

A Work Project, presented as part of the requirements for the Award of a Master Degree in Finance from the NOVA – School of Business and Economics

# NSP Work Project

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# Investment Styles



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*A Project carried out on the Master in Finance Program, under the supervision of:*

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## **Abstract**

This paper analyzes the Nova Student Portfolio (NSP) with the objective to understand performances of the fund. Each investment style has been analyzed (growth, value and momentum) in order to highlight what style allocation contributed positively and which had a negative impact. The results show that the team mainly invested in value stocks, which contributed positively but that its growth investments had a negative impact on the stock picking performance. The stock selection shows a major influence of the value investment style. A statistical approach shows that the market factor was the one explaining the most the NSP returns.

## **Literature review**

The modern portfolio theory has been based on the existence of an efficient frontier (Markowitz, 1952, 1959). The most famous Capital Asset Pricing Model has been created step by step (Sharpe 1964, Lintner 1965, Mossin 1966), adding the Risk Free asset to the Markowitz work in order to create a new line that highlights the optimal portfolio. Several papers have been written on the bias coming from the CAPM and enhancement have been proposed over time (Black 1972, Ross 1976).

The first academic works that demonstrated an inefficiency of the market in favor of value stocks came later. Indeed, it was demonstrated that stocks with low Price to Earnings ratios (PE) tend to outperform stock higher PE (Basu 1977). The next step came with the demonstration that stocks with low Price to Book value (PB) outperforms stock with high PB (Rosenberg, Reid and Lanstein, 1985). Those two factors are the main fundamentals that summarized the value investment style (John S. Brush 2007). That factor has been taken into account in order to create a new asset price model with 3 factors, including the Price to Book (Fama, French 1992). Nevertheless the existence of such investment style was already in practice earlier (Graham 1946).

Different approaches of investment styles have been observed more recently with the uprising of the Growth investment style, especially with the creation of the Price Earnings Growth (Peter Lynch 1989). While Value investors care about the current intrinsic value of assets, Growth Investors care especially about expected growth of firms. Recent studies sometimes affirm that in reality, value stocks does not beat growth stocks (John S. Brush 2007).

Another bias of the market inefficiency hypothesis has been exploited by the demonstration of a momentum anomaly (Jegadeesh, Titman 1993) which shows that stocks that perform the most tend to create an unexplained excess return compared to the market.

The fund is going to be analyzed keeping in mind those investment styles and their specificities with the objective to estimate the realized contribution to return for each of them.

## **Introduction**

Sponsored by Banco Invest, the Nova Student Portfolio (NSP) has been launched in November 2014 with an inception net asset value of \$310 000 in order to give the students the opportunity to manage a real portfolio with a high degree of autonomy. Students have followed rules and advises of two supervisors, the Professor Pedro Lameira and his teaching assistant Gonçalo Sommer Ribeiro, investing exclusively in US traded assets.

The main guideline of this research will be to analyze the stock selection and its relative performance between the inception date and the 29<sup>th</sup> of May.

The performance of the fund will be analyzed, in total, month by month and compared to the performance of its benchmark. Then, the fund performance will be split in detail in order to highlight where value has been created or lost. Indeed, the fund will be analyzed per asset class (Equity, Bonds and derivatives), per sector and per investment style.

Then, the analysis will be focused on the performance of the several investment styles. The contribution to return of each investment style will be analyzed as a portfolio itself. Indeed, each style portfolio will be analyzed sector by sector in order to explain those performances. Besides explaining contributions and pure performances, the selection and allocation effects will be distinguished in order to have a true measure of the investment team performance for its stock picking performance. The stock picking will also be analyzed stock by stock in order to highlight the best and the worst contributors, in order to confront it with previous analyzes. In order to have another view on the stock picking influence over the NSP, the rolling weighted average of the NSP fundamentals will be analyzed in order to understand changes in investment style that appeared over the investment period.

Finally, the influence of the market on NSP will be analyzed in order to explain statistically NSP returns. Indeed, through several regressions the portfolio returns have been studied with the objective to target a possible market factor that may explain the most the NSP behavior.

## **NSP performance**

The portfolio has a UP of 102,92 after a 6 months investment period while the benchmark has a UP of 102,61 as it can be seen on the appendix (1). The implied annualized return of the fund is 5,56% (versus 4,96% for the benchmark), for an annualized daily volatility of 5,53% (versus 4,98% for the benchmark) which leads to an Info Sharpe of 1,01 (versus 1,00 for the benchmark)<sup>1</sup>. In terms of value, the final NAV (net asset value) was \$ 319 056 which has been increased by \$9 056 compared to the inception NAV of \$ 310 000.

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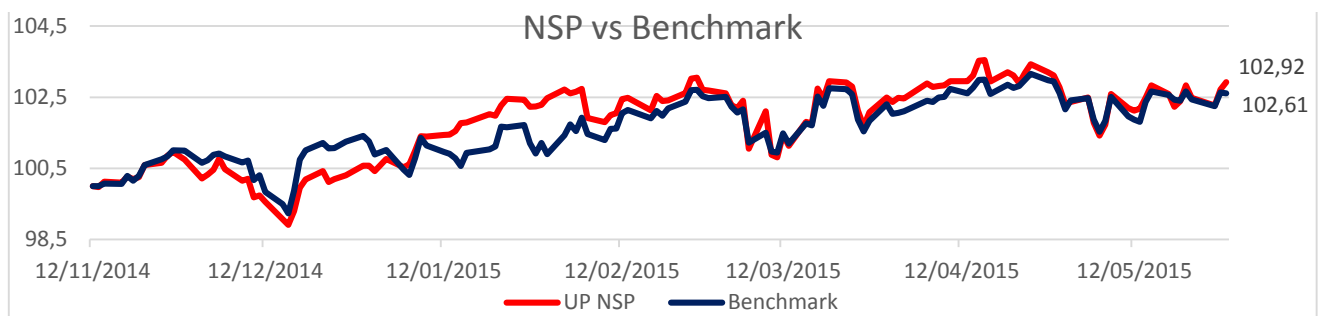
<sup>1</sup> Info Sharpe = Annualized return / Annualized standard deviation

	NSP	Benchmark
TOTAL RETURN	2,92%	2,61%
Annualized return	5,56%	4,96%
Risk	5,53%	4,98%
Info sharpe	1,01	1,00
Max Drawdown	-2,17%	-1,76%
BETA vs S&P 500	0,29	0,36
NAV - Inception	\$ 310 000,00	
NAV - Final	\$ 319 056,10	

1- NSP performance vs Benchmark

The fund manages to outperform its benchmark with an excess return of 0,31%. The maximum drawdown of the fund is -2,17% and -1,76% for the benchmark. The BETA of the fund versus the S&P 500 is 0,29 over the period versus 0,36 for the benchmark. That shows that the NSP has got less sensitivity to the market than the benchmark. This can be explained by the fact that the stock selection decreased the correlation with the S&P 500 and by the high allocation in bonds.

