dassault Aviation and Balfour Beatty since their price is expected to increase event in the worst-case scenario. On the other hand, we strongly suggest hedging all the short positions except for Sartorius Pref, which is the only one expected to decrease.

	SPOT PRICE (March 26 <sup>th</sup> , 2019)	3-MONTHS TARGET PRICE	WORST-CASE SCENARIO PRICE	HEDGE RATIO	FORWARD PRICE	FORWARD POSITION
<b>VOLVO B</b>	SEK 139.06	SEK 150,69 (+8.6%)	SEK 105 (-24.46%)	<b>100%</b>	SEK 129.60	Short
<b>SECURITAS B</b>	SEK 145.05	SEK 149.14 (+2.75%)	SEK 115 (-20.68%)	<b>100%</b>	SEK 140.50	Short
<b>ADP</b>	€ 171.30	€ 183.5 (+7.06%)	€ 119 (-30.40%)	<b>100%</b>	€ 165.45	Short
<b>DASSAULT AVIATION</b>	€ 1,323	€ 1,718 (+29.43%)	€ 1,500 (+13.37%)	<b>0%</b>	€ 1400.98	Short
<b>BALFOUR BEATTY</b>	£ 261.60	£ 347.86 (+33.07%)	£ 310 (+18.77%)	<b>0%</b>	€ 281.89	Short
<b>LAFARGEHOLCIM</b>	CHF 48.95	CHF 53.01 (+8.86%)	CHF 66 (+34.83%)	<b>100%</b>	CHF 46.97	Long
<b>WIRECARD (XET)</b>	€ 121.77	€ 196.67 (+61.6%)	€ 240 (+97%)	<b>100%</b>	€ 130.79	Long
<b>OSRAM LICHT (XET)</b>	€ 35.28	€ 40.22 (+13.99%)	€ 52 (+47.39%)	<b>100%</b>	€ 37.08	Long
<b>MELROSE INDUSTRIES</b>	€ 181.75	€ 231.73 (+27.5%)	€ 250 (+37,55%)	<b>100%</b>	176.48	Long
<b>SARTORIUS PREF. (XET)</b>	€ 129.5	€ 106 (-17 %)	€ 124 (-4,24%)	<b>0%</b>	140.89	Long

**FINANCIALS:** 15% of the European long section of the portfolio is made of stocks from the financial sector. These include PZU Group, Lundbergforetagen B, 3I Group. The short positions include Investec, Phoenix Group, Banco de Sabadell, Bankia, Natixis, AIB Group and Land Securities Group.

For this year, the central bank forecasts growth of just 1.1%, that is why Mario Draghi said that he will never raise interest rates. The ECB also announced new loans to banks today. The targeted longer-term refinancing operations (TLTROs), cheap loans to banks in return for boosting credit to households and businesses, will begin in September and last until March 2021.

For the next quarter, we see the potential for significant gains for European banks, so we suggest hedging completely the short side of our portfolio. Regarding the three long positions, even though they both have low expected downward movements, we suggest at least a partial hedge.

	SPOT PRICE (March 26 <sup>th</sup> , 2019)	3-MONTHS TARGET PRICE	WORST-CASE SCENARIO PRICE	SUGGESTED HEDGE RATIO	FORWARD PRICE	FORWARD POSITION
<b>PZU Group</b>	€ 40.68	€ 46.76 (+14.94%)	€ 36.50 (-10.27%)	<b>50%</b>	n.a.	Short
<b>LUNDBERGF ORETAGEN B</b>	SEK 286.60	SEK 300 (+4.67%)	SEK 252 (-11.88%)	<b>50%</b>	SEK 279.86	Short
<b>3I GROUP</b>	£ 962,40	£ 1,109 (+15.30%)	£ 950 (-1.29%)	<b>25%</b>	£ 966.34	Short
<b>INVESTEC</b>	£ 433.90	£ 593.6 (+36.86%)	£ 691 (+59.25%)	<b>100%</b>	£ 460.96	Long
<b>PHOENIX GROUP</b>	£ 660.60	£ 772.90 (+17%)	£ 900 (+36.23%)	<b>100%</b>	£ 673.79	Long
<b>BANCO DE SABADELL</b>	€ 0.88	€ 1.30 (+46.35%)	€ 1.82 (+106%)	<b>100%</b>	£ 0.90	Long
<b>BANKIA</b>	€ 2.33	€ 2.94 (26.34%)	€ 4.35 (+86.69%)	<b>100%</b>	€ 2.30	Long
<b>NATIXIS</b>	€ 4.63	€ 5.66 (+21.96%)	€ 6.5 (+40.38%)	<b>100%</b>	4.30	Long
<b>AIB GROUP</b>	€ 3.86	€ 4.54 (+17.49%)	€ 5.3 (+37.30%)	<b>100%</b>	€ 3.88	Long
<b>LAND SECURITIES GROUP</b>	£ 903.60	£ 916.44 (+0.77%)	£ 1,125 (+24.50%)	<b>100%</b>	£ 885.55	Long

