

Passive / Active Strategy on the Euro Stoxx 50 Index

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RETHINKING
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STOXX

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Executive Summary

We focused our analysis on the Euro Stoxx 50 (1999 – 2014), by studying trends in volume traded, returns and prices during a specific window period, beginning with the official announcement date of the introduction of a stock(s) in the Euro Stoxx 50, and ending with the date corresponding to the actual inclusion of the stock(s) in the index. The volume traded during the window for added stocks is about 1.6 times higher than the month prior to the announcement, and roughly 1.4 times higher than the month after the inclusion of the stock. These volumes are increasingly higher, over time, reflecting the larger weight of passive investors within market participants.

The increasing volumes have an impact on returns during the window explored: the stocks of the companies added (geometric mean returns of 2.94%) outperform their respective supersectors (2.05%), the Euro Stoxx 600 (0.41%), as well as the Euro Stoxx 50 (0.42%). Eighty percent of stocks being added (32 out of 40) outperformed the Euro Stoxx 50 during their respective windows. This gave us the opportunity to develop a passive / active strategy on the Euro Stoxx 50.

The strategy starts by holding a portfolio replicating the Euro Stoxx 50 (ETFs). At the announcement date of inclusion of a stock to the Euro Stoxx 50, short the market portfolio while going long in the stock of the company being added to the index (equal weight allocation between stocks when multiple additions occur). At the effective date of inclusion, reverse the operation by shorting the stock of the company added and buy back the market portfolio. Hold the market portfolio until another stock is added. This strategy outperformed the Euro Stoxx 50 by 4% annually from 1999 to 2014 (3.14% annual return). Looking at the time series, there is some evidence that the strategy is more profitable today than it was at the end of the 1990s.

Some factors however need to be considered: 1) Reliance on the exclusive performance of one or few stocks during specific periods (accentuated losses); 2) Buying the stock added to the index does not necessarily guarantee greater returns over every episode: in a period of accentuated divergence, the strategy would continue to allocate to underperforming asset; 3) Limited returns above market returns - our strategy is mainly a passive strategy outside of the trading windows; 4) Few trades limit potential incremental gains; and 5) Strategy limited to one benchmark index. To make this viable, we would need to apply the same methodology and trading strategy to other markets and indices.

An alternative strategy (trading/hold cash) would be to limit trades during the windows, and hold cash in-between trading periods. This strategy yields a 3.75% annual return (4.6% above the market annual return), and allows us to free up cash that we can invest in other asset classes. In a market in backwardation with few stock additions, holding cash instead of directly reinvesting in the Euro Stoxx 50 guarantees some downside protection. On the other hand, in a market in contango with few stock inclusions, the strategy has limited upside.

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I. EVOLUTION OF PASSIVE INVESTMENTS

As the sophistication and complexity of financial models grow, so do basic investment strategies built on broad exposure to the market: the rise of passive investments. While active management is the predominant model for investment strategy today, passive investors have continuously grown their market shares in the past fifteen years, with passive funds accounting for about 30% of all funds at the end of 2013¹ (Appendix 1). Mutual funds now only account for 85% of active investment, down from 100% in 1980. While institutional funds now represent only about 60% from active investment compared to 80% before². This shows that big institutions, such as pension funds and endowments, are gravitating towards more passive investments.

The main difference between active and passive management boils down to the managers' attempts to distinguish attractive from unattractive securities (forecast securities prices, time markets and market sectors etc.); and to over perform the selected market benchmark. Active investors believe in misvaluation of assets or taking a premium on risk to beat the market returns; passive investors accept the average returns their portfolio produce, by diversifying within and across asset classes, and maintain specific allocations through periodic rebalancing³.

Active management fees approximate roughly 1.5%⁴, without accounting for frequent transaction fees of actively traded funds. Passive management, on the other hand, seeks to gain broad market exposure while minimizing management fees. Passive

¹ Moore, H., *You Will Be Investing For Free In 5 Years*, 2014

² Stambaugh, 2014

³ *Evanson Asset Management*

⁴ Berk, *University of Chicago, Five Myths of Active Management*, 2004

management largely consists of Exchange Trade Funds (ETFs) and mutual funds that seek to mirror a specific benchmark index (S&P500, Euro Stoxx 50, FTSE 100, etc.)

ETF's and index funds appeal to investors differently. While index funds trade like stocks, nearly instantaneously, index funds trade like mutual funds and wait for the market to close, using that price for the transaction. Thus, ETF's are more liquid. Dividend policy also differs between the two: whereas index funds reinvest dividends, ETF's return dividends in cash for the discretion of the investor.

The rise of passive investment has occurred concurrently with the rise of ETFs. The first ETF began trading in 1993. As of 2013, the US market for ETFs totaled US\$1,578 billion at year-end 2013, compared with US\$1,213 billion at year-end 2012⁵ (more than 3,300 ETFs⁶). They have come into prominence for two major reasons: the aforementioned low costs and that active managers typically underperform against the market⁷ when factoring in transaction costs. In the United States, 3% of investors held ETF's. Appendix 2 shows the net issuance of ETF shares in America.

II. HYPOTHESES

The rise of passive investments such as ETFs has increased the number of players participating in passive investment strategies directly linked and replicating benchmark stock indices. Passive investing requires little decision-making by the fund manager, who tries to duplicate a chosen index, tracking it as efficiently as possible. However, stock indices evolve and change, and must adapt to 1) the evolution of the respective market capitalization of their constituents (except the equally weighted indices); and 2) to other

⁵ Smith S., *ABN Amro launches AEX and Euro Stoxx 50 ETFs, ETF Strategy*

⁶ *Deutsche Bank, 2013*

⁷ *Bogel, 2007*

specific market events (mergers, acquisitions etc.). As such, passive investors must rebalance their portfolios when the composition of the underlying reference index changes in order to avoid tracking errors. How does the required rebalancing by passive investors affect the investing environment? Can the predictable rebalancing of passive investors be used to formulate a viable trading strategy for active investors? To answer these questions, we explored three hypotheses, related to the addition and the removal of stocks of companies replacing other stocks in the same reference index:

1. Passive investors act on the same triggers (addition of a stock / replacement of a stock), which should result in increasing trading volumes of the added and removed stocks.
2. Increased buy and sell orders from passive investors should influence the prices of the included and excluded stocks – during a specific time period that remains to be identified.
3. Movements of the included and deleted stock prices away from fundamentals should create a specific trading opportunity for active investors.

III. STOCK MARKET SELECTION

To confirm or refute our hypotheses, we needed to select an appropriate index benchmark, characterized by:

- Liquidity of stocks listed and transactions
- Access and transparency of data
- Relatively recent stock market (between 15 and 30 years old), allowing us to gather enough data points while not being overwhelmed by the amount of

information to analyze

- Number of stocks included in the index below 100, in order to have limited periodical index changes, reallocation and rebalancing
- Underlying index followed and used in a substantial manner by passive investors (passive investment strategies replicating indices must rebalance when index composition changes in order to avoid tracking error)

Based on the aforementioned criteria, we selected the Euro Stoxx 50, which is among the most traded index in the world. Additionally, with assets under management of about 27bn euros held by 18 ETFs as of 03/03/2014⁸, the segment of ETFs tracking the Euro Stoxx 50 is one of the largest peer groups in the European ETF market. Appendix 3 shows the Plain Vanilla Euro Stoxx 50 ETFs available to European Investors⁹ with their market capitalization.