The appendix (2) shows the evolution of the NSP performance overtime versus its benchmark.



2- NSP performance vs Benchmark

Several factors can explain the performance of the fund: the bond performance, the equity performance and the derivatives. This performance has been created month after month. Therefore the performance will be analyzed, focusing on the months during which excess returns has been created between the fund and the benchmark.

## Monthly performances

	November	December	January	February	March	April	May
NSP	0,75%	-0,32%	2,04%	0,20%	-0,31%	-0,06%	0,60%
Benchmark	1,00%	-0,11%	0,01%	1,55%	-0,42%	0,12%	0,44%

3- Monthly Performance of NSP vs benchmark

The appendix (3) shows the monthly performances of the fund and of the benchmark. The fund created the majority of its excess return in January with a performance of 2,04% while the benchmark had a performance of 0,01%.

	November	December	January	February	March	April	May
NSP UP	100,75	100,43	102,48	102,69	102,37	102,30	102,92
Benchmark UP	101,00	100,89	100,90	102,47	102,04	102,16	102,61

4- Monthly UP of NSP vs Benchmark

Indeed, at the end of January, the UP of the fund was 102,48 while the benchmark one was 100,90 as the appendix (4) shows. At this point the fund had an excess return of 1,58%.

Nevertheless, the fund lost an important part of this excess return in February, with a performance of 0,20% versus 1,55% for the benchmark (Appendix 3). At the end of February, the fund UP was 102,69 while the benchmark had a UP of 102,47. It results that the fund had a relative negative performance of -1,35% compared to the benchmark.

According to the structure of the asset class composition of the fund and of the benchmark, two market variables could explain the performance gap between January and February, the S&P 500 performance and the Bonds performances.

	November	December	January	February	March	April	May	TOTAL
S&P 500	1,38%	-0,42%	-3,10%	5,49%	-1,74%	0,85%	1,69%	3,99%
Barclays US Aggregate	0,75%	0,09%	2,10%	-0,94%	0,46%	-0,36%	-0,40%	1,69%

5- Monthly performance of Benchmark Indexes-

The appendix (5) shows performances of the S&P 500 and the Barclays US aggregate (an aggregate performance of the US Bond Market). Looking at the performance of the S&P 500 and the Bond market in January, it may look clear that the NSP took advantage of the bond performance and was

not affected by the negative performance of the equity market, while the 40% of the benchmark allocation in equity explain its weak performance during that month as it was seen before (0,01%).

In February, the S&P 500 realized a performance of 5,49%, while the Bond index had a negative performance of -0,94%. Over the same time period, the fund had a negative relative performance versus the benchmark (-1,35%) as it was previously seen. Contrary to January, the fund looks to have been underperforming because it was too underweighted in equity compared to the benchmark.

Month	November	December	January	February	March	April	May	Total
EQUITY Contribution	0,28%	-0,11%	-0,94%	1,56%	-0,82%	0,25%	0,60%	0,81%
Average weight	24,29%	47,05%	26,85%	31,05%	44,57%	41,37%	41,07%	37,60%
BOND Contribution	0,46%	-0,21%	2,99%	-1,30%	0,50%	-0,31%	0,01%	2,11%
Average weight	84,59%	112,91%	122,32%	102,72%	95,34%	104,16%	95,40%	103,39%
NSP Performance	0,75%	-0,32%	2,04%	0,20%	-0,31%	-0,06%	0,60%	2,92%
Total Average Weight	108,88%	159,96%	149,17%	133,77%	139,91%	145,53%	136,46%	140,99%

*6-Monthly Contribution per Asset Class*

The appendix (6) shows the monthly contributions of the equities and bonds with respective average allocation weights per month. The hypothesis previously explained is confirmed. Indeed, in January the NSP fund took advantage of its low allocation in equity. It was therefore not much affected by the poor performance of the equity us market (performance of -3,10% for the S&P 500, -0,94% of contribution for the equity part with an average allocation weight of 26,85% over the month). The leverage on bonds enabled the fund to take advantage of the Bond market over January (2,10% of performance for the Bond market, 2,99% of contribution for the bonds with an average allocation weight of 122,32% over the month).

In February, the fund underperformed its benchmark as it was seen before (negative relative performance of -1,35%). Indeed the poor performance of the fund comes from the fact that it was less allocated in equity compared to the benchmark (31,05% of average allocation in equity over

the month versus 40% for the benchmark). That month, the bond market suffered with a negative performance of -0,94%. The fund has been affected by this weak performance because of its high allocation in bonds as we can see in appendix (6). Indeed it had an average bond allocation of 102,72% while the benchmark was less affected with its 60% in bond allocation.

## Leverage effect

As previously explained, the team was able to change the leverage of the fund from 1 to 2. It was already shown in the appendix (7) that the average leverage level of the fund was 1,41. The P&L of futures that the team invested in has been calculated in order to understand the leverage effect over NSP.

	Contribution	P&L	Average weight
EQUITY	1,34%	\$ 4 165,27	35,13%
Bond	1,67%	\$ 5 177,28	36,00%
Derivative	-0,09%	\$ -286,45	69,85%
TOTAL	2,92%	\$ 9 056,10	140,99%

*7-Total contribution per asset class*

The appendix (8) shows that unlevered equity contribution is 1,34% and the unlevered bond performance is 1,67%. The total unlevered return is 3,01%. That results leads us to focus on the contribution of the derivative instruments. The global contribution (futures on bond and equity together) is -0,09%. The conclusion of those results is that the team has not managed well its future allocation and therefore its leverage strategy.

## Equity analysis

As previously announced, the objective of this paper is to analyze in detail the equity part. The equity contribution of NSP is 0,81%, (1,34% unlevered). The equity part has been divided between several parts, in order to understand how each part performed.



