MSCI

Quantitative Insight

Does Style Make the Sector?

Style factor contributions to European sector returns

Zoltán Nagy

Oleg Ruban

August 2011

Abstract

Sector rotation strategies are a staple of finance textbooks. This paper discusses sector rotation strategies and contributes beyond the typical literature by highlighting the need to look at the style profile within each sector. Most of the earlier studies on sector rotation focus on the links between industry membership and the macroeconomic or market cycles. We find that style exposures play an important role in sector performance, and returns driven by style effects can dominate returns due to industry membership. Our results suggest that analyzing and managing the style profile of sector rotation strategies can be a key component for the successful implementation of such strategies.

Introduction

Sectors are often classified as being either cyclical or defensive. This classification forms the basis of rotation strategies, as the performance of defensive sectors is expected to be less sensitive to macroeconomic and market fluctuations than the performance of cyclical sectors.

This paper discusses sector rotation strategies and contributes beyond the typical literature by highlighting the need to look at the style factor profile within each sector. Having a suitable model of portfolio risk and return is crucial to this analysis. The enhanced Barra Europe Equity Model (EUE3) decomposes portfolio return and risk into a currency part, a local factor part and an asset specific part. Nine style factors help users explore systematic drivers of return and risk beyond the country and industry factors. We use the model to illustrate how the characteristics of companies captured by style factor exposures – Value, Growth, Dividend Yield and Leverage, among others – impact the return and risk of the sector portfolio. Our results suggest that the analysis of the style profile of a sector can help in implementing a superior sector rotation strategy.

Most of the earlier studies on sector rotation focus on the links between industry membership and the macroeconomic or market cycles. The EUE3 model opens up new dimensions to this analysis. Although companies in the same sector pursue similar activities, their business structure can still differ in obvious ways: their size, the amount of leverage, or their recent or forecast growth patterns. Some of these differences are captured in style factor exposures. We find that style exposures play an important role in sector performance, and returns driven by style effects can dominate returns due to industry membership. Moreover, we show that the cyclical or defensive behavior of the sector can be typically amplified by the style characteristics of the sector portfolios and contributions due to styles may follow a pattern based on macroeconomic regimes.

Style Tilts Contribute Significantly to Sector Risk and Performance

We use the highest hierarchy level of the GICS®[1] methodology to define ten European sector portfolios. Our earlier papers, such as *Sector Performance Across Business Cycles* (MSCI Research Bulletin,

[1] GICS - the global industry classification standard jointly developed by MSCI and Standard & Poor's.

November 2009), examined the correlation of GICS sector performance with a macroeconomic leading indicator variable. That paper defined five cyclical and five defensive sectors for Europe, based on the sign of the correlation of sector returns with a leading macroeconomic indicator.[2] We classified Materials, Industrials, Consumer Discretionary, Financials and Information Technology sectors as cyclical, and Energy, Consumer Staples, Health Care, Telecommunication Services and Utilities as defensive sectors. Following this classification, we also created two broad aggregate portfolios, cyclical and defensive, to assess the overall characteristics of the two sector groups.

In the Barra regional equity models, the active performance of a portfolio can be broadly decomposed as follows[3]

$$r_{Active} = r_{Country} + r_{Industry} + r_{Style} + r_{Currency} + r_{Specific} .$$

Our aim is to examine the contribution of styles to the active performance of European sectors (using MSCI Europe Index as benchmark). How significant is the contribution of styles to the risk and return of sector portfolios? Exhibit 1 shows the risk decomposition of European sector portfolios, using the EUE3 model, on January 25, 2011.[4]

Exhibit 1: Active risk decomposition of European sector portfolios

	Active risk contributions due to:					Active Risk (%)
	Style	Industry	Country	Specific	Currency	
Cyclicals						
Materials	3.24	8.38	0.22	0.84	0.04	12.72
Industrials	1.23	3.46	0.35	1.10	0.55	6.69
Consumer Discretionary	0.94	5.27	0.22	1.28	0.01	7.72
Financials	6.66	6.01	0.20	0.49	0.03	13.39
Info Tech	0.23	4.11	0.40	4.37	0.45	9.56
Defensives						
Energy	0.09	7.16	0.05	3.05	0.52	10.87
Consumer Staples	7.39	4.91	-0.07	0.67	0.60	13.50
Health care	5.89	5.70	-0.02	1.17	0.82	13.56
Telecoms	3.68	7.08	0.45	1.62	-0.18	12.65
Utilities	1.46	6.28	0.64	1.11	0.24	9.73

Notes: This table presents active risk decomposition of the ten sector portfolios relative to the MSCI Europe Index portfolio. The total active risk is equal to the sum of style, industry, country, currency and specific risks.

Source: MSCI, Barra EUE3 model, data as of January 25, 2011

[2] More precisely, we calculated the correlation between the 1-year rolling sector return relative to the MSCI Europe Index and the 1-year rolling relative change of the OECD Composite Leading Indicator for Europe. By using deep history MSCI data, we could extend the sector return series until 1976. Those sectors having a positive correlation were classified as cyclical, those having a negative correlation, as defensive.