IV. THE EURO STOXX 50 INDEX

The Euro Stoxx 50 was launched in February 1998 by STOXX Ltd. as a blue-chip stock index for the Eurozone, holding 50 constituents. The stocks eligible are components of the nineteen Euro Stoxx supersector indices (Appendix 4) and only represent the Eurozone portion (Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, and Spain) of the respective domestic indices.

The selection list first originates from the nineteen Euro Stoxx supersector indices, whose own constituents all are ranked by free-floating market capitalization. The

⁸ Data from Bloomberg database

⁹ STOXX, Stoxx Exchange Traded Products

largest stocks are added to the selection list until the coverage is close to, but still less than, 60% of the free-float market capitalization of the corresponding STOXX Regional TMI Supersector Index. If the next highest-ranked stock brings the coverage closer to 60% in absolute terms, then it is also added to the selection list¹⁰. All current Euro Stoxx 50 Index stocks are then added to the selection list. All the stocks on the selection list are then ranked in terms of free-float market capitalization to produce the final index selection list. The largest 40 stocks on the selection list are selected; the remaining 10 stocks are selected from the largest remaining current stocks ranked between 41 and 60; if the number of stocks selected is still below 50, then the largest remaining stocks are selected until there are 50 stocks. Each component's weight is capped at 10% of the index's total free-floating market capitalization. The index composition is reviewed annually in September, while the free-floating weights are updated once per quarter to account for changes in market capitalization¹¹.

As a result of this selection process the country and supersector allocation of the Euro Stoxx 50 index is driven by the free-floating market capitalization of the respective supersectors and their constituents. France, Germany and Spain are the countries most represented in the index. Banks, Industrial Goods & Services, and Insurance are supersectors with the highest weightings as of January 31, 2014¹² (Appendix 5 shows more detailed information about current constituents).

¹⁰ Glow D., *ETFs—A Review of “Plain-Vanilla” Euro Stoxx 50 Products*, Fund Market Insight Report Exchange-Traded Funds

¹¹ STOXX, *Index Methodology Guide (Portfolio Based Indices)*

¹² Data from Bloomberg database

V. DATA USED

Our data set consists of all the stocks that were added and removed from the Euro Stoxx 50, from its inception to present time. Ending daily returns and ending daily exchange-based trading volumes were therefore collected from the Bloomberg database for the 3Q1999 - 1Q2014 period.

For each stock, we focused our analysis on a specific time window, which we considered the most likely to yield significant outcomes/results regarding volume and price variations. The time window was delineated as such:

- Beginning – Announcement date, by STOXX Ltd. through official press release of the stock being added and the stock being removed from the Euro Stoxx 50. We took closing prices from the day of announcement.
- Ending – Effective introduction / removal date of the stock in / from the Euro Stoxx 50 (as stated in the official press release from STOXX Ltd.). Since the changes are effective at market open on the effective dates, we took closing prices from the previous day.
- We deliberately chose to limit the time frame of analysis of historical data on price, volume, and volatility to 30 days prior to the announcement date and 30 day period after the introduction date, in order to eliminate the effects of long term external factors on stock volume and prices and to better reflect the immediate economic and financial fundamentals.
- We excluded the companies entering the index as a result of a merger, to avoid a misleading interpretation of a potential increase / decrease in stock volume / price during the period – which could have potentially originated

from the effect of the merger

Appendix 6 shows the evolution of the index composition over time, from its first to the most recent revisions.

We then analyzed for each stock being added and removed:

- Evolution of volume being traded during the window
- Average daily volume traded
 - vs 30 day period prior to the announcement date
 - vs 30 day period after the introduction date
- Average daily returns
 - vs 30 day period prior to the announcement date
 - vs 30 day period after the introduction date
- Average daily volatility
 - vs 30 day period prior to the announcement date
 - vs 30 day period after the introduction date
- Absolute stock returns during the window
- Relative stock returns during the window
 - vs respective supersector of stock
 - vs Euro Stoxx 600 (broader market benchmark)

VI. RESULTS

- Evolution of volume being traded during the window

For both stocks being removed and added to the Euro Stoxx 50, the volume of trades during the window is much higher than either the month before the announcement or the month after the inclusion. For example, volume traded during the window for added stocks is about 1.6 times higher than during the period previous to the announcement, and roughly 1.4 times higher than during the period after the inclusion of the stock in the Euro Stoxx 50 index. Looking more closely at the data, there is almost systematically a spike in volume traded at the end of the window, right before the inclusion of the stock to the index. Appendix 7 shows screenshots from Bloomberg illustrating the phenomenon. This confirms our first hypothesis: increasing trading volumes occur as a result of portfolio rebalancing from passive investors.

While Appendix 8 shows detailed data of the analysis, the tables on the page summarize our findings. Interestingly, the traded volumes during the window are increasingly higher, over time, compared to the period

Summary - Stocks being added to the Euro Stoxx 50

Average Daily Returns 1999 - 2013	
Before	0.08%
Window	0.49%
After	-0.06%

Average Volatility of returns	
Before	2.02%
Window	2.07%
After	2.15%

Average Daily volume	
Before	4,160,702
Window	6,644,588
After	4,912,086

Window volume compared to	
Before	159.70%
After	135.27%

Source: Bloomberg; Team Analysis

Summary - Stocks being removed from the Euro Stoxx 50

Average Daily Returns 1999 - 2013	
Before	-0.34%
Window	-0.36%
After	0.03%

Average Volatility of returns	
Before	2.66%
Window	2.75%
After	3.05%

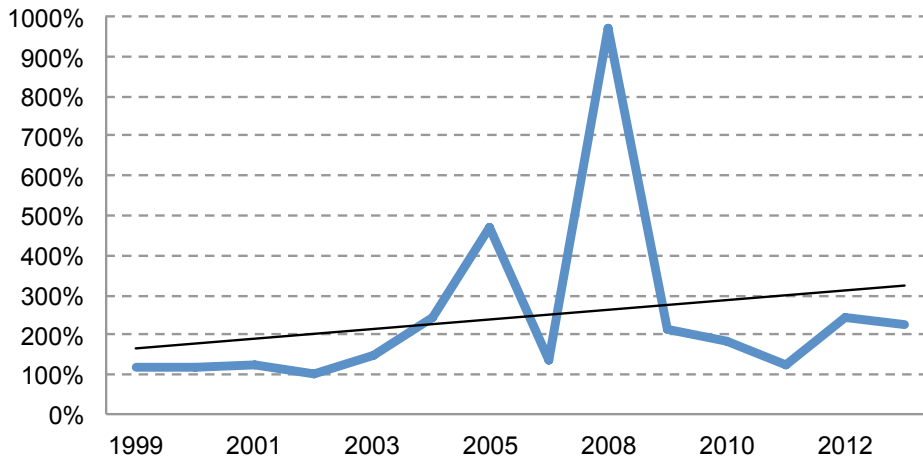
Average Daily volume	
Before	10,005,822
Window	15,248,395
After	8,077,910

Window volume compared to	
Before	152.40%
After	188.77%

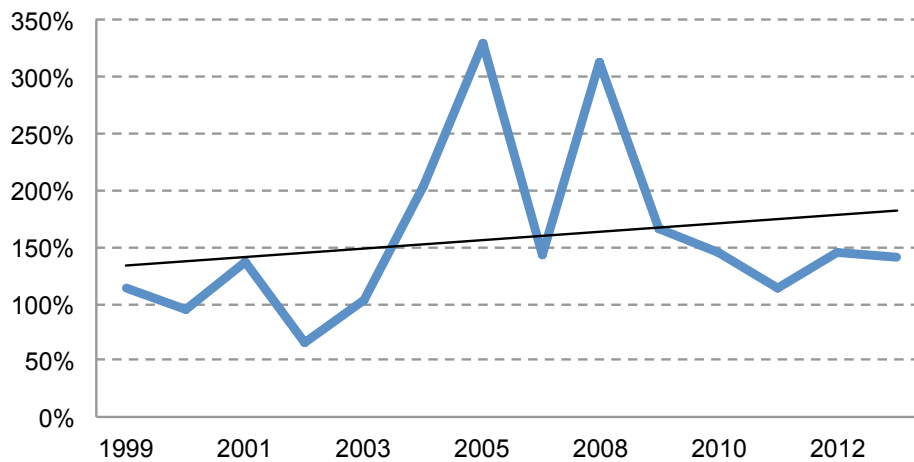
Source: Bloomberg; Team Analysis

before the announcement and period after the inclusion (see graphs below); this is directly related to the increasing amount of passive investors on the market.