## Contribution per asset class of the equity part

	Contribution	Average weight	Contribution / weight
Future on SPY	-0,53%	2,47%	-0,216
SPY	1,19%	21,31%	0,056
Other ETFs	0,08%	1,57%	0,048
STOCKS	0,08%	12,26%	0,006
TOTAL EQUITY	0,81%	37,60%	0,022
Equity Unlevered	1,34%	35,13%	0,038

9- Total contribution of the equities

The appendix (9) shows the contribution of each type of asset with its average weight over the investment period. As previously demonstrated, the futures bring a negative contribution of -0,53%. The total contribution of the tracker on the S&P 500 (SPY) is 1,19% which explains the main part of the total equity contribution. The team has also invested in other ETFs (three in total, one tracker on the DAX, one on the small capitalizations and one over high dividend yields stocks). Those ETFs have been separated to other selected stocks in order to show the ability of the team to select specific stocks and to create value with those ones and not through selecting other funds. The contribution of those funds is 0,08% with an average allocation weight of 1,57%.

The concept of the NSP project is to let students managing the fund but also to invest in specific stocks, in order to overperform the benchmark. The stocks selected by the student have a global contribution of 0,08% with an average allocation weight of 12,26%. This contribution is equivalent to the one of the 3 selected ETFs that have an average allocation weight of 1,57% which is 7,8 times less than the one of the selected stocks. A ratio comparing the contribution to the average allocation weight has been computed in order to have an efficient tool of comparison between the contribution and the weight taken by the asset class in order to be able to bring that contribution. The first conclusion about the stock picking is that it has poorly performed, firstly compared to the SPY and secondly to the other ETFs. Indeed, the ratio Contribution over average allocation weight of the SPY (0,056) is higher than the one of the stock picking (0,006) which means that the

allocation weight occupied by the stock picking was not efficient (appendix 9). The same conclusion can be applied comparing ETFs and selected stocks.

## Performance of the stock portfolio

Stocks	NSP				S&P 500			
	Performance	Annualized perf	Risk	Info Sharpe	Performance	Annualized perf	Risk	Info Sharpe
	0,20%	0,41%	14,02%	0,03	2,62%	5,54%	13,03%	0,43

10 - Performance of stocks vs S&P 500

The appendix (10) shows the performance of the stock picking (excluding the 3 ETFs). For the total invested of \$119 388 in these specific stocks, a positive P&L of \$233,17 has been realized which gives a return of 0,20% (or 0,41% annualized) for an annualized standard deviation of 14,02%. The Info Sharpe of the stock portfolio is 0,03, significantly below the info Sharpe of NSP (1,01). The performance of the S&P 500 has also been calculated over the same time period. The Stock portfolio has underperformed the US equity market over its investment period. In terms of performance (0,20% vs 2,62%) and in term of efficiency (Info Sharpe of 0,03 vs 0,43).

## Analysis per sector

### Contribution

The stock portfolio has been split per sector (GICS, according to Bloomberg) in order to point out what sectors have poorly performed and which sectors have positively performed.

	Contribution	Average weight	Contribution / Weight	Average % stocks	Average allocation of S&P 500
Technology	-0,15%	2,01%	-0,075	16,44%	20,90%
Financial	0,28%	1,00%	0,278	8,18%	16,60%
Basic Materials	-0,18%	0,47%	-0,372	3,86%	2,90%
Consumer, Cyclical	0,02%	3,75%	0,006	30,62%	9,60%
Consumer, Non-cyclical	0,13%	2,24%	0,059	18,25%	13,10%
Industrial	0,00%	0,92%	-0,001	7,47%	10,10%
Communications	-0,28%	1,47%	-0,194	11,97%	2,30%
Energy	0,25%	0,39%	0,646	3,21%	7,10%
TOTAL Stock	0,08%	12,26%	0,006	100,00%	

11 - Contribution per sector

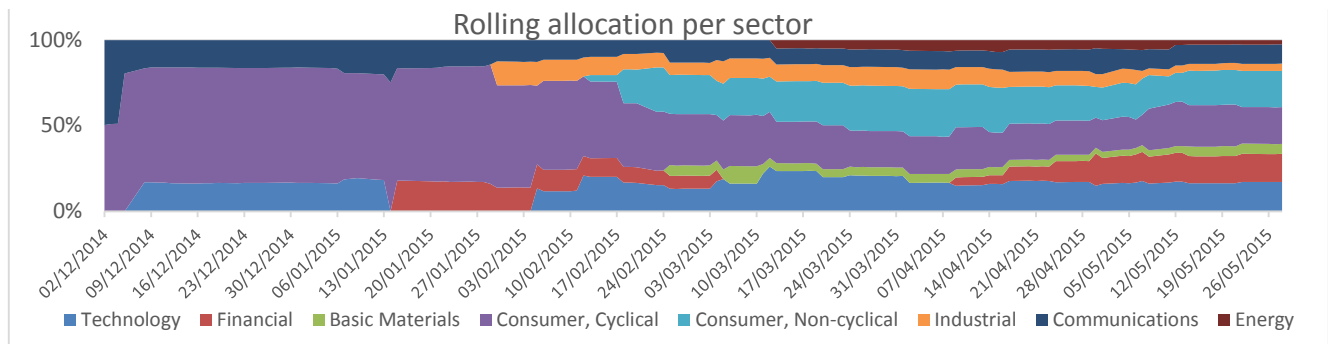
As the appendix (11) shows, the best sector of NSP in terms of contribution is the financial sector with a total contribution of 0,28%. In terms of allocation efficiency, the best sector is the energy

sector with a contribution of 0,25% and a ratio Contribution / Weight of 0,646 (versus 0,278 for the financial sector). That means that the energy sector needed a low allocation weight in order to realize this contribution. The financial sector, that has the best contribution, needed a higher allocation in order to realize that allocation. The worst sector in terms of contribution is the Communication sector with a total contribution of -0,28%. The worst sector in terms of allocation efficiency is the sector of Basic Materials with a contribution of -0,18% and a ratio of -0,372 that means that this sector negatively affected the NSP performance with only a small allocation weight.

#### **Allocation comparison with S&P 500**

The appendix (11) shows the average allocation weight per sector of the NSP stock picking and of the S&P 500. The fund was on average underweighted on the technology, financial, industrial, and energy sectors. On the other side, the stock portfolio was overweighted on the consumer sectors (cyclical and non-cyclical) and on the sector of communications. The technology sector was underweighted (16,44% vs 20,90%). Therefore the negative performance affected less the relative performance of the fund versus the benchmark than if the allocation was in line with the benchmark. The financial sector was underweighted (8,18% vs 16,60%). Therefore, the team lost potential positive contribution since the stock selection was positive (the best with 0,28%). Indeed if the allocation was in line with the benchmark, the contribution would have been higher.