[3] A fully invested long only portfolio will have zero active exposure to the market factor.

[4] We use the three source risk decomposition, as outlined in Menchero and Davis (MSCI Research Insight, January 2010).

Style contribution to active risk is sizeable in most sector portfolios. In three sectors (Financials, Consumer Staples, and Health Care) risk due to styles dominates the contribution due to industry risk; in seven sectors it dominates the contribution due to specific risk; and in nine sectors style is more important than country risk contribution. Next, we examine what drives these contributions.

Sectors Have Important Style Exposures

In the Barra equity models, we can get more insight into what is driving return contributions by breaking them down further into components. Contribution from an individual factor is calculated as the product of the exposure to the factor (x_s) and the factor's return (f_s). In the Barra EUE3 model, the nine individual style factor contributions are summed to yield the total style contribution:

$$r_{Style} = \sum_{s \in styles} x_s \cdot f_s$$

While country and industry exposures of stocks can assume only binary values (0 or 1), style factor exposures can take on continuous values. They measure the deviation of a given stock's particular characteristics from the average characteristics of a broad universe of stocks. These characteristics in turn can be based on fundamental or market-related data. For example, a positive (or negative) exposure to the size factor means that the weighted average of market capitalization and total assets[5] of the issuer of the stock in question is greater (or smaller) than that of the average company in the universe. Intuitively, the exposure of a portfolio can then be obtained as the weighted average of its constituents' exposures. Factor returns, on the other hand, are derived from cross-sectional regressions.

Thus, it is clear that factor contributions to sector portfolio returns depend both on the changing portfolio exposures and changing factor returns. In the remainder of this section, we will focus on exposure differences among sectors and their evolution over time.

Exhibit 2 shows a recent snapshot of active style exposures for European sectors, plus broad aggregate cyclical and defensive portfolios using the Barra Europe Equity Model (EUE3). The underlying universe of stocks – from which we construct our sector portfolios – is the MSCI Europe Index, which is designed to cover the top 85% of the European market. Therefore, our sector portfolios by construction had a positive size and liquidity factor exposure tilts. To remove the overall tilt of the underlying MSCI Europe Index portfolio to larger and more liquid stocks, as well as other possible tilts, we performed the analysis from an active perspective relative to the MSCI Europe Index portfolio.[6]

In November 2010, cyclical sectors (with the exception of Financials) tended to have negative exposures to Dividend Yield, Earnings Yield, Financial Leverage, Size, and Value. The cyclical sectors had positive exposure to Volatility, Growth, and Liquidity.

It should be noted that high exposure by itself does not imply a sizeable contribution to portfolio risk or return coming from the factor. A moderate exposure to a volatile factor can result in a higher return or risk contribution than a high exposure to a less volatile factor.

[5] More precisely, the logarithm of market capitalisation and the logarithm of total assets are used to define the size exposure in Barra EUE3.

[6] Therefore, the exposures shown in Exhibit 4 are the difference between sector portfolio exposures and the exposures of the MSCI Europe Index.

Exhibit 2: Snapshot of active exposures of MSCI Europe Index sector portfolios, Nov 2010

as of Nov 2010	Dividend Yield	Earnings Yield	Financial Leverage	Growth	Liquidity	Momentum	Size	Value	Volatility	Return contribution (bp)
Average cyclical	**-0.33**	-0.06	0.15	0.04	0.18	0.03	-0.09	0.18	**0.57**	-37.67
Materials	**-0.60**	-0.09	**-0.38**	**0.35**	**0.21**	**0.21**	**-0.26**	**-0.21**	**0.84**	7.46
Industrials	**-0.48**	**-0.35**	-0.19	0.02	0.08	**0.30**	**-0.59**	-0.18	**0.28**	59.58
Consumer discretionary	**-0.46**	**-0.27**	-0.06	0.07	0.09	**0.55**	**-0.51**	-0.09	**0.22**	116.63
Financials	-0.08	**0.22**	**0.45**	0.16	**0.21**	**-0.35**	**0.44**	**0.70**	**0.80**	-162.47
Info tech	**-0.42**	**-0.47**	**-0.58**	0.14	**0.42**	-0.11	**-0.65**	**-0.37**	-0.06	-27.39
Average defensive	**0.40**	0.07	-0.18	-0.05	**-0.21**	-0.04	0.11	**-0.22**	**-0.69**	45.47
Energy	**0.52**	**0.35**	**-0.53**	0.02	**-0.35**	**-0.22**	**0.32**	0.18	-0.06	-20.18
Consumer staples	**-0.26**	**-0.35**	**-0.23**	-0.12	**-0.36**	0.19	0.04	**-0.46**	**-0.99**	116.78
Health care	0.17	0.13	0.02	**-0.24**	**-0.23**	-0.10	0.01	**-0.63**	**-0.94**	44.99
Telecom	**1.13**	**0.26**	**0.39**	**-0.47**	0.09	**0.20**	**0.20**	-0.14	**-0.83**	98.48
Utilities	**1.10**	0.17	**0.52**	**-0.24**	0.01	**-0.37**	-0.03	**0.22**	**-0.55**	-58.31
factor returns (bp)	26.27	-10.47	-20.41	2.79	-49.55	242.57	-4.43	-28.25	-39.96	