Stocks Added to the Euro Stoxx 50
Traded volumes during the window compared to period before announcement



Stocks Added to the Euro Stoxx 50
Traded volumes during the window compared to period after inclusion



- **Absolute and relative returns**

Geometric returns for stocks being added between 1999 and 2013 reach 2.94% during the window identified – vs 2.05%, 0.41% and 0.42%, for the company supersector, the Euro Stoxx 600 and the Euro Stoxx 50, respectively. Not only do companies added outperform their respective sectors and the broader industry, but they also outperformed, on average, the Euro Stoxx 50 by more than 7 times during the window from 3Q1999 to 1Q2014.

The conclusion is similar for stocks being removed: geometric returns of the stocks erased from the index reach 3.72%, compared to -0.87% for the company supersector, -0.05% for the Euro Stoxx 600; and -0.09% the Euro Stoxx 50.

This confirms our second hypothesis that increased buy and sell orders from passive investors influence the prices of the stocks included and removed from the Euro Stoxx 50 during a window period beginning from the day of announcement, and ending with the effective introduction / removal in / from the Euro Stoxx 50.

The skewness of the returns of the stocks being added is significantly higher than the skewness of the Euro Stoxx 50. It shows that the distribution of the stocks' returns is skewed to the right of the geometric mean (positive tail longer than the negative tail), and that stocks added to the Euro Stoxx 50 are more likely to generate a window return higher than the benchmark market. Consistent with this analysis, 80% of stocks being added (32 out of 40) outperformed the Euro Stoxx 50 during their respective windows.

Additionally, positive kurtosis is enhanced, meaning that companies being added have lesser risks of extreme outcomes (greater losses or gains) than the euro Stoxx 50 during the window. The tables below summarize our findings; appendix 9 provides

detailed data.

Additions to Euro Stoxx 50 - Window Geometric Returns - 1999 - 2013

	Stock Added	Super Sector	Euro Stoxx 600	Euro Stoxx 50
Geometric Mean	1.029	1.020	1.004	1.004
Returns	2.94%	2.05%	0.41%	0.42%
<i>Skew</i>	1.08	2.47	-2.66	-1.86
<i>Kurtosis</i>	6.51	13.37	9.84	5.80

Removals from Euro Stoxx 50 - Window Geometric Returns - 1999 - 2013

	Stock Removed	Super Sector	Euro Stoxx 600	Euro Stoxx 50
Geometric Mean	1.037	0.991	1.000	0.999
Returns	3.72%	-0.87%	-0.05%	-0.09%
<i>Skew</i>	0.45	-0.63	-2.48	-1.78
<i>Kurtosis</i>	0.72	-0.48	8.57	5.19

The superior returns of the stocks added to the Euro Stoxx 50 during the specific window in turn confirms our third hypothesis: stock price is driven away from fundamentals, and therefore creates a specific trading opportunity for active investors.

VII. TRADING STRATEGY

Our trading strategy is a mixed passive / active strategy focusing on the stocks being added to the Euro Stoxx 50 (higher window returns than for stocks being removed):

- Passive strategy
 - Hold portfolio replicating the Euro Stoxx 50 (ETFs) in-between windows
- Active strategy
 - At the announcement of inclusion of a stock to the Euro Stoxx 50
 - Sell market portfolio
 - Buy stock of company added
 - Equal weight allocation between stocks when multiple additions occur
 - At the effective date of inclusion in the index
 - Sell the stock(s) of company (ies) added
 - Buy market portfolio
- Hold market portfolio (ETFs) until next stock addition

The table summarizes the overall results of our trading strategy, from 08/18/1999 (first day of the very first window), to present day. The strategy outperformed the Euro Stoxx 50 by about 4% annually on average: since the geometric mean return of companies being added to the index during the window is higher than the return of the Euro Stoxx 50, shorting the index and

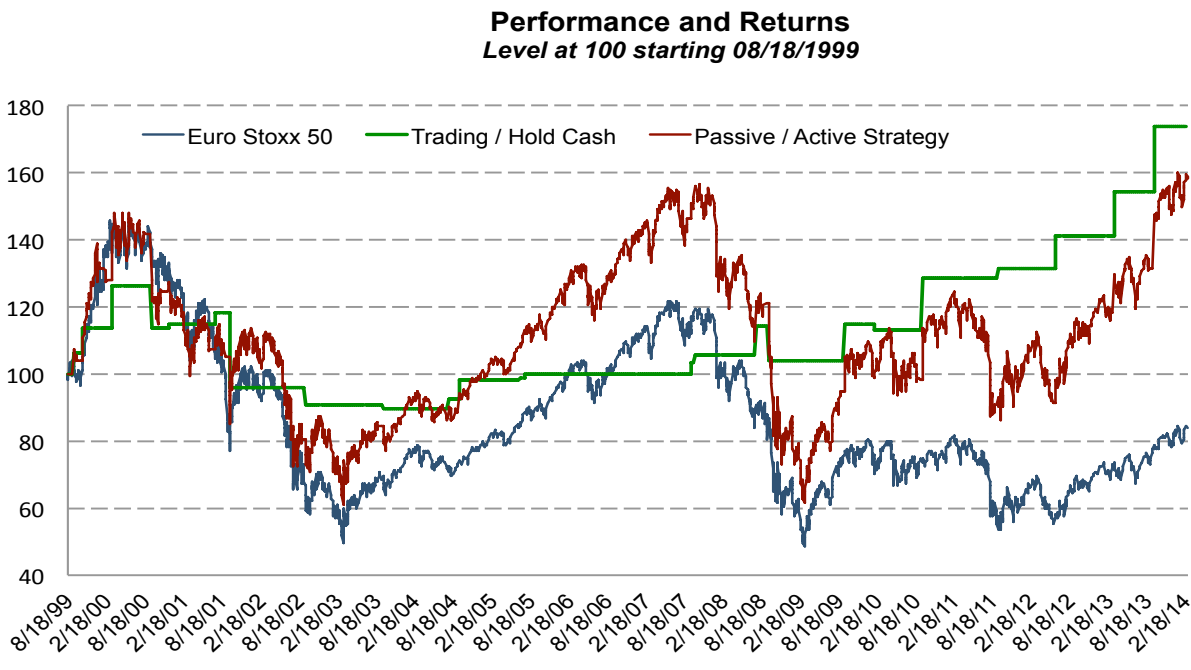
Summary			
	Trading Strategy	Euro Stoxx 50 (benchmark index)	Trading / Hold Cash
Annual Returns*	3.14%	-1.14%	3.75%
Annualized volatility	25.18%	24.40%	10.25%
Absolute returns (08.1999 - Present)	58.91%	-15.77%	73.80%
Skewness	0.23	0.16	1.37
Kurtosis	14.03	4.59	397.92
Number of days	3,725	3,725	3,725
Best Daily Return	13.80%	11.00%	13.80%
Percent up Days	46.15%	50.50%	0.48%
Worst day on day	-18.95%	-7.88%	-18.95%
Max Drawdown	-60.90%	-66.88%	-29.12%

* Does not include transaction costs

taking a long position on these stocks generated a more positive upside. As such, overall annual returns for our trading strategy between 08.1999 – 02.2014 reaches 3.1%, compared to -1.14% for the Euro Stoxx 50. Similarly, absolute returns reach close to 59% and close to -16% between 08.1999 and 02.2014, for the trading strategy and the Euro Stoxx 50, respectively.