The appendix (12) shows the rolling allocation per sector of the NSP in order to have a better view on the portfolio evolution.



12- Rolling allocation per sector

The predominance of the consumer cyclical sector was mainly observable during the first half of the investment period. Indeed, the portfolio became more diversified after February, investing in several sectors. Again, the presented allocation weights are only calculated taking into account the stock picking. Obviously, the investment in the SPY brought a direct sectorial diversification since it tracks the S&P 500.

## Performance

The performance has been calculated for each sector, comparing the P&L of all stocks of each sector to the value invested in total for each one.

	NSP				S&P 500			
	Performance	Annualized perf	Risk	Info Sharpe	Performance	Annualized perf	Risk	Info Sharpe
Technology	-2,25%	-4,79%	21,57%	-0,22	2,94%	6,37%	13,19%	0,48
Financial	4,82%	13,92%	16,25%	0,86	6,43%	18,61%	11,84%	1,57
Basic Materials	-7,39%	-26,08%	22,85%	-1,14	0,33%	1,28%	11,23%	0,11
Consumer, Cyclical	0,22%	0,45%	15,28%	0,03	2,62%	5,50%	13,03%	0,42
Consumer, Non-cyclical	2,28%	8,32%	15,56%	0,53	1,13%	4,03%	10,73%	0,38
Industrial	-0,03%	-0,10%	15,01%	-0,01	6,31%	20,67%	11,09%	1,86
Communications	-7,35%	-14,69%	18,28%	-0,80	2,62%	5,50%	13,03%	0,42
Energy	26,25%	209,44%	36,10%	5,80	3,28%	16,60%	10,75%	1,54

13- Performance per sector vs S&P 500

### Best sectorial performances

The appendix (13) shows the performance of each sector among the stock portfolio of NSP and its comparison with the S&P 500 over the same time period. The best performer is the sector of the energy with a performance of 26,5%. The annualized return looks abnormally extreme (209,44%) since the performance was realized by only one stock over a short time period (less than 2 months).

Over the same time period the benchmark realized a performance of 3,28% with an Info Sharpe of 1,54.

It was previously seen that the financial sector was the best contributor. The stock of the sector realized a performance of 4,82% with an Info Sharpe of 0,86. Over the same time period the S&P 500 had a performance of 6,43% with an Info Sharpe of 1,57. The financial sector have therefore underperformed the US market over its investment period. The good performance of the financial sector can be more explained by the market timing and a positive market trend than by a positive stock selection.

The sector of the “Consumer – Non Cyclical” of NSP achieved a performance of 2,28% with an info Sharpe of 0,53 while the S&P 500 achieved a performance of 1,13% with an Info Sharpe of 0,38 over the same time period. The stock of this sector have therefore overperformed the market in terms of performance and efficiency.

#### *Worst sectorial performances*

Stocks of the sector of communications achieved a negative performance of -7,35% while the S&P 500 achieved a performance of 2,62%. The stocks of the sector have therefore weakly performed among a positive market environment (Appendix 13).

Stocks of the sector of basic materials have a negative performance of -7,39% which is the worst performance among all the several sectors. Over the same time period, the S&P 500 achieved a performance of 0,33%. Compared to the case of the stock of the communication sector, the stocks of the basic material had a more negative market environment even if a poor stock selection is also the explanation of the negative performance.

## Analysis of the stock picking per investment style

### Methodology

The stock portfolio has been split in function of the relative investment style of each stock. The style depends of several factors such as the Price Earnings Ratio, the Price to Book Ratio, the Return on Equity, the Dividend Yield, the Price to free cash flow, the growth of the earnings per share and the sales growth. A quantitative grade has been given to stocks in function of the position of each fundamental ratio compared to the average of the relative sector of each stock.

In his paper, “Value and Growth, Theory and Practice”, John S. Brush uses several criteria for selecting value stocks (dividend yield, price earnings ratio, free cash flow to price, expected Price earnings ratio and price to book ratio) or growth stocks (change in price earnings ratio, long time growth of PE ratio, earnings surprises and price momentum)<sup>2</sup>. In this analysis, all the suggested ratios were added to the quantitative process for the value allocation, while growth criteria were taken over for simplicity of execution. The growth ratios that are compared to the sector average for each stock are: the price earnings ratio, the sales growth and the earning per share growth.

Stocks with fundamentals in average below the average fundamentals of the sector are classified as value stocks while stocks with growth indicator above the sector fundamentals are classified as growth stocks. The momentum stocks are the ones for which the stock picker specifically mentioned the momentum strategy with a significant price momentum.

The style announced by the stock picker during investment idea presentations has also been taken into consideration in order to respect the stock picker decision, since every decision was approved by investment committees. For specific cases where the investment style was not easily visible,

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<sup>2</sup> John S. Brush 2007, “Value and Growth, Theory and Practice “ Journal of Portfolio Management vol. 33

subjective decisions have been made (for example, Apple has been considered as a growth stock even if it could be interpreted differently). The whole style attribution ranking is available in the external appendix.

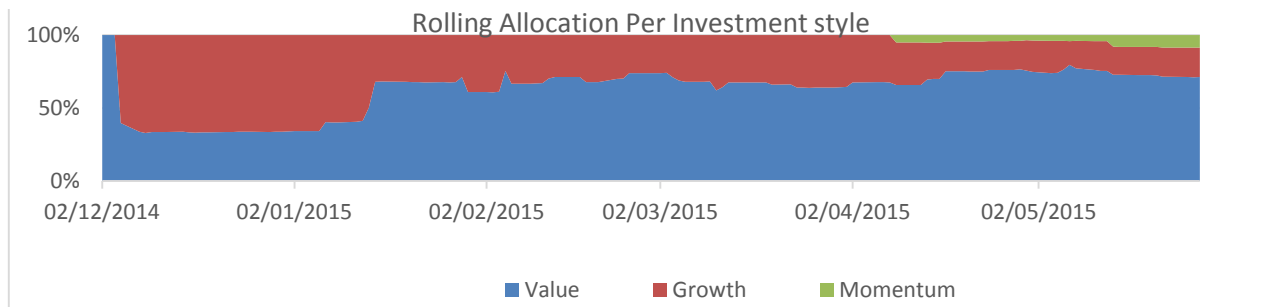
### Sectorial allocation analysis per investment style

The average allocation has been compared between the NSP stock selection and the allocation of May 2015 of 3 indexes: The S&P 500, the S&P 500 Value and the S&P 500 Growth. The appendix (14) shows these comparisons.