Notes: This table presents the active style factor exposures of sector portfolios relative to the MSCI Europe Index portfolio. The rows Average cyclical, and Average defensive contain the active exposures of the capitalization weighted aggregate portfolios of cyclical and defensive sectors respectively. The last row of the table shows the style factor returns for November 2010, while the last column contains the combined contribution of all style factors to the sector portfolio's active return during November 2010.

Source: MSCI, Barra EUE3 model

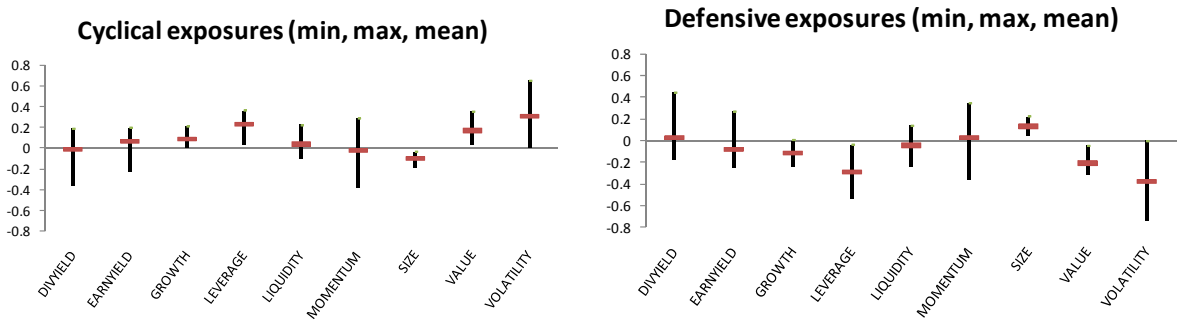
The last column in Exhibit 2 presents the return contributions to the sector portfolios coming from styles. We see that in most cases this return contribution was non-negligible. In the next section, we explore the magnitude and behavior of style factor contributions to sector returns and volatilities.

In Exhibit 3, we show basic descriptive statistics of the two broad sector aggregate exposure time series. Note that since the market capitalization of cyclical and defensive sectors are not too different (55% and 45% of the total market on average), the active exposures of the aggregates are almost perfect mirror images of each other.

We observe that the aggregated cyclical sectors had consistently positive exposures to Growth, Leverage, Value, and Volatility, and negative exposure to Size, while exposures to Dividend Yield, Earnings Yield, Liquidity and Momentum changed signs at least once during our sample period of 1995-2010. The results are reversed for the aggregated defensive sectors.[7]

[7] We examine some of the drivers of the time-series variation in exposures in more detail in Appendix 1.

Exhibit 3: Minimum, maximum and average active style factor exposures of MSCI Europe Index sector portfolios, Jan 1995 – Nov 2010



Notes: We show the active exposures of the aggregate capitalization weighted portfolios of cyclical and defensive sectors relative to the MSCI Europe Index.

Source: MSCI, Barra EUE3 model, based on monthly data

So far we have shown that styles can contribute significantly to the risk and return of sector portfolios and that sectors differ with regards to their style profiles. From a portfolio manager's perspective, this highlights that sector portfolios differ not only by industry definitions, but also by different stock attributes. We can now examine the implications of these differences for sector rotation strategies. The rationale behind these strategies is that different sectors do not behave homogenously in various macroeconomic and market environments. Our objective is to analyze to what extend the performance differences across sectors are the result of style or industry characteristics. Insights into this question may help a portfolio manager to build more efficient sector rotation strategies under changing market and macroeconomic conditions.

Stylized Facts about Cyclical and Defensive Sectors

Let us first look at the performance of cyclical and defensive sectors under different market conditions. In Exhibit 4, we divide the sample period into bull and bear markets, based on the rolling 1-year performance of the MSCI Europe Index, and show the returns of the 10 sectors.