An alternative strategy (trading/hold cash) would be to limit trades during the windows (long the stocks added at the date of the announcement; short these stocks at the date of inclusion), and hold cash in-between trading periods. This strategy allows us to more clearly identify the “window” effect, and to free up cash that investors could chose to allocate to another asset classes. In a market in backwardation with few stock additions (eg. 2001 – 2003, and 2008 – 2009 for the Euro Stoxx 50), holding cash instead of directly reinvesting in the index guarantees some downside protection. On the other hand, in a market in contango with few stock inclusions, the strategy has limited upside.

The graph below illustrates the performance of the different trading strategies.

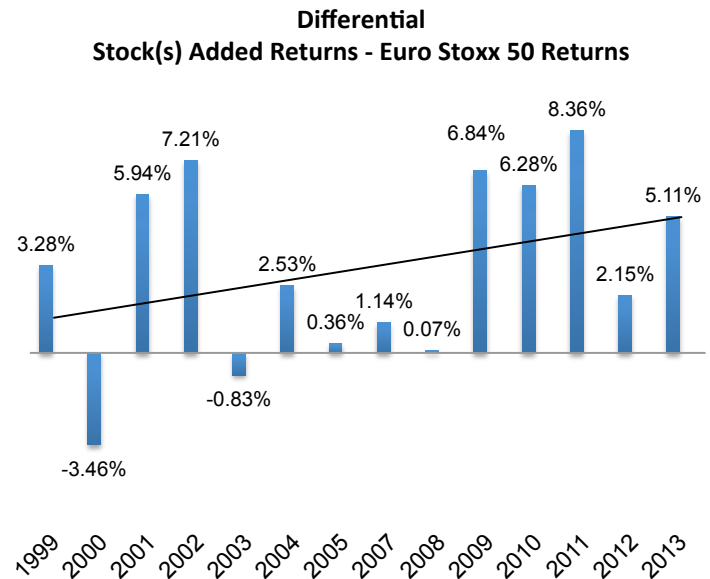


VIII. CONCLUSION

Looking at the time series, there is no clear evidence that the strategy is less profitable today than it was at the end of the 1990s (see table and graph below). There is therefore some potential to apply this strategy in the future. Market participants might be aware of this arbitrage opportunity; the proliferation of passive investors rebalancing after the inclusion of new stocks however still drives the volume traded up during the window, in turn positively affecting returns.

Window Returns by Year

	Stock(s) Added (Average)	Euro Stoxx 50	Differential Stock(s) Added Returns - Euro Stoxx 50 Returns
1999	6.17%	2.89%	3.28%
2000	-1.53%	1.92%	-3.46%
2001	-7.82%	-13.76%	5.94%
2002	-5.33%	-12.55%	7.21%
2003	-1.54%	-0.71%	-0.83%
2004	4.90%	2.37%	2.53%
2005	0.84%	0.48%	0.36%
2007	2.29%	1.15%	1.14%
2008	-0.39%	-0.45%	0.07%
2009	10.88%	4.04%	6.84%
2010	5.94%	-0.33%	6.28%
2011	2.16%	-6.20%	8.36%
2012	7.59%	5.44%	2.15%
2013	10.97%	5.86%	5.11%



While skewness and kurtosis are enhanced under our passive / active trading strategy (due to the long position in stocks that are more likely to outperform the Euro Stoxx 50 during their respective windows), some drawbacks can be identified:

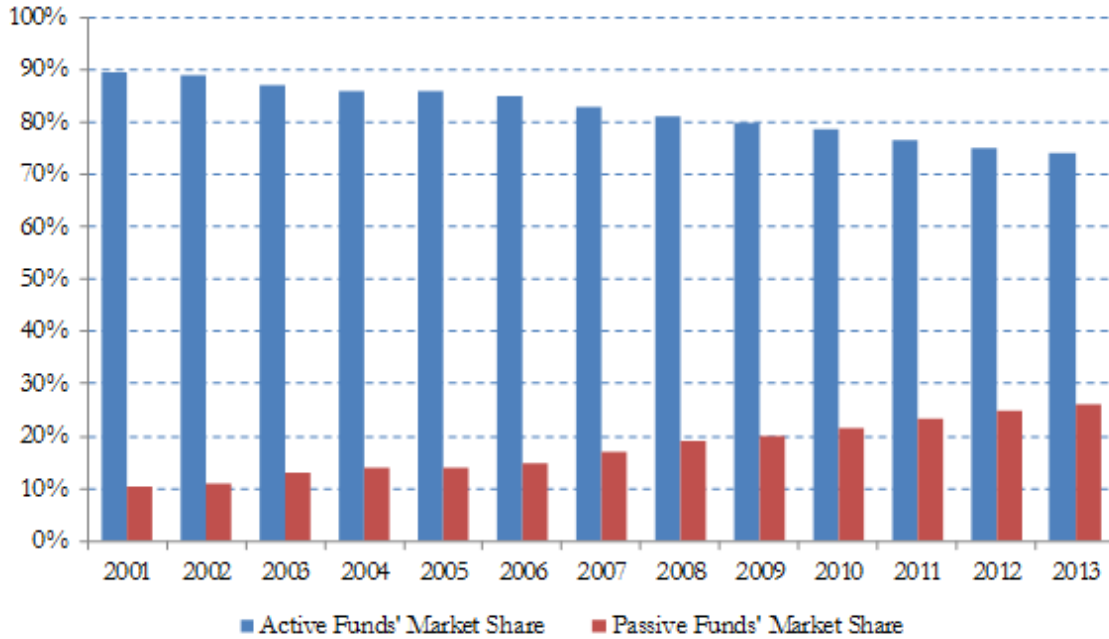
- Reliance on the exclusive performance of one or few stocks during a non-negligible time frame. Heavy losses during the window by a stock introduced can

significantly affect our overall position. For example, in September 2008, Alstom was introduced in the Euro Stoxx 50; the stock's value decreased by more than 9% during the window, compared to a decrease of 3.3% for the Euro Stoxx 50. Another illustration is the worst day on day performance: when Saint Gobain's stock lost close to 19% during the window in 2001, it automatically has the same negative impact on the trading strategy.