	Technology	Financial	Basic Materials	Consumer, Cyclical	Consumer, Non-cyclical	Industrial	Communications	Energy
NSP	16,44%	8,18%	3,86%	30,62%	18,25%	7,47%	11,97%	3,21%
S&P 500 Value	6,50%	25,70%	3,70%	8%	10,10%	12,80%	4,90%	12,60%
S&P 500 Growth	33,20%	8,90%	2,20%	17,40%	9,10%	7,90%	0,20%	2,40%
S&P 500	20,90%	16,60%	2,90%	13,10%	9,60%	10,10%	2,30%	7,10%

84 - Average sectorial allocation vs S&P 500 indexes

On paper, and without looking on each component of each sector, the NSP stock selection seems more oriented into a growth style. Indeed, the allocation between NSP and the Growth index shows some similarity, for example with the following sectors: the energy allocation (3,21% vs 2,40%), the industrial allocation (7,74% vs 7,90%) and the financial allocation (8,18% vs 8,90%). Nevertheless, the allocation differs significantly for key growth sector, such as the technology sector (16,44% vs 33,20%) or the communication sector (11,97% vs 0,20%). No conclusion about the style orientation of the stock selection can be made for now. Looking at detail, stock by stock is compulsory. Nevertheless, the overweight of the consumer sectors (30,62% for the cyclical and 18,25% for the non-cyclical) are obvious. Indeed the gap is significant compared to the 3 indexes. The appendix (15) shows the evolution of the investment style allocation of NSP. That shows that the stock picking was more focused on growth stocks and then more oriented on value stocks.



15- Rolling allocation per investment style

## Performance

	NSP				S&P 500			
	Performance	Annualized perf	Risk	Info Sharpe	Performance	Annualized perf	Risk	Info Sharpe
Value	2,55%	5,37%	15,21%	0,35	2,62%	5,54%	13,03%	0,43
Growth	-5,21%	-10,79%	17,90%	-0,60	2,19%	4,69%	13,18%	0,36
Momentum	2,15%	17,07%	18,49%	0,92	1,42%	10,65%	10,01%	1,06

16- Performance per investment style vs S&P 500

As mentioned before, the total stock portfolio has a performance of 0,20%. The growth portfolio is responsible for the weak performance of the total stock portfolio since it had a performance of -5,21%, strongly underperforming the S&P 500 (2,19%) over its investment period, as shown on the appendix (16).

The value portfolio ends the investment period with a performance of 2,55% which is the best performance compared to the other two investment styles (-5,21% for growth stocks and 2,15% for momentum stocks). Nevertheless, the value portfolio has slightly underperformed the S&P 500 over its investment period (2,62%) and was riskier (standard deviation of 15,21% vs 13,03%). It can be concluded that the S&P 500 was more efficient, comparing the Info Sharpe (0,35 vs 0,43).

In terms of annualized return, the best performance comes from the momentum stocks with 17,07% of annualized return (the team invested less than two months in those stocks). Then the momentum portfolio has the best Info Sharpe Ratio with 0,92 versus 0,35 for the value portfolio. The momentum portfolio has overperformed the S&P 500 over its investment period and was more efficient.



## Contribution

	CONTRIBUTION	Average weight	Average % stocks
Value stocks	0,64%	8,30%	67,72%
Growth stocks	-0,60%	3,64%	29,73%
Momentum stocks	0,04%	0,31%	2,56%
TOTAL stock	0,08%	12,26%	100,00%

17 - Contribution to return per investment style

As mentioned previously, the momentum stocks have only a contribution of 0,04% since the allocation for this style was small (0,31% of the AUM in average over the 6 months) as the appendix (17) shows. Compared to the total stock allocation, it represents in average 2,56% of the stock allocation. The value portfolio has a contribution of 0,64% (for an investment return of 2,55%) which contributes positively on the NSP performance. The value allocation was also higher than for the two other styles (67,72% for value style vs 29,73% for the growth style and 2,56% for the momentum one). The growth portfolio decreased the global contribution of the stocks with a negative contribution to return of -0,60% in total. It represented in average 29,73% of the total invested in stocks and significantly affected the global contribution. Indeed as mentioned before, the total contribution of stocks (excluding the ETFs) was 0,08%.

### Value contribution analysis

	CONTRIBUTION	Average % Fund	Average % Value
Technology	0,01%	1,30%	15,62%
Financial	0,28%	1,00%	12,08%
Basic Materials	-0,11%	0,10%	1,17%
Consumer, Cyclical	0,27%	2,05%	24,73%
Consumer, Non-cyclical	-0,01%	1,69%	20,32%
Industrial	0,01%	0,42%	5,03%
Communications	-0,07%	1,35%	16,31%
Energy	0,25%	0,39%	4,73%
Total Value	0,64%	8,30%	100,00%

18 - Contribution to return of the value stocks

The appendix (18) shows the contribution among the value style and the respective weight of each sector, among the total portfolio and among the value part itself.

The value portfolio was mainly composed by stocks from the sector of “consumer cyclical” that represented 24,73% of the value portfolio in average as we can see in appendix (18). The sector that was the less represented among the value portfolio was the sector of the Basic materials with an average allocation of 1,17%.

The positive contribution of the value portfolio can mainly be explained by the contribution of 3 sectors, such as the financial sector (0,28% of contribution), the consumer cyclical one (0,27%) and the energy (0,25%), shown on appendix (18). As said before the value portfolio was mainly composed by stocks of the sector of the consumer discretionary. It is interesting to remind that this sector has a total (adding stocks of the 3 styles) contribution of 0,02%. Then, it can be assumed that the stocks of this sector among other investment styles have weakly performed.

The one reducing the most the total contribution is the sector of the basic materials with a total contribution of -0,11% even if it has a small average allocation weight. The sector of communications has also brought a negative contribution -0,07%.