**HEALTH CARE:** 15% of the European long section of the portfolio is made of stocks from the Health Care sector, it includes BTG, Shire and Bayer. The short position includes only one stock, Evotec.

We suggest not to hedge the long position of Bayern because the share price has fallen over the last weeks due to a legal inquiry which involved Monsanto, recently acquired by Bayer itself, therefore the price is expected

to bounce back at 70 € at least. On the other hand, BTG should be 100% hedged since both the target price and the worst-case scenario show a negative outlook. For the same reason we suggest hedging 100% of the short position on Evotec, since the price of the related forward contract is € 20.87.

	SPOT PRICE (March 26 <sup>th</sup> , 2019)	3-MONTHS TARGET PRICE	WORST-CASE SCENARIO PRICE	SUGGESTED HEDGE RATIO	FORWARD PRICE	FORWARD POSITION
<b>BTG</b>	£ 832.50	£ 763.33 (-8.31%)	£ 490 (-41.14%)	<b>100%</b>	£ 833.02	Short
<b>Shire</b>	£ 4690	£ 4820 (+2.77%)	£ 4252 (-9.33%)	<b>50%</b>	n.a.	Short
<b>Bayer</b>	€ 56.80	€ 84.76 (+ 48.94%)	€ 123 (+116%)	<b>0%</b>	€ 65.88	Short
<b>Evotec</b>	€ 22.41	€ 23.88 (6.78%)	€ 28 (+24.94%)	<b>100%</b>	€ 20.87	Long

After having conducted this analysis, we suggest the following structure for the specular portfolio.

<b>LONG FORWARD CONTRACTS</b>					
#	Name	Industry	Forward Price	Currency	Contract size
<b>S&amp;P500</b>					
20	WEYERHAEUSER	Financials	24.4832	USD	\$1025.64
21	DOWDUPONT	Basic Materials	54.8855	USD	\$897.45
22	MARATHON OIL	Oil & Gas	16.3193	USD	\$1282
23	UNDER ARMOUR A	Consumer Goods	16.424	USD	\$1282
24	DARDEN RESTAURANTS	Consumer Services	107.5625	USD	\$512.82
25	AVALONBAY COMMNS.	Financials	196.168	USD	\$256.41
26	NEWS 'B'	Consumer Services	13.0231	USD	\$1282
27	FIRSTENERGY	Utilities	40.7866	USD	\$1282

28	RED HAT	Technology	181.9756	USD	\$1025.64
29	QUALCOMM	Technology	53.2084	USD	\$1282
30	UNDER ARMOUR 'C'	Consumer Goods	19.2276	USD	\$1282
31	NRG ENERGY	Utilities	41.691	USD	\$897.45
32	PERKINELMER	Industrials	92.3844	USD	\$256.41
33	GENERAL ELECTRIC	Industrials	9.6365	USD	\$641
34	VERTEX PHARMS.	Health Care	178.4129	USD	\$641
35	WATERS	Industrials	240.091	USD	\$256.41
36	NISOURCE	Utilities	27.3904	USD	\$1025.64
37	MCKESSON	Consumer Services	112.173	USD	\$1282
38	NEKTAR THERAPEUTICS	Health Care	35.3505	USD	\$1282
<b>STOXX600</b>					
21	WILLIAM HILL	Consumer Services	150.109	GBP	\$ 641
22	INVESTEC	Financials	460.969	GBP	\$1282
23	AMS	Technology	30.600	CHF	\$ 641
24	OCADO GROUP	Consumer Services	1049.548	GBP	\$ 641
25	PHOENIX GROUP HDG.	Financials	673.792	GBP	\$ 1282
26	BANCO DE SABADELL	Financials	0.908	EUR	\$1282
27	EVOTEC (XET)	Health Care	20.878	EUR	\$1282
28	BANKIA	Financials	2.301	EUR	\$1282
29	NATIXIS	Financials	4.306	EUR	\$1282
30	AIB GROUP	Financials	3.885	EUR	\$1282
31	LAFARGEHOLCIM	Industrials	46.970	CHF	\$ 1282
32	CD PROJECT RED	Consumer Goods	183.270	PLN	\$ 641
33	TEMENOS N	Technology	144.940	CHF	\$ 641
34	LAND SECURITIES GROUP	Financials	885.551	GBP	\$ 1282
35	WIRECARD (XET)	Industrials	130.799	EUR	\$ 1282
36	CELLNEX TELECOM	Telecommunications	24.436	EUR	\$ 641
37	OSRAM LICHT (XET)	Industrials	37.088	EUR	\$ 1282