- There is a premium for going long, during the windows, in the stock(s) added to the index: it does not necessarily guarantee greater returns/performance over every episode: in period of accentuated divergence (no mean reversion in relative asset performance), the strategy could continue to allocate to underperforming assets.
- Limited returns above market returns: our strategy is mainly a passive strategy outside of the trading windows. Over time, the generated returns are therefore closely linked and dependent of the overall performance of the index benchmark – which puts a limit on the upside gains.
- Few trades limit potential incremental gains above the market returns. Since 2001, only 24 companies were added / removed from the Euro Stoxx 50 (with 2006 being a year without any changes), limiting the opportunities to take advantage of potential trading opportunities.
- Strategy limited to one benchmark index. To make this viable, we would need to apply the same methodology and trading strategy to other markets.

APPENDICES

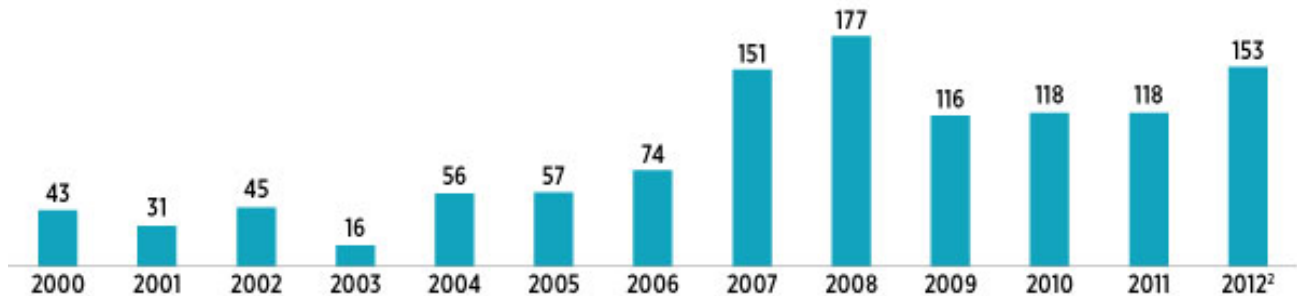
Appendix 1 - Rise of Passive Investment



Source: Moore, 2014

Appendix 2 - ETF Share issuance in USA

Net Issuance of ETFs Shares - Billions of dollars US



Source: Company Institute and Strategic Insight Simfund

Appendix 3 - Plain Vanilla Euro Stoxx 50 ETFs available to European Investors

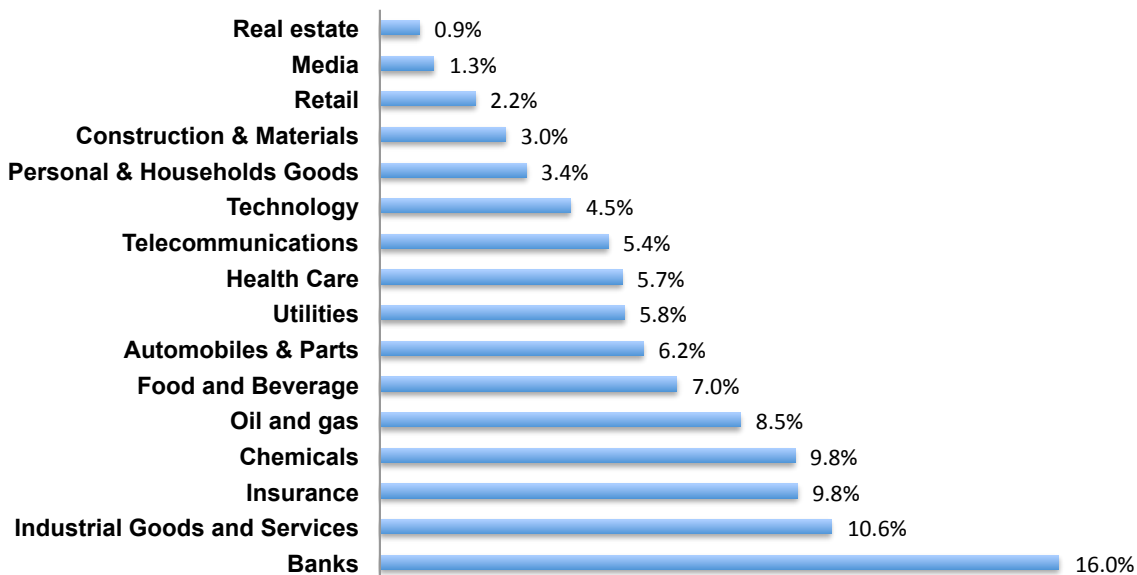
Plain Vanilla Euro Stoxx 50 ETFs available to European Investors			
<i>Total Assets - As of March 03, 2014</i>			
Name	Year of Inception	Total Assets (Mn Euros)	
ABN AMRO Basic EURO STOXX 50 UCITS ETF	2014	€	31.5
Acción EURO STOXX 50 ETF	2006	€	137.9
Amundi ETF EURO STOXX 50 C	2008	€	969.9
ComStage ETF EURO STOXX 50 NR	2008	€	238.2
ComStage ETF EURO STOXX 50	2010	€	20.8
CS ETF (IE) on EURO STOXX 50	2010	€	123.7
db x-trackers EURO STOXX 50 ETF	2007	€	2,528.9
db x-trackers itrix EURO STOXX 50 ETF	2005	€	94.9
Deka EURO STOXX 50 UCITS ETF	2008	€	1,238.9
EasyETF EURO STOXX 50 (C)	2005	€	283.4
EURO STOXX 50 ETF (Source)	2009	€	405.8
HSBC EURO STOXX 50 ETF	2009	€	105.4
iShares EURO STOXX 50 (DE)	2001	€	4,891.4
iShares EURO STOXX 50 (Acc)	2001	€	124.4
iShares EURO STOXX 50	2000	€	6,393.9
Lyxor ETF EURO STOXX 50	2001	€	4,913.6
SPDR EURO STOXX 50 ETF	2002	€	3,849.6
UBS ETF EURO STOXX 50 / (SM)	2001	€	603.6
Total Assets		€	26,956

Appendix 4 – Euro Stoxx Supersectors

Euro Stoxx - Supersectors			
Automobiles and Parts	Financial Services	Media	Technology
Banks	Food and Beverage	Oil and Gas	Telecom
Basic Resources	Health Care	Personal and household goods	Travel and Leisure
Chemicals	Industrial Goods and Services	Real Estate	Utilities
Construction and materials	Insurance	Retail	