#### *Growth contribution analysis*

	CONTRIBUTION	Average weight	Average % Growth
Technology	-0,17%	0,72%	19,70%
Basic Materials	-0,07%	0,38%	10,34%
Consumer, Cyclical	-0,22%	1,46%	40,11%
Consumer, Non-cyclical	0,08%	0,48%	13,06%
Industrial	-0,02%	0,50%	13,68%
Communications	-0,22%	0,11%	3,11%
Total Growth	-0,60%	3,64%	100,00%

*199 - Contribution to return of the growth stocks*

The appendix (19) shows the detail of the contribution of the growth portfolio, split by sector. The allocation weight of each sector is also available.

The growth portfolio is mainly composed by stocks from the “consumer, cyclical” sector that represented in average 40% of that growth portfolio. The sector the least represented was the sector of communications with an average weight of 3,11%.

It was previously mentioned that the consumer cyclical sector performed well among the value style (0,27%) compared to the total contribution of this sector (0,02%). This can be mainly explained by the negative impact of this sector on the growth portfolio with a contribution of -0,22%. The top loser of the stocks (Alibaba) mainly explains that negative impact with a contribution of -0,25% for that stock.

The sector of communication has also a negative impact with a contribution of -0,22% for an average allocation of 3,11% among the growth portfolio. Again that negative contribution can be explained by the second top loser (Linkedin) that has a contribution of -0,22% since it was the only one stock from that sector.

*Momentum contribution analysis*

	CONTRIBUTION	Average weight	Average % Momentum
Consumer, Cyclical	-0,02%	0,24%	76,26%
Consumer, Non-cyclical	0,06%	0,07%	23,74%
Total Momentum	0,04%	0,31%	100,00%

*2010 - Contribution to return of the momentum stocks*

The appendix (20) shows the contribution of stocks from the momentum investment style with their allocation weight. Only two stocks composed that portfolio, from two sectors. The Non-cyclical stock has a positive contribution of 0,06% while the stock of the consumer cyclical has a negative contribution of -0,02%. That style does not have significant impact on the portfolio. Therefore no main conclusion can be based on the result about that style.

## **Allocation effect versus selection effect**

The precedent analysis shows the details of the contribution per investment style. The following analysis tries to explain the contribution of each style, by separating the selection effect from the allocation effect.

### **Methodology**

The allocation effect of a performance is the part that comes from the decision to invest in a specific sector, industry, or style (in the present case).

The selection effect of a performance is the part of that performance that comes from the decision to invest in a specific stock among a sector, industry or style that was decided previously.

In order to estimate the market performance for each style, 3 indexes have been used. The S&P 500 Value, the S&P 500 Growth and the S&P 500 Momentum. The performance of each indexes represents the allocation effect. A performance of a hypothetical portfolio has been calculated. That portfolio respects that allocation by style of the NSP team (same amount invested, same market timing) but invested in hypothetical ETFs on the 3 style indexes instead of investing in specific stocks as the team did in reality.

The P&L of each allocation has been converted to contribution as it was realized previously for the contribution calculation.

The performance realized by this hypothetical portfolio can be interpreted as the performance that the team would have realized by investing in ETFs respecting the same investment style allocation.

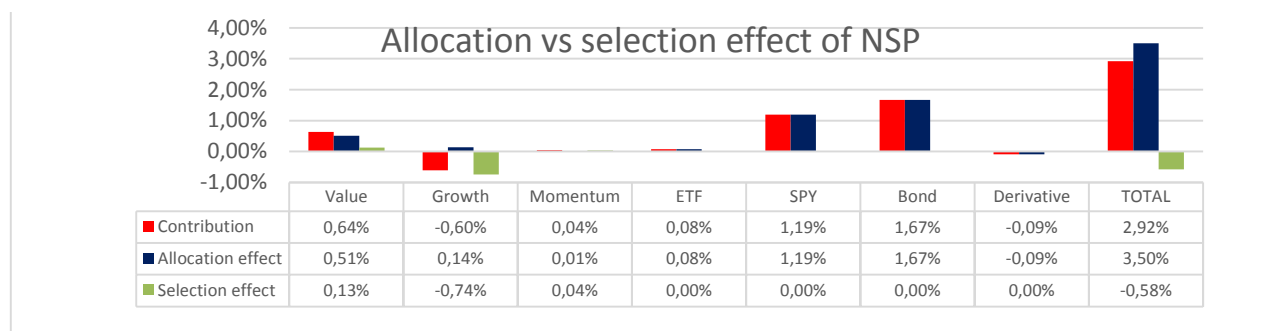
The difference between the realized performance and the allocation effect is considered as the selection effect. Indeed, this is the performance that the team has realized by selecting stocks among specific styles.

## Hypothesis

That process is based on one hypothesis, which is that the team member have always considered the investment style as the first criteria before to select a stock among that investment style.

## Allocation and selection effects

The appendix (21) shows the realized contribution of NSP and their respective allocation and selection effect in total but also split by investment styles.



2111 - Allocation vs selection effect of NSP

The allocation effect is estimated at 3,50%, which is above the realized performance of 2,92%. Then, the selection effect is estimated at -0,58%, which represents the value lost by the team selecting wrong stocks among specific investment styles.

## Effects on value style

The results show that the value portfolio of NSP has performed better than a hypothetical ETF tracking the S&P 500 Value with the same market timing. Indeed, the ETF would have got a positive contribution of 0,51% while the realized contribution of the value stocks is 0,64%. Then, a positive selection effect can be estimated at 0,13%. It means that the stock selection was positive.

## Effects on growth style

The results show that the growth portfolio has underperformed the hypothetical ETF tracking the S&P 500 Growth with the same market timing. Indeed, the ETF would have got a positive contribution of 0,14% while the realized contribution of the Growth stocks is -0,60%. Then, a

negative selection effect can be estimated at -0,74% (Appendix 21). It means that the stock selection was not appropriate and destroyed potential value.

### Effects on momentum style

The results show that the momentum portfolio of NSP has performed better than a hypothetical ETF tracking the S&P 500 Momentum with the same market timing. Indeed, the ETF would have got a positive contribution of 0,01% while the realized contribution of the value stocks is 0,04%. Then, a positive selection effect can be estimated at 0,03% (Appendix 21). It means that the stock selection was positive.

### Stock picking analysis

The objective of the following analysis is to determine the typical stock that the team has picked about several criteria such as the fundamentals, or the capitalizations size in order to confirm or not the precedent analysis, especially the one that showed that the team was more oriented on value stocks. The second objective is to highlight the best and worst performers, which should also be in conformity with the precedent results that showed that the growth stock underperformed while the best performance for the fund was on value stocks.