38	MELROSE INDUSTRIES	Industrials	176.480	GBP	\$ 1282
39	SARTORIUS PREF. (XET)	Industrials	140.898	EUR	\$ 0
40	UNIPER SE (XET)	Utilities	25.065	EUR	\$641
<b>SHORT FORWARD CONTRACTS</b>					
#	Name	Industry	Forward Price	Currency	Contract size
<b>S&amp;P500</b>					
1	LOCKHEED MARTIN	Industrials	300.67	USD	\$1282
2	LAMB WESTON HOLDINGS	Consumer Goods	70.2538	USD	\$1282
3	MCDONALDS	Consumer Services	179.441	USD	\$1282
4	BANK OF NEW YORK MELLON	Financials	51.5246	USD	\$1282
5	AUTODESK	Technology	153.343	USD	\$897.45
6	BOEING	Industrials	423.122	USD	\$1282
7	KEYSIGHT TECHNOLOGIES	Industrials	84.5241	USD	\$1282
8	COMERICA	Financials	83.3265	USD	\$1282
9	HUMANA	Health Care	269.469	USD	\$641
10	ASSURANT	Financials	100.0009	USD	\$641
11	MOTOROLA SOLUTIONS	Technology	139.1928	USD	\$1282
12	CBS 'B'	Consumer Services	49.1295	USD	\$641
13	PRINCIPAL FINL.GP.	Financials	49.685	USD	\$1282
14	AUTOZONE	Consumer Services	940.604	USD	\$1282
15	SYMANTEC	Technology	22.0108	USD	\$1282
16	LYONDELLBASELL INDS.CL.A	Basic Materials	86.7092	USD	\$897.45
17	T ROWE PRICE GROUP	Financials	96.6968	USD	\$1282
18	D R HORTON	Consumer Goods	40.514	USD	\$1282
19	PHILIP MORRIS INTL.	Consumer Goods	86.8499	USD	\$1282
<b>STOXX600</b>					
1	PZU GROUP	Financials	n.a.	EUR	\$ 641

2	NATIONAL GRID	Utilities	844.213	GBP	\$ 641
3	KPN KON	Telecommunications	2.681	EUR	\$ 641
4	BTG	Health Care	833.022	GBP	\$ 1282
5	VOLVO B	Industrials	129.608	SEK	\$ 1282
6	LUNDBERGFÖRETAGEN B	Financials	279.864	SEK	\$ 641
7	SECURITAS B	Industrials	140.507	SEK	\$ 1282
8	BRITISH AMERICAN TOBACCO	Consumer Goods	3016.295	GBP	\$ 641
9	ADP	Industrials	165.453	EUR	\$ 1282
10	LOGITECH 'R'	Technology	37.494	CHF	\$ 641
11	SHIRE	Health Care	n.a.	GBP	\$ 641
12	3I GROUP	Financials	966.346	GBP	\$ 320.5
13	DASSAULT AVIATION	Industrials	1400.985	EUR	\$ 0
14	BARRATT DEVELOPMENTS	Consumer Goods	593.649	GBP	\$ 641
15	BALFOUR BEATTY	Industrials	281.890	GBP	\$ 0
16	PEARSON	Consumer Services	813.584	GBP	\$ 641
17	SWEDISH MATCH	Consumer Goods	452.841	SEK	\$ 641
18	BP	Oil & Gas	529.287	GBP	\$ 641
19	KION GROUP (XET)	Industrials	47.722	EUR	\$641
20	BAYER (XET)	Health Care	65.881	EUR	\$ 0