Appendix 5 – Euro Stoxx Constituents as of January 31, 2014

**Euro Stoxx 50 - Supersectors Constituents
01/31/2014**



EuroStoxx 50 Constituents - As of January 31, 2014

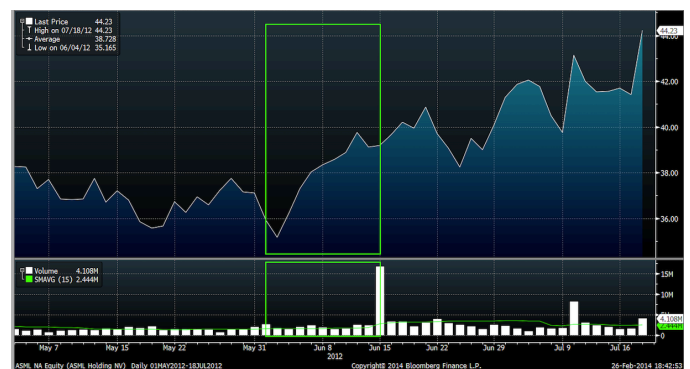
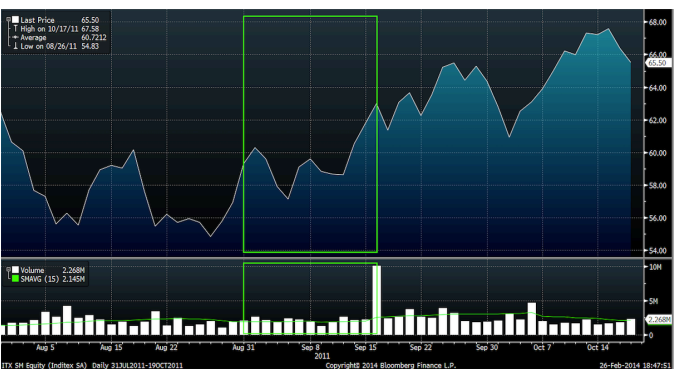
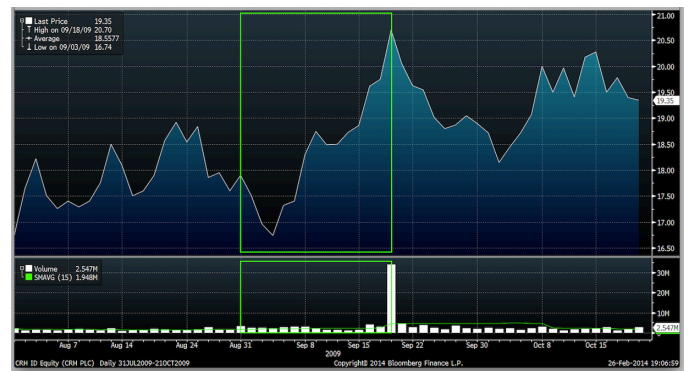
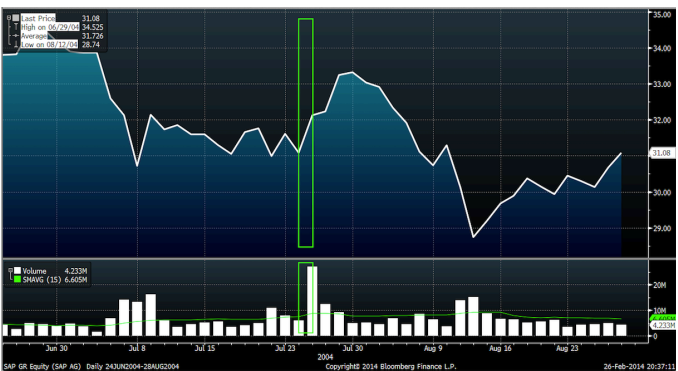
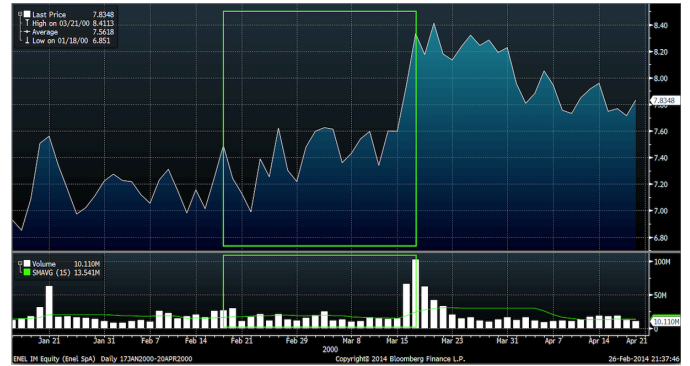
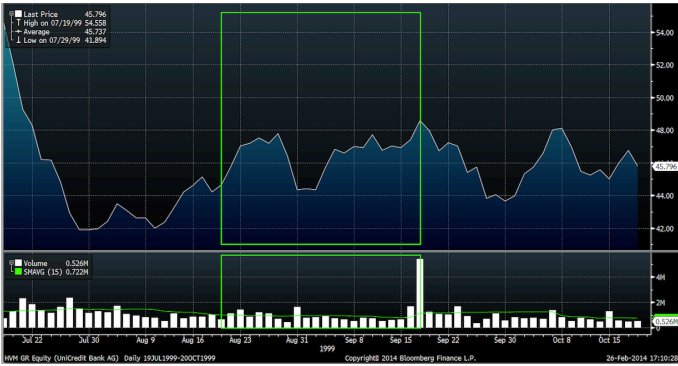
Company	Supersector	Weight (%)	Market Cap. (\$bn)
TOTAL	Oil and gas	5.24%	\$ 98.36
SANOFI	Health Care	4.84%	\$ 90.89
BAYER	Chemicals	4.38%	\$ 82.25
SIEMENS	Industrial Goods and Services	4.35%	\$ 81.53
BCO SANTANDER	Banks	3.77%	\$ 70.68
BASF	Chemicals	3.72%	\$ 69.86
DAIMLER	Automobiles & Parts	3.23%	\$ 60.67
ALLIANZ	Insurance	3.11%	\$ 58.26
SAP	Technology	3.11%	\$ 58.26
BNP PARIBAS	Banks	3.09%	\$ 58.04
ANHEUSER-BUSCH INBEV	Food and Beverage	3.01%	\$ 56.51
BCO BILBAO VIZCAYA ARGENTARIA	Banks	2.68%	\$ 50.28
TELEFONICA	Telecommunications	2.46%	\$ 46.23
ENI	Oil and gas	2.44%	\$ 45.73
UNILEVER	Food and Beverage	2.39%	\$ 44.90
AXA	Insurance	2.14%	\$ 40.21
ING	Insurance	2.01%	\$ 37.66
DEUTSCHE TELEKOM	Telecommunications	2.01%	\$ 37.64
LVMH MOET HENNESSY	Personal & Households Goods	1.85%	\$ 34.69
DEUTSCHE BANK	Banks	1.85%	\$ 34.66
SCHNEIDER ELECTRIC	Industrial Goods and Services	1.84%	\$ 34.44
SOCIETE GENERALE	Banks	1.74%	\$ 32.66
AIRBUS GROUP	Industrial Goods and Services	1.73%	\$ 32.46
AIR LIQUIDE	Chemicals	1.67%	\$ 31.26
DANONE	Food and Beverage	1.59%	\$ 29.83
L'OREAL	Personal & Households Goods	1.59%	\$ 29.81
UNICREDIT	Banks	1.53%	\$ 28.72
VOLKSWAGEN	Automobiles & Parts	1.53%	\$ 28.66
BMW	Automobiles & Parts	1.44%	\$ 27.00
E.ON	Utilities	1.41%	\$ 26.46
GDF SUEZ	Utilities	1.38%	\$ 25.91
PHILIPS	Industrial Goods and Services	1.37%	\$ 25.80
MUENCHENER RUECK ASML HLDG	Insurance	1.37%	\$ 25.68
ASML HLDG	Technology	1.37%	\$ 25.66
DEUTSCHE POST	Industrial Goods and Services	1.33%	\$ 24.99
INTESA	Banks	1.32%	\$ 24.81
INDITEX	Retail	1.31%	\$ 24.59
VINCI	Construction & Materials	1.30%	\$ 24.41
VIVENDI	Media	1.27%	\$ 23.80
IBERDROLA	Utilities	1.22%	\$ 22.85
ASSICURAZIONI GENERALI	Insurance	1.19%	\$ 22.39
ENEL	Utilities	1.05%	\$ 19.73
SAINT GOBAIN	Construction & Materials	0.96%	\$ 17.94
CARREFOUR	Retail	0.93%	\$ 17.40
UNIBAIL-RODAMCO	Real estate	0.93%	\$ 17.39
ORANGE	Telecommunications	0.90%	\$ 16.95
ESSILOR INTERNATIONAL	Health Care	0.86%	\$ 16.18
REPSOL	Oil and gas	0.80%	\$ 14.97
CRH	Construction & Materials	0.70%	\$ 13.18
RWE	Utilities	0.69%	\$ 12.85