### Fundamentals for stock picking

#### Average portfolio fundamentals of the stock picking

The following analysis shows the average fundamentals of the stocks picked by the team, at the moment when the team picked them. The average and the median results are presented in order to take into consideration that some extreme values create bias in the average.

NSP FUNDAMENTALS	ROE	EPS Growth	Sales Growth	PE Ratio	PB Ratio	Dividend Yield	Price to FCF	Market cap
Average	30,89	50,93	7,01	16,55	6,08	1,55	27,39	80964,22
Mediane	29,55	7,72	3,00	14,82	4,02	1,30	14,27	30456,05
S&P 500	14,35	13,50	4,81	18,37	2,84	2,08	17,37	37987,75

*122 - Average fundamentals of NSP vs S&P 500*

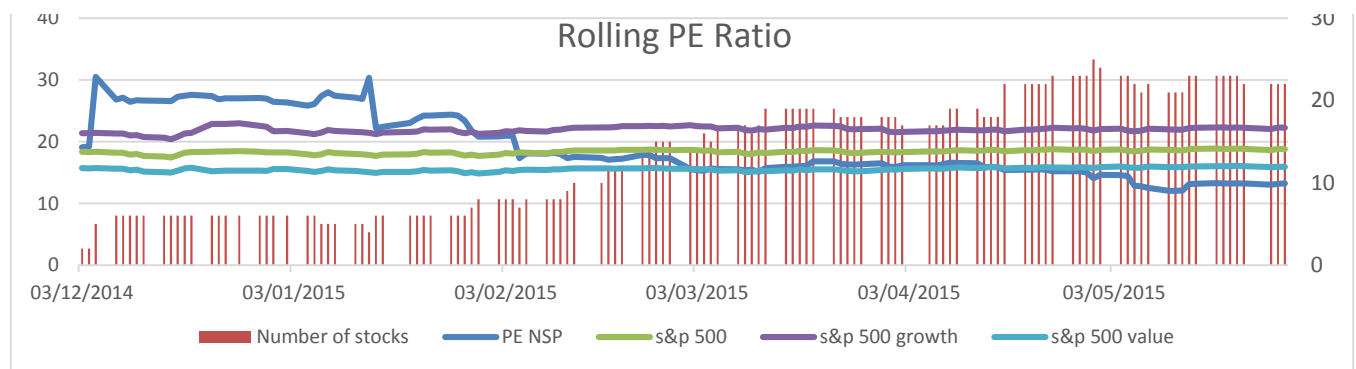
A first analysis has been computed with all stocks included. This analysis shows the average fundamentals among the selected stocks as the appendix (22) shows.

The average NSP fundamentals do not show significant information that lead to a specific investment style influence. For example, it can be seen that on average, EPS growth (50,93%), Sales growth (7,01%) Price to Book ratio (2,08) and Price to Free Cash Flows (27,39) show a portfolio composed of overvalued stocks, while Price Earnings ratio (16,55), was lower than the S&P 500 one (18,37) which is typical of value stocks. Moreover, the large gap between averages and medians mean that extreme numbers create a bias in the output.

### Rolling portfolio fundamentals

#### Rolling PE Ratio

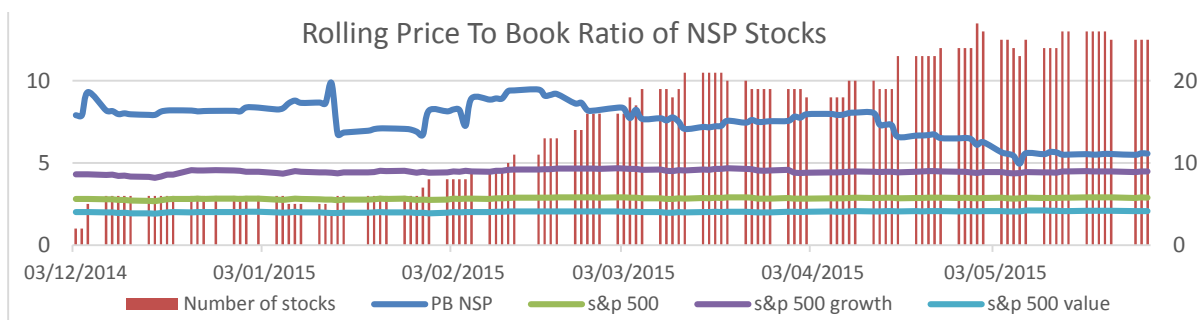
As depicted on Appendix (23), the team has progressively reduced the PE Ratio of the fund. The stock selection was oriented on high PE ratios at the beginning of the investment period. The average PE on the fund was firstly above the average PE of the S&P 500 and the one of the S&P 500 Growth. According to the graph, the fund PE decreased progressively, and ended up below the PE ratio of the S&P 500 value. It can be seen that when the team increased the number of stocks in the portfolio, it has selected stock with low PE ratios.



23- Rolling Price Earnings Ratio of NSP stocks

## Rolling PB ratio

As shown on Appendix (24), the portfolio has got an average price to book ratio above the average one of the several indexes. Nevertheless, following the same trend as the average PE ratio, the PB Ratio has constantly decreased over the investment period, getting closer of the criteria of a value oriented portfolio.



24- Rolling price to book ratio of NSP stocks

It was previously seen that the allocation weight of the value style has also increased over the time, which makes sense according to our first result that showed a bigger number of value stocks in the portfolio composition.

## Best and worst performers

TOP Performers								
RANK	Stock	Contribution	Performance	Risk	Info Sharpe	P&L	Sector	Investment style
1	GazProm	0,25%	26,25%	36,18%	0,73	\$787,29	Energy	Value
2	Goodyear	0,18%	18,81%	21,05%	0,89	\$562,77	Consumer - Cyclical	Value
3	World Acceptance	0,14%	14,39%	115,56%	0,12	\$438,80	Financials	Value
4	Southwest Airlines	0,14%	14,09%	32,16%	0,44	\$421,43	Consumer - Cyclical	Value
5	JPMorgan Chase	0,12%	12,41%	21,28%	0,58	\$377,30	Financials	Value

25- TOP performers of NSP stocks

The best performers of the equity portfolio have been value stocks as it can be seen on the appendix (25). The result are in line with the one of the previous analyses that showed that the team reached a better performance with the value approach (2,55%) than with the growth one (-5,21%).