Since all the 78 stocks have the same weight in our portfolio, the formula to calculate the size of each forward contract is:

$$\text{Contract Size} = \$100,000 * \frac{1}{78} * \text{Hedge Ratio}$$



## Cash and Carry

Forward contracts can also be used to seize riskless profits, exploiting their own eventual mispricing. This technique is known as cash and carry: if the forward price is higher than the collateral's current spot price plus carrying and storage costs (the forward "trades rich"), an investor could buy the security and gain a short position on the forward; then hold the collateral until the expiration date and settle the contract by physical delivery. If mispricing is significant, the investor gains a risk-free profit which is the difference between the costs of buying and holding the security, versus the forward sell price. A specular version of this strategy is known as reverse cash and carry: if the forward is significantly cheaper than the spot price (the forward "trades cheap"), riskless profits could be made by combining a short position in the stock with a long position in the derivative. On the expiration date, the investor receives the stock to settle the contract and uses it to cover the short position: this way, he pays a lower price and receives a higher payoff. However, since this report is only a theoretical exercise, we will not apply this strategy to our portfolio.

## IV - Hedging our Portfolio with Options

### Collar Strategy

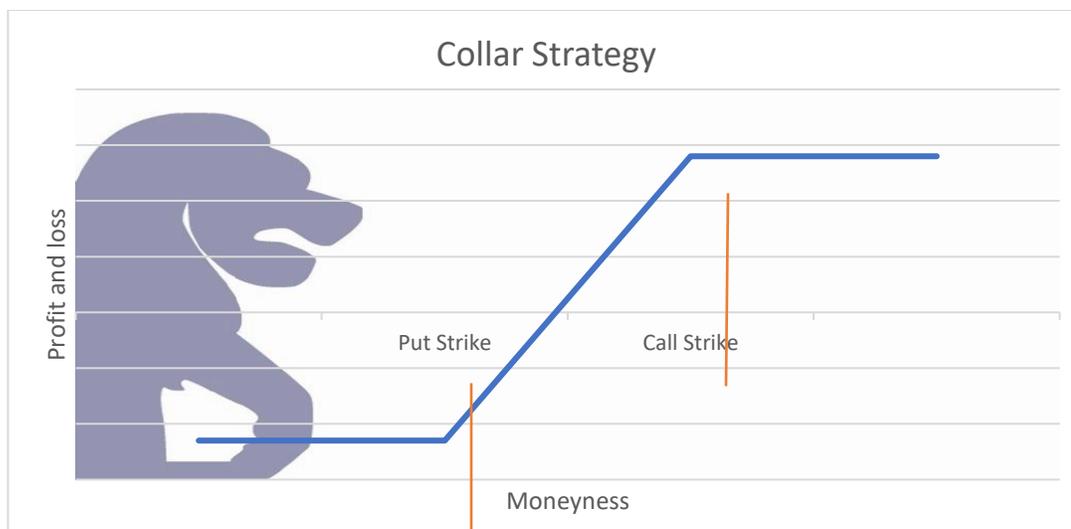
The second portfolio built by the Asset Management team is not sector-neutral. This option strategy is aimed at hedging the sectors risk of this portfolio. In this way, we should manage to deliver returns (or losses) that are only linked to the alfas of our stocks. Once we have isolated the idiosyncratic sector risk of each stock, the way in which the portfolio is constructed should guarantees us a performance that is ascribable only at the fundamentals of the stocks.

The strategy we have chosen to hedge the market risk is a collar option strategy. A collar option is a strategy where you buy a protective put and sell a covered call with the stock price generally in between the two strike prices. This strategy is usually implemented when your analysis suggests an upward in stock prices.

In our case, we will implement two different collar option strategies. The first is to hedge the long part of our non-sector-neutral portfolio and the second is to hedge the short part. Therefore, the first strategy consists in the position of being long put options, short call options, and long shares of the underlying stock. The second is specular, with a short position on the put option and being long on call, since we are already short on the underlining.