Appendix 6 – Evolution of the composition of the Euro Stoxx 50

Changes to Euro Stoxx 50 since Inception

Annoucement Date	Effective Date	Company Added	Company Removed
8/19/99	9/20/99	Banco Santander	Akzo Nobel
8/19/99	9/20/99	BASF	Allied Irish Banks
8/19/99	9/20/99	Bayerische Hypo & Vereinsbank	Elsevier
8/19/99	9/20/99	Dresdner Bank	Fiat
8/19/99	9/20/99	Munich Re	Lufthansa
8/19/99	9/20/99	Sanofi	Portugal Telecom
8/19/99	9/20/99	Suez	Schneider Eletric
9/30/99	11/1/99	BNP	Paribas
9/30/99	11/1/99	Pinault Printemps Redoute	ELF Aquitaine
11/19/99	12/20/99	Aventis	Rhone-Poulenc
1/13/00	2/14/00	Canal +	Mannesmann
2/17/00	3/20/00	ENEL	St. Gobain
8/15/00	9/18/00	Danone	Electrabel
8/15/00	9/18/00	Sao Paulo - IMI	Metro
11/9/00	12/11/00	Volkswagen	Canal +
6/20/01	7/23/01	Telecom Italia Mobile	Dresdner bank
9/3/01	9/24/01	St. Gobain	KPN
9/2/02	9/23/02	Lafarge	Pinault Printemps Redoute
9/1/03	9/22/03	Iberdrola	Bayerische Hypo & Vereinsbank
7/24/04	7/28/04	SAP	Aventis
9/1/04	9/20/04	Credit Agricole	Volkswagen
6/22/05	6/30/05	Allied Irish Banks	Telecom Italia Mobile
7/15/05	7/20/05	Renault	Royal Dutch Shell A
9/3/07	9/24/07	ArcelorMittal	Ahold
9/3/07	9/24/07	Schneider Electric	Allied Irish Banks
9/3/07	9/24/07	VINCI	Lafarge
10/5/07	10/10/07	Volkswagen	Endesa
10/10/07	10/15/07	Deutsche Boerse AG	ABN Amro
7/17/08	7/22/08	Gaz de France	Suez
9/1/08	9/22/08	Alstom	Alcatel Lucent
8/31/09	9/21/09	Anheuser-Busch Inbev	Fortis
8/31/09	9/21/09	CRH	Renault
2/1/10	2/8/10	Unibail-Rodamco	Volkswagen
8/31/10	9/20/10	BMW	Aegon
8/31/11	9/19/11	Volkswagen	Alstom
8/31/11	9/19/11	Inditex	Credit Agricole
6/1/12	6/18/12	ASML HLDG	Deutsche Boerse
6/1/12	6/18/12	Essilor	Telecom Italia
3/1/13	3/18/13	EADS (now Airbus Group)	Nokia
8/30/13	9/23/13	Deutsche Post	ArcelorMittal

Appendix 7 – Selected added stock and announcement/inclusion widow – Effect on volume and price



Appendix 8 – Evolution of volume being traded during the window

Summary - Stocks being added to the Euro Stoxx 50														
	1999	2000	2001	2002	2003	2004	2005	2007	2008	2009	2010	2011	2012	2013
Average Daily Returns 1999 - 2013														
Before	-0.27%	0.55%	-0.25%	0.66%	0.20%	-0.03%	0.33%	0.46%	-0.13%	0.30%	0.03%	-0.69%	0.01%	0.39%
Window	0.31%	0.82%	-0.43%	-0.46%	-0.05%	0.67%	0.52%	0.71%	1.42%	0.82%	0.44%	0.47%	0.48%	0.73%
After	-0.01%	-0.02%	0.16%	-0.71%	-0.25%	-0.03%	-0.05%	0.12%	-1.32%	0.00%	0.11%	0.08%	0.28%	-0.18%
Average Volatility of returns														
Before	2.24%	2.83%	1.67%	2.29%	0.88%	1.52%	1.01%	2.02%	2.21%	2.38%	1.19%	2.88%	1.42%	1.59%
Window	1.97%	3.08%	2.70%	1.91%	0.67%	2.27%	0.71%	2.02%	2.96%	1.86%	0.96%	2.86%	1.65%	1.27%
After	2.15%	3.17%	2.12%	3.51%	0.81%	1.59%	0.90%	1.89%	4.44%	2.12%	1.80%	2.63%	2.08%	1.74%
Average Daily volume														
Before	4,160,702	2,529,007	7,116,042	13,427,310	833,559	20,468,764	4,484,562	3,080,391	1,331,469	2,135,135	1,374,665	1,196,209	971,036	2,710,417
Window	6,644,588	2,971,374	8,389,439	16,853,010	844,208	29,969,554	11,024,027	4,216,868	12,952,959	4,506,901	2,557,524	1,454,226	2,388,194	6,103,015
After	4,912,086	2,605,234	8,866,305	12,327,633	1,287,331	29,175,153	5,431,391	2,953,805	4,138,209	2,705,765	1,774,273	1,289,683	1,653,837	4,325,855
Window volume compared to														
Before	159.70%	117.89%	125.51%	101.28%	146.42%	245.82%	470.12%	136.89%	972.83%	211.08%	186.05%	121.57%	245.94%	225.17%
After	135.27%	94.62%	136.71%	65.58%	102.72%	202.97%	328.71%	142.76%	313.01%	166.57%	144.14%	112.76%	144.40%	141.08%

Source: Bloomberg, Team Analysis

Summary - Stocks being removed from the Euro Stoxx 50														
	1999	2000	2001	2002	2003	2004	2005	2007	2008	2009	2010	2011	2012	2013
Average Daily Returns 1999 - 2013														
Before	-0.27%	-0.39%	-0.80%	0.25%	-0.45%	-0.05%	0.35%	-0.24%	0.38%	0.51%	-0.65%	-0.93%	-1.01%	-0.12%
Window	-0.04%	-0.26%	-0.66%	-1.03%	1.44%	-0.82%	-1.60%	-0.41%	-2.09%	0.04%	0.23%	-1.46%	0.34%	-0.15%
After	0.01%	0.17%	-0.45%	-0.10%	0.52%	0.39%	0.13%	-0.02%	-1.71%	0.40%	0.42%	0.05%	0.29%	0.11%
Average Volatility of returns														
Before	2.14%	3.13%	3.19%	5.55%	1.60%	0.99%	1.46%	2.76%	3.40%	4.29%	1.84%	3.85%	2.62%	2.44%
Window	1.69%	2.51%	5.25%	3.19%	3.89%	1.36%	0.92%	2.67%	3.24%	3.65%	2.77%	5.06%	2.66%	1.95%
After	3.05%	2.13%	9.46%	4.66%	4.46%	1.27%	1.17%	1.40%	7.88%	2.18%	1.68%	4.96%	2.67%	2.19%
Average Daily volume														
Before	10,005,822	1,941,664	726,016	6,911,144	809,505	2,933,768	2,204,959	37,087,837	5,943,752	19,887,285	2,351,487	10,474,163	59,738,826	19,054,385
Window	15,248,395	2,003,696	797,756	13,747,083	599,753	5,471,355	8,498,290	115,552,165	7,680,043	36,345,975	3,358,195	9,990,644	62,100,997	29,567,234
After	8,077,910	1,935,782	717,422	7,634,741	719,056	5,839,542	2,539,075	27,958,762	4,331,772	34,686,429	2,433,596	4,932,958	31,232,092	19,755,309
Window volume compared to														
Before	152.40%	109.88%	198.91%	74.09%	186.50%	385.42%	311.56%	129.21%	182.76%	142.81%	132.25%	91.33%	103.95%	155.17%
After	188.77%	103.51%	111.20%	180.06%	83.41%	93.69%	334.70%	413.29%	177.30%	137.99%	202.53%	125.69%	198.84%	149.67%