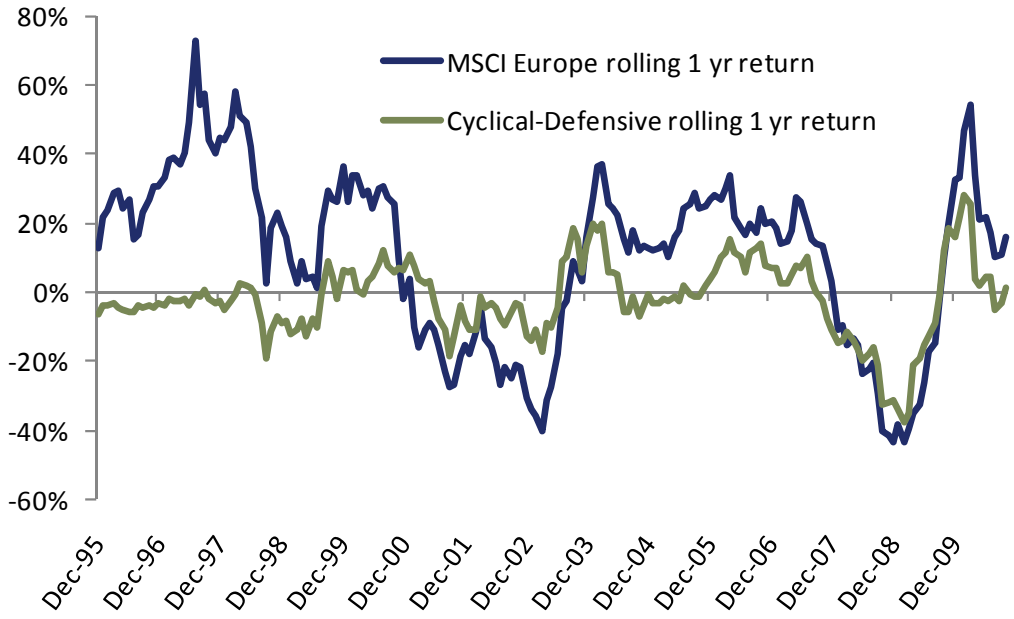
Exhibit 4: Sector performance in bull and bear markets, Dec 1995 - Nov 2010

	Full period			Bull markets			Bear markets		
	Return	Risk	Sharpe Ratio	Return	Risk	Sharpe ratio	Return	Risk	Sharpe ratio
MSCI Europe	8.9%	17.2%	0.52	18.4%	13.7%	1.34	-15.1%	22.3%	-0.68
Cyclicals	8.6%	22.3%	0.39	18.6%	16.2%	1.15	-15.4%	31.2%	-0.49
Materials	13.2%	22.4%	0.59	21.3%	18.2%	1.18	-6.1%	29.5%	-0.21
Industrials	10.1%	21.4%	0.47	19.6%	16.0%	1.22	-12.3%	29.6%	-0.42
Consumer discretionary	8.1%	20.7%	0.39	17.2%	15.8%	1.09	-12.9%	28.3%	-0.45
Financials	7.7%	24.8%	0.31	17.4%	18.2%	0.96	-14.5%	34.9%	-0.42
Info tech	9.7%	34.7%	0.28	24.1%	27.1%	0.89	-25.8%	46.5%	-0.55
Defensives	10.0%	13.2%	0.76	19.8%	11.3%	1.75	-13.1%	14.8%	-0.89
Energy	11.3%	19.8%	0.57	20.2%	18.6%	1.09	-8.5%	21.4%	-0.40
Consumer staples	11.2%	13.3%	0.84	19.7%	11.6%	1.69	-7.9%	15.2%	-0.52
Health care	8.5%	14.4%	0.59	17.3%	13.5%	1.28	-11.2%	14.7%	-0.76
Telecom	11.1%	24.0%	0.46	23.8%	20.7%	1.15	-18.5%	28.5%	-0.65
Utilities	10.9%	15.4%	0.71	21.0%	13.2%	1.60	-12.4%	17.8%	-0.70

Notes: This table presents risk and return statistics of sector portfolios and of the MSCI Europe Index. Calculations are based on monthly gross returns in EUR/DEM and annualized values are reported. Bull and bear markets are defined as periods where the one year rolling MSCI Europe Index return is positive or negative respectively. The first column of each of the three groups contains the average monthly return of the sector over the corresponding time period, the second column contains the annualized standard deviation of the sector returns over the same period, and the third column contains the ratio of the return and risk figures.

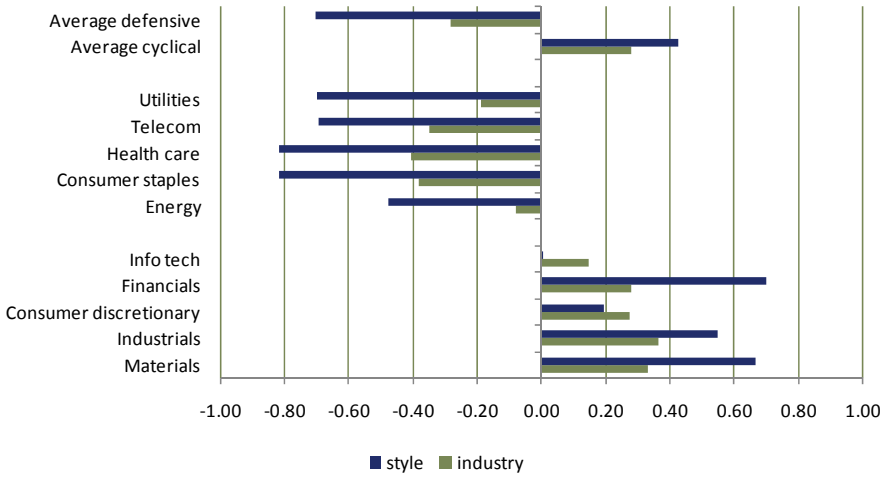
We find that the defensive aggregate tends to outperform both the MSCI Europe Index and the cyclical aggregate during both bear and bull markets; however, the relative outperformance is greater during bear markets. Exhibit 5 shows the relative performance of defensive and cyclical aggregates over time, plotting the difference between the defensive and cyclical 1-year rolling returns against the MSCI Europe Index 1-year rolling returns. During the last five years, we see periods of positive overall market performance associated with outperformance of cyclical aggregate, relative to the defensive aggregate, while periods of negative market performance show defensive sectors outperforming cyclical sectors.

Exhibit 5: MSCI Europe Index rolling return and the relative performance of cyclical versus defensive aggregate portfolios



Let us now decompose sector returns and assess how the style and industry factor contributions are related to the business or stock market cycle, i. e., whether style factors hedge or amplify the cyclical/defensive behavior of sector portfolios. The simplest way to assess this is to look at the correlation of monthly style and industry factor contributions with the monthly market returns. Results for the period between September 2000 and September 2010 are reported in Exhibit 6.

Exhibit 6: Correlation between style and industry factor contributions and MSCI Europe Index returns, by sector, Sep 2000 – Sep 2010



These correlation figures show that, during the last 10 years, style contributions to sector returns have been more strongly related to the market cycle than industry contributions (with the exception of Information Technology). On average, the correlation is positive in the cyclical and negative in the defensive aggregate. This implies that style factor contributions tended to reinforce the cyclical/defensive nature of the sectors during the observed period.

Correlations measure the strength of the co-movement between return contributions and market or macro variables. They do not, however, give insight into the relative and absolute performance in different macroeconomic environments, which is a more pressing concern for portfolio managers. In the next section, we introduce four macroeconomic regimes and focus on a detailed examination of relative sector performance.

A More Detailed Look at Macroeconomic Regimes

We combine GDP growth and consumer price inflation data to define four macroeconomic regimes. The method we use to identify the regimes is similar to the one developed in *Economic Cycles and Equity Styles in Europe* (MSCI Research Bulletin, October 2009). To distinguish between the trend and the cyclical component of these variables, we first use a statistical filter[8] to extract an estimated trend from the time-series. Rising GDP growth regimes are defined as those where the cyclical component of the GDP (that is, the output gap) is rising; in other words, the change in the output gap is positive. Slowing GDP growth regimes are those where the output gap is contracting. For inflation, we identify above and below trend inflation regimes by comparing actual year on year change in (seasonally adjusted) CPI with an estimated trend value. The combination of CPI and GDP, filtered in this way, yields four different regimes which are roughly related to the stages of the macroeconomic cycle as follows:

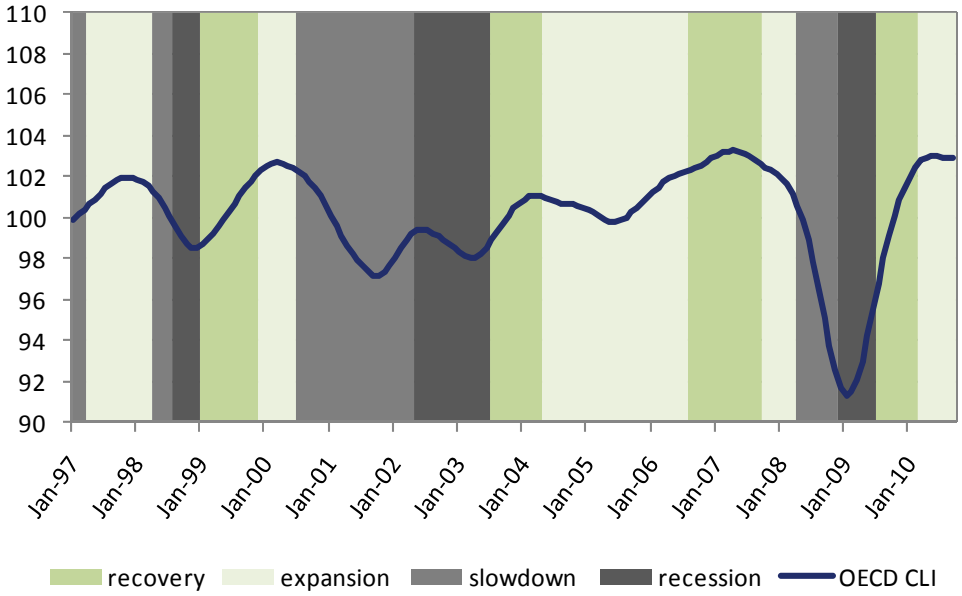
- Recession: output gap is contracting and inflation is below trend
- Recovery: output gap is expanding, inflation is below trend
- Expansion: output gap is expanding and inflation is above trend
- Slowdown: output gap is contracting, inflation is above trend

An important caveat to our analysis is that splitting our analysis period into macroeconomic regimes that typically last several months comes at the price of higher sampling error. Indeed, during the time period considered here, we count 4 recoveries, 5 expansions, 4 slowdowns, and 3 recessions.

In Exhibit 7, we show how these regimes are related to the OECD Composite Leading Indicator series. As expected, peaks of the CLI (an indicator focusing on growth patterns) typically precede downturns, while troughs typically precede upswings. It is important to note that we do not impose a specific order on the regimes in this methodology—Recovery, Expansion, Slowdown and Recession typically occur in a logical order, but there are exceptions. For example, below trend inflation in 2006-2007 meant that the two episodes of expansion were interrupted by a "recovery."

[8] We use quarterly GDP and monthly CPI data provided by Eurostat for the 25 countries in the European Union. The data is seasonally adjusted. The filter is a Hodrick-Prescott filter with λ=1600 for the quarterly and λ=14400 for the monthly series.

Exhibit 7: Regimes and the OECD CLI for Europe, Jan 1997 – Sep 2010



Notes: This chart presents the evolution of different macroeconomic regimes through time. Recovery regimes are periods where the output gap is expanding, while inflation is below its estimated trend. Expansion regimes are periods where the output gap is expanding and inflation is above its estimated trend. Slowdown regimes are periods where the output gap is contracting and inflation is above its estimated trend. Recession regimes are periods where the output gap is contracting and inflation is below its estimated trend.

Source: MSCI, Eurostat, OECD

Let us now turn to the analysis of sector and style contributions to active sector returns during different macroeconomic regimes. In Exhibit 8, we present the summary results by sector and macroeconomic regime for the 13-year period starting in 1997. The average of active sector returns – also reported in Exhibit 8 – allows us to look at the co-movement of style contributions and overall sector returns in different macroeconomic environments.

Exhibit 8: Returns and Sharpe ratios[9] of style factor contributions and sector indices in various macroeconomic regimes in EUR[10], Jan 1997 – Sep 2010

Period: Jan 1997 - Sep 2010	Recovery		Expansion		Slowdown		Recession	
	Style contribution	Return	Style contribution	Return	Style contribution	Return	Style contribution	Return
Cyclical	2.0%	1.8%	-0.4%	1.3%	-2.7%	-5.1%	4.2%	0.3%
	0.81	0.40	-0.22	0.31	-0.83	-0.67	0.64	0.03
Materials	3.2%	**14.4%**	1.2%	-0.6%	6.2%	1.1%	**9.1%**	2.9%
	1.15	1.18	0.30	-0.06	0.88	0.07	1.41	0.25
Industrials	3.2%	9.6%	0.6%	1.4%	-1.7%	-3.6%	5.0%	-3.5%
	1.17	1.36	0.18	0.18	-0.45	-0.30	1.28	-0.37
Consumer discretionary	0.6%	0.2%	-0.2%	-3.0%	-4.0%	-3.0%	-0.4%	1.4%
	0.22	0.04	-0.10	-0.37	-0.97	-0.23	-0.08	0.15
Financials	1.7%	**-5.6%**	-0.6%	2.7%	2.8%	0.4%	6.7%	1.6%
	0.45	-0.69	-0.14	0.30	0.53	0.04	0.61	0.08
Info tech	1.9%	**14.7%**	-1.7%	-0.1%	**-23.1%**	**-13.5%**	**-6.9%**	0.7%
	0.25	0.73	-0.20	-0.01	-1.27	-0.45	-0.42	0.02
Defensive	-2.1%	-1.9%	0.6%	-1.1%	3.5%	6.8%	-3.4%	2.1%
	-0.73	-0.34	0.28	-0.22	0.89	0.74	-0.53	0.18
Energy	-0.6%	1.1%	1.3%	-1.4%	**10.2%**	11.1%	-0.7%	-1.6%
	-0.19	0.07	0.28	-0.10	1.36	0.65	-0.16	-0.07
Consumer staples	-2.1%	-5.4%	2.2%	0.6%	**9.5%**	**17.2%**	-2.4%	0.9%
	-0.49	-0.51	0.51	0.06	1.28	1.13	-0.21	0.05
Health care	-5.6%	**-10.8%**	0.7%	-2.6%	**7.7%**	**16.6%**	**-5.7%**	0.4%
	-1.37	-1.07	0.16	-0.17	1.03	0.86	-0.65	0.03
Telecom	-0.3%	10.4%	-1.6%	-2.7%	**-11.8%**	**-7.1%**	**-9.6%**	**12.4%**
	-0.11	0.73	-0.42	-0.18	-1.15	-0.32	-1.45	0.59
Utilities	-1.0%	**-5.9%**	1.7%	3.4%	**11.1%**	7.5%	3.3%	5.2%
	-0.24	-0.55	0.40	0.35	1.56	0.62	0.42	0.34

Notes: This table presents statistics for sector returns and style factor contributions to sector returns in different macroeconomic regimes. Regime identification is based on quarterly data. The rows named Cyclical and Defensive correspond to portfolios which are capitalization weighted combinations of cyclical and defensive sector portfolios. We present active risk and return figures, using the MSCI Europe Index as the benchmark. For each portfolio and macroeconomic regime, we present four numbers: the average contribution of style factors to the portfolio's active return during the regime; the average active return of the portfolio during the regime; the ratio of active portfolio returns due to style factors over the volatility of the active returns due to style factors, and the ratio of active portfolio returns over the volatility of active portfolio returns. Return figures are computed using monthly data and are reported on an annualized basis. Active sector returns are based on total returns in EUR/DEM. We have highlighted the top five sector returns and style contribution in green, and the bottom five in red.

Source: MSCI, Barra EUE3 model.

Let us first focus on the behavior of aggregate sector portfolios. The performance of the cyclical and defensive aggregates is consistent with intuition—cyclicals outperformed the MSCI Europe index during Recovery and Expansion regimes (when the output gap is growing), while defensives outperformed during Slowdowns and Recessions (when the output gap is contracting). Our results suggest that during the historical period under consideration, Materials, Information Technology, and Telecoms performed best in the Recovery regime, while Industrials, Financials, and Utilities performed well during Expansion. Utilities continued to perform well during Slowdown, joined by Energy, Consumer Staples and Health

[9] More precisely, we report annualized return over annualized volatility.

[10] Note that regime classifications are slightly different from those in our earlier paper *Economic Cycles and Equity Styles in Europe*, especially during the early part of the sample. While the methodologies used in the two papers are the same, this paper identifies them using growth and inflation data for the 25 EU countries, in contrast to a narrower range of Eurozone countries used earlier. During the latter half of the sample regimes identified, using the two datasets are identical.

Care. During the Recession regime, Telecom, Utilities, Materials, Financials and Consumer Discretionary sectors performed well.[11]

Let us now turn to the contributions of style factor exposures to sector performance. While overall sector performance is generally more aligned with GDP growth fluctuations, style factor contributions appear to have an alignment with inflation regimes. Inflation is below its estimated trend value in Recessions and Recoveries and above its estimated trend value in Expansions and Slowdowns. As Exhibit 8 illustrates, on average style factors contributed positively to cyclical sector returns and negatively to defensive sector returns during below-trend inflation regimes (Recessions and Recoveries). In the above-trend inflation regimes (Expansions and Slowdowns) style factors contributed negatively to cyclical sector returns and positively to defensive sector returns. Interestingly, the Materials sector had positive contributions to return from styles in all regimes, while the Telecom sector had a negative contribution from styles in all regimes.

A limitation of the analysis is that EUE3 factor returns are only available from the mid 1990s, making our sample period relatively short. The short sample period and the limited number of regimes available may raise the risk that our results are period specific and may not be applicable to cycles outside our sample. Keeping this limitation in mind, the patterns observed in this study may suggest that those following a sector rotation strategy may wish to neutralize certain style exposures of sectors in different macroeconomic regimes.

Conclusions

In this paper, we highlighted the importance of style exposures for European sector portfolios. These factors can represent certain investment themes, such as value or momentum, related to the fundamental characteristics of firms or their past behavior. We explored how cyclical and defensive sectors differ not only by the industry composition, but also by the fundamental characteristics of the companies that populate them. Using Barra's European equity factor model (EUE3), we illustrated how style exposures of sector portfolios can important drivers of risk and return, occasionally eclipsing contribution from industry returns.

Finally, we explored how the style contributions to sector portfolio returns relate to market and macroeconomic cycles. In particular, we found that the respective cyclical or defensive nature of industries in a sector tends to be reinforced by the behavior of style contributions. When separating periods based on key macroeconomic variables, we discovered that cyclical sectors on aggregate outperformed the MSCI Europe Index in Recoveries and Expansions, and defensives on aggregate outperformed during Slowdowns and Recessions. While overall sector performance was generally aligned more with GDP growth regimes, style factor contributions, on the other hand, appeared to have an alignment with inflation regimes. In other words, style contributions to cyclical sectors tended to be positive in Recessions and Recoveries (below-trend inflation regimes), while the opposite was true for defensive sectors.

[11] The performance of individual sectors was also broadly consistent with the patterns identified by Stovall (1996), who based his observations on National Bureau of Economic Research business cycle stages. He suggests that in the early Recovery stage, Technology and Transportation sectors will perform best. As the recovery progresses, he suggests that the best performance shifts to Basic Materials and Capital Goods. In the final stage of the Expansion, he suggests that Consumer Staples and Energy perform best. Then, as the economic cycle turns, he suggests that Utilities outperform during the early stages of Recession. In the later stages of the Recession, he suggests that the best performing sectors are Consumer Cyclical and Financial.

Bibliography

Avramov, D. and R. Wermers, 2006," Investing in Mutual Funds When Returns are Predictable," *Journal of Financial Economics*, Volume 81, 339-377.

Bodie, Z., A. Kane, and A. Marcus, 2008, *Investments*, 8th edition, McGraw-Hill.

Conover, C. M., G. R. Jensen, R. R. Johnson, and J. M. Mercer, 2008, "Sector Rotation and Monetary Conditions," *The Journal of Investing*, Volume 17, Number 1, 34-46.

Davis, B., and J. Menchero, 2010, "Risk Contribution is Exposure Times Volatility Times Correlation," MSCI Research Insight, available from www.msci.com

Hou, K., 2007, "Industry Information Diffusion and the Lead-Lag Effect in Stock Returns," *The Review of Financial Studies*, Volume 20, Issue 4, 1113 – 1138.

Jacobsen, B. and N. Visaltanachoti, 2009, "The Halloween Effect in U.S. Sectors," *The Financial Review*, Volume 44, Issue 3, 437 – 459.

Jiang, G. J., T. Yao, and T. Yu, 2007, "Do Mutual Funds Time the Market? Evidence from Portfolio Holdings," *Journal of Financial Economics*, Volume 86, Issue 3, 724-758.

Kouzmenko, R. and Z. Nagy, 2009, "Sector Performance Across Business Cycles," MSCI Research Bulletin, available from www.msci.com

Ruban, O., 2009, "Economic Cycles and Equity Styles in Europe," MSCI Research Bulletin, available from www.msci.com.

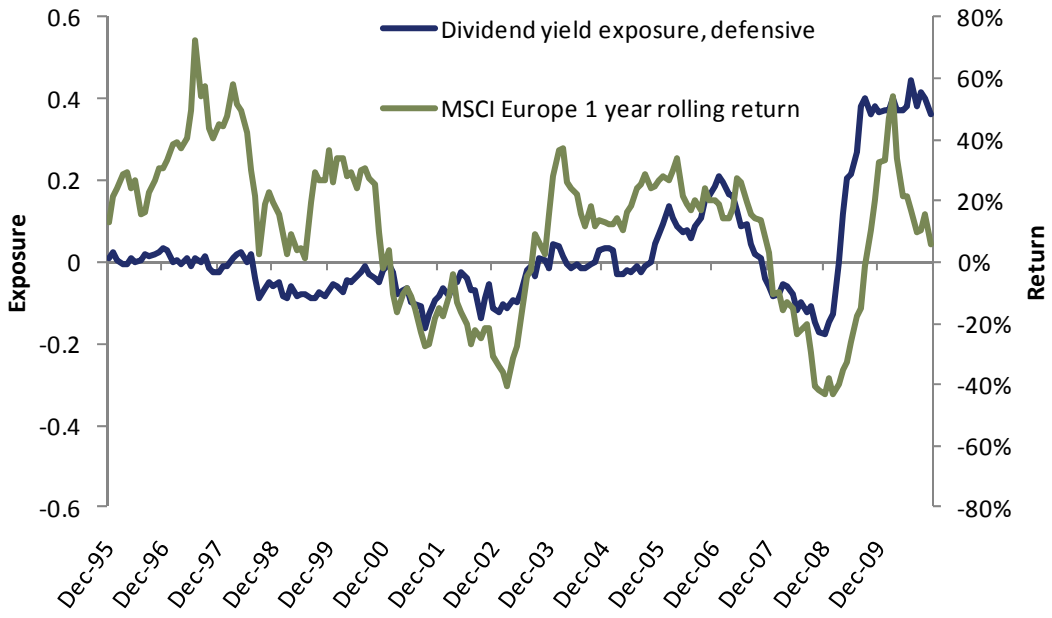
Stovall, S., 1996, 1995, *Standard & Poor's Guide to Sector Investing* (McGraw-Hill).

Torous, W. N., R. I. Valkanov, and H. G. Hong, 2007, "Do Industries Lead Stock Markets?" *Journal of Financial Economics*, Volume 83, Issue 2, 367 – 396.

Appendix 1: Examining Factor Exposure Changes through Time

Consistent with intuition, Exhibit 3 shows that defensive sectors on average tended to have positive and sometimes important exposure to the Dividend Yield factor;[12] that is, the average dividend yield in these sectors tended to be higher than the average yield in the broad European stock universe. As illustrated by Exhibit 11, the exposure of the aggregate defensive portfolio to the Dividend Yield factor followed a similar pattern to the rolling 1-year return of the MSCI Europe Index in recent years. Drilling into the drivers of the aggregate sector exposure, we find that not all defensive sectors have had stable positive exposure to the Dividend Yield factor; in fact, Consumer Staples and Health Care stocks tended to be negatively exposed to this factor. Furthermore, the Telecom sector had experienced considerable swings in its exposure during the last 10 years – between 2003 and 2006, its exposure switched from -0.74 to 1.25. More recently, the important rise in the exposure since late 2008 had been due to a concurrent increase in all defensive sectors.