For our hedging purpose, we defined the exposure at the sector risk of the portfolio and we choose the indexes on which build our collar strategy. The main measures we are interested in are the cost of strategy, the maximum profit and the maximum loss. A collar strategy is a bullish position, so we will have a gain if the sectors will perform better in the future but in the other hand, it will ensure a defined amount of losses ex ante, hedging the portfolio in case of bad performance and fulfilling our purpose.

To understand how the strategy works, it is useful to look at the graph of a collar position on options.



On the axes we have the profit and loss of the position (long spot, short put and long call) and the moneyness of the options that is linked to underlining current price. Both options must be Out of the Money to correctly implement the strategy. As from the graph can be seen, a collar strategy perfectly defines a level of loss and profit that cannot be exceeded.

About the US stocks, listed in the S&P 500 index, in the portfolio the sector we are exposed to are Industrials, Consumer Services, Consumer Goods, Financials, Technology, Health Care, Basic Materials, Oil & Gas, Utilities. According to this, the underlining sectorial indexes and ETF of call and put options we are using in our strategy are respectively: Dow Jones U.S. Industrial Average; U.S. Consumer Services ETF; US Consumer Goods ETF; U.S. Financial Services ETF; U.S. Technology ETF; U.S. Healthcare ETF; U.S. Basic Materials ETF; U.S. Energy ETF; Transportation Average ETF.

Sectors S&P 500	Cost of the strategy	Max profit	Max loss	Weight
Industrials	-0,50	6,96	-7,96	16%
Consumer Services	-0,09	2,69	-2,87	16%
Consumer Goods	0,04	5,68	-5,60	16%
Financials	-0,20	5,98	-6,38	21%
Technology	-0,70	8,80	-10,20	16%
Health Care	-0,40	9,23	-10,03	5%
Basic Materials	-0,20	4,30	-4,70	5%
Oil & Gas	-0,08	1,73	-1,88	3%
Utilities	-1,60	7,49	-10,69	3%



Based on the prices of the Underlining, of the call and put options with expiration date 21/06/2019, we have calculated the cost of the collar strategy for each sector that is defined as the difference between the cost of buy a call option and the earnings of sell a put option. Moreover, we calculated the maximum profit and loss of the strategy at the expiration date of the option (note that options on stock indexes are commonly European, so the we can easily define the best or the worst payoff at the end of the contract).

In the first case, the profit is given by the difference between the strike price of call option and the price of underlining securities plus the cost of the strategy. In a specular way, the maximum loss is given by the difference between the price of the underlining and the strike of the put option.

Note that the calculation has been made on a single contract. To implement it on a portfolio level, we can define the amount of call to be bought and put to be sold based on the weight (shown in the table) given to each sector in the portfolio.

In the same way, we computed the cost of strategy, the maximum profit and the maximum loss of a collar strategy on our European portfolio. The sector we are exposed to are Financials, Utilities, Telecommunications, Health Care, Industrials, Consumer Goods, Technology, Consumer Services and Oil & Gas. The underlining sector indexes of the options are respectively: Stoxx Europe 600 Financial Services Index; Stoxx Europe 600 Utilities; Stoxx Europe 600 Telecommunication; Stoxx 600 Europe; Stoxx Europe 600 Health Care UCITS ETF DE; Stoxx Europe 600 industrial good and services; Euro Stoxx Personal & Household Goods; Stoxx Europe 600 Technology UCITS ETF DE; Stoxx Europe 600 Personal & Household Goods; Stoxx Europe 600 Oil and Gas.

Sectors	Cost of the strategy	Max Profit	Max Loss	weight
Financials	-4,90	18,39	-28,19	25%
Utilities	-2,20	13,65	-18,05	5%
Telecommunications	-5,10	7,42	-17,62	5%
Health Care	-3,10	35,93	-42,13	10%
Industrials	-6,90	18,51	-32,31	28%
Consumer Goods	-8,30	38,34	-54,94	10%
Technology	-3,40	19,21	-26,01	8%
Consumer Services	-3,60	37,66	-44,86	8%
Oil & Gas	-3,30	13,46	-20,06	3%

[Note: all the prices and the data are collected and referred to the date 27/03/2019]

This paper, as aforementioned, is only for academic purposes. Hence, we will not care about the prices of these strategies even if we are aware that is a crucial point to consider when you structure a hedging strategy.