Source: Bloomberg, Team Analysis

Appendix 9 - Absolute and relative returns

Additions to Euro Stoxx 50 - Window Returns

Company Added	Supersector	Stock Added	Super Sector	Euro Stoxx 600	Euro Stoxx 50
Banco Santander	Banks	3.54%	4.39%	2.41%	1.88%
BASF	Chemicals	3.71%	-0.17%	2.41%	1.88%
Bayerische Hypo & Vereinsbank	Banks	8.83%	4.39%	2.41%	1.88%
Dresdner Bank	Banks	10.52%	4.39%	2.41%	1.88%
Munich Re	Insurance	9.10%	4.42%	2.41%	1.88%
Sanofi	Healthcare	7.00%	3.71%	2.41%	1.88%
Suez	Utilities	1.91%	2.17%	2.41%	0.90%
BNP	Banks	11.41%	3.46%	4.40%	6.90%
Pinault Printemps Redoute	Retail	1.85%	5.23%	4.40%	6.90%
Canal +	Media	43.54%	43.54%	4.54%	10.82%
ENEL	Utilities	11.25%	8.25%	3.63%	2.29%
Danone	Food & Beverage	-2.40%	-3.62%	-0.75%	-0.47%
Sao Paolo - IMI	Banks	-17.22%	-0.99%	-0.75%	-0.47%
Volkswagen	Automobiles and Parts	0.69%	-5.59%	-2.77%	-2.55%
Telecom Italia Mobile	Telecom	3.31%	-2.03%	-4.57%	-5.47%
St. Gobain	Construction and materials	-18.95%	-19.23%	-19.96%	-22.05%
Lafarge	Construction and Materials	-5.33%	-4.23%	-9.20%	-12.55%
Iberdrola	Utilities	-1.54%	-1.80%	0.79%	-0.71%
SAP	Construction and materials	3.39%	0.44%	0.20%	1.13%
Credit Agricole	Banks	6.41%	3.55%	2.51%	3.60%
Allied Irish Banks	Banks	0.56%	1.68%	2.19%	-0.11%
Renault	Automobiles and Parts	1.12%	1.75%	0.16%	1.08%
ArcelorMittal	Basic Resources	11.12%	7.08%	-0.07%	1.73%
Schneider Electric	Industrial Goods and Services	-3.58%	0.62%	-0.07%	1.73%
VINCI	Construction and Materials	1.75%	-5.00%	-0.07%	1.73%
Volkswagen	Automobiles and Parts	2.37%	2.75%	0.96%	-0.17%
Deutsche Boerse AG	Financial Services	-0.19%	0.54%	0.96%	0.75%
Gaz de France	Utilities	8.42%	0.80%	2.20%	2.39%
Alstom	Industrial Goods and Services	-9.20%	-7.02%	-3.13%	-3.30%
Anheuser-Busch Inbev	Food and Beverage	6.11%	4.62%	3.78%	4.04%
CRH	Construction and Materials	15.64%	8.75%	3.78%	4.04%
Unibail-Rodamco	Real Estate	-1.91%	-1.58%	-4.41%	-5.79%
BMW	Automobiles and Parts	13.80%	13.75%	4.60%	5.12%
Volkswagen	Automobiles and Parts	-1.90%	-3.97%	-3.06%	-6.20%
Inditex	Retail	6.21%	-1.58%	-3.06%	-6.20%
ASML HLDG	Technology	9.10%	2.76%	3.88%	5.44%
Essilor	Healthcare	6.09%	4.45%	3.88%	5.44%
EADS (now Airbus Group)	Industrial Goods and Services	9.33%	3.06%	2.91%	4.16%
Deutsche Post	Industrial Goods and Services	12.61%	8.92%	5.68%	7.56%

Removals from Euro Stoxx 50 - Window Returns

Company Added	Supersector	Stock Removed	Super Sector	Euro Stoxx 600	Euro Stoxx 50
Akzo Nobel	Chemicals	4.62%	-0.17%	2.41%	1.88%
Allied Irish Banks	Banks	7.57%	4.39%	2.41%	1.88%
Elsevier	Healthcare	-3.98%	3.71%	2.41%	1.88%
Fiat	Automobiles and Parts	4.27%	0.05%	2.41%	1.88%
Lufthansa	Industrial Goods and Services	-1.93%	3.88%	2.41%	1.88%
Portugal Telecom	Telecom	3.11%	4.67%	2.41%	1.88%
Schneider Electric	Industrial Goods and Services	-11.70%	3.88%	2.41%	1.88%
Mannesmann	Construction and material	11.20%	-3.30%	4.54%	10.82%
St. Gobain	Construction and material	6.29%	-1.16%	3.63%	2.29%
Electrabel	Utilities	0.17%	0.28%	-0.75%	-0.47%
Metro	Retail	6.67%	1.25%	-0.75%	-0.47%
Canal +	Media	15.84%	-9.82%	-2.77%	-2.55%
Dresdner bank	Banks	17.77%	-7.33%	-4.57%	-5.47%
KPN	Telecom	10.85%	-11.01%	-19.96%	-22.05%
Pinault Printemps Redoute	Retail	13.04%	-9.21%	-9.20%	-12.55%
Bayerische Hypo & Vereinsbank	Banks	-17.71%	2.07%	0.79%	-0.71%
Aventis	Healthcare	2.80%	-3.13%	0.20%	1.13%
Volkswagen	Automobiles and Parts	-2.56%	2.93%	2.51%	3.60%
Royal Dutch Shell A	Oil and Gas	3.84%	-0.42%	0.16%	1.08%
Ahold	Retail	-6.94%	1.64%	-0.07%	1.73%
Allied Irish Banks	Banks	8.60%	-1.36%	-0.07%	1.73%
Lafarge	Construction and materials	4.82%	-5.00%	-0.07%	1.73%
Endesa	Utilities	6.43%	1.29%	0.96%	-0.17%
Alcatel Lucent	Technology	30.27%	-9.20%	-3.13%	-3.30%
Renault	Automobiles and Parts	-3.50%	2.62%	3.78%	4.04%
Volkswagen	Automobiles and Parts	4.84%	-5.53%	-4.41%	-5.79%
Aegon	Insurance	-9.21%	4.38%	4.60%	5.12%
Alstom	Industrial Goods and Services	15.58%	-4.27%	-3.06%	-6.20%
Credit Agricole	Banks	27.91%	-12.65%	-3.06%	-6.20%
Deutsche Boerse	Financial Services	-6.21%	5.84%	3.88%	5.44%
Telecom Italia	Telecom	-1.90%	4.75%	3.88%	5.44%
Nokia	Technology	5.22%	3.20%	2.91%	4.16%
ArcelorMittal	Basic Resources	-7.07%	8.82%	5.68%	7.56%

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