RANK	Stock	Contribution	Performance	TOP Losers			Sector	Investment style
				Risk	Info Sharpe	P&L		
44	Alibaba Group	-0,25%	-26,18%	29,69%	-0,88	\$-765,99	Consumer - Cyclical	Growth
43	LinkedIn Corp	-0,22%	-22,12%	68,92%	-0,32	\$-668,64	Communications	Growth
42	Micron Technology	-0,14%	-14,79%	35,22%	-0,42	\$-441,16	Technology	Growth
41	Lions Gate	-0,14%	-14,44%	27,44%	-0,53	\$-430,10	Consumer - Cyclical	Growth
40	Tesco PLC	-0,11%	-11,15%	27,31%	-0,41	\$-335,07	Consumer - Non Cyclical	Value

26- TOP losers of NSP stocks

The worst performances are mainly related to a growth investment style as it can be seen on appendix (26). Indeed, the results are in line with the previous analyses that showed poor performance of the NSP Growth portfolio (-5,21%).

## Regression Analysis

### NSP versus benchmark

A regression was run between the returns of the NSP and the returns of the benchmark, over a total of 121 observations. The  $R^2$  of the model is 0,72 which means that that one explains 72% of the returns of the portfolio as we can see on the appendix (27). According to the analysis of the variance, the F test does reject the null hypothesis.

	R <sup>2</sup>	0,711984638			
	Observations	121			
	<i>Degree of freedom</i>	<i>F</i>	<i>Critical value of F</i>		
Regressor	1	294,17	5,89943E-34		
Residuals	119				
Total	120				
	<i>Coefficients</i>	<i>T Statistic</i>	<i>P Value</i>	<i>Lower limit 95%</i>	<i>Upper limit 95%</i>
Constante	0,000061	0,3480008	0,72845441	-0,000288332	0,00041129
Benchmark	0,936601214	17,1514549	5,8994E-34	0,828472548	1,04472988

27- Output regression 1

The coefficient is not rejected and is statistically significant according to the t statistic (17,15, above 1,98 that is the critical value according to the t distribution) and the p value of the variable below 5%. Also the interval of the confidence interval does not concludes zero which means that the variable can be used for making observations.

The intercept shows a slightly positive alpha (unexplained variable). Nevertheless, its p-value is too high (0,72) in order to be statistically significant.

According to the results, the NSP has a beta coefficient below 1 vs the benchmark (composed of market components: S&P 500 and aggregate bond index). That means that when the benchmark increases or decreases by 1 or -1%, the NSP is likely to moves by 0,93% in both sides, with a confidence interval of 95%.

### NSP versus the Fama French factors

Opposed to the Capital Asset Pricing Model using only one variable, the Fama French model uses 3 variables in order to estimate the expected return<sup>3</sup>. The first variable is the market coefficient that represents the systematic risk part. The second variable is based on a market inefficiency hypothesis that shows that small capitalizations perform better than large ones. The last variable is also based on an hypothetical market inefficiency that is based on the fact that low price to book value stocks (also called value stocks) performs better than stocks with high price to book value (growth stocks).

A regression was run between returns of the NSP (minus the Risk free) and the Fama French factors given by the website of Kenneth R. French The R<sup>2</sup> of the model is 0,42 which means that the Fama French model explains 42% of the NSP returns as we can see on appendix (28).

		Degree of freedom	F	Critical value of F
R <sup>2</sup>	0,422552882	Regressor	3	30,2704124
Observations	121	Residuals	117	1,4754E-14
		Total	120	

	Coefficients	T statistic	P value	Lower limit with confidence interval = 95%	Upper limit with confidence interval = 95%
Constante	0,000103331	0,41293323	0,68041129	-0,00039225	0,00059891
MKT - RF	0,276899125	9,05171239	3,7063E-15	0,21631565	0,3374826
SMB	-0,14056037	-2,44871202	0,01582007	-0,25424154	-0,0268792
HML	-0,13438052	-2,19911957	0,02983613	-0,25539876	-0,01336228

28- Output regression 2

<sup>3</sup> Fama, Eugene and French Kenneth R. 1992, "The cross section of expected returns", Journal of finance vol 47

The F test does reject the null hypothesis according to the F Distribution that gives a critical value of 3,92 for this confidence interval.

For this degree of freedom and this confidence interval of 95%, the t statistic must be higher than 1,98 or lower than -1,98. According to the result of the t test all the variables are statistically significant (except the intercept). Following the interval of confidence, none of them should be equal to zero since zero is not includes in those intervals.

According to our result, the NSP has a negative sensibility to the Small minus Big and the High minus low factors as their respective coefficient show (-0,14 and -0,13). The market coefficient of NSP is 0,27 which means a low sensibility to the market risk for the NSP.

The return of the NSP may be explains by the following equation:

$$r = R_f + 0,27 \cdot (K_m - R_f) + -0,14 \cdot SMB + -0,13 \cdot HML + \alpha$$

Where:

- $R_f$  is the risk free
- $K_m - R_f$  is the market risk premium
- $SMB$  is the Premium for the Small Minus Big factor
- $HML$  is the Premium for the High Minus Low factor

## Conclusion

The portfolio ended up its first investment period with a total return of 2,92% while its benchmark ends the period with a total return of 2,61%. In order to explain the excess return, the contribution per asset class has been estimated. The equity part has a positive contribution of 1,34%, the bond part has a positive contribution of 1,67 while the derivatives instruments contributes negatively on the NSP with a contribution to return of -0,09%. In order to understand the equity contribution, the equity part has been analyzed according to several criteria. In total, the contribution of the stock picking is estimated at 0,08%. Over the same investment period, the S&P 500 achieved a total return of 2,62% Therefore, the stock portfolio has underperformed the US Equity Market over its investment period.

The analysis shows that the stock picking was mainly composed of value stocks, which performed well and outperformed the S&P 500 value over their investment period (due to a positive stock selection effect) while the growth stocks strongly lost and underperformed the S&P 500 (due to a negative stock selection effect). It was also discovered that the momentum was not significantly present into the stock portfolio.

Regression analysis shows a low sensitivity of the NSP to the market risk and a negative correlation with Fama French factors.

Overall, the main part of the NSP performance is explained by its ETFs performance (on Bond index and on the S&P 500). The team has not managed to take advantage with its derivative strategy. In total, the stock picking has not contributes significantly even if the team performed well over the value strategy but this performance has been significantly lowered by the team performance on the growth stocks with a significant gap between both performances.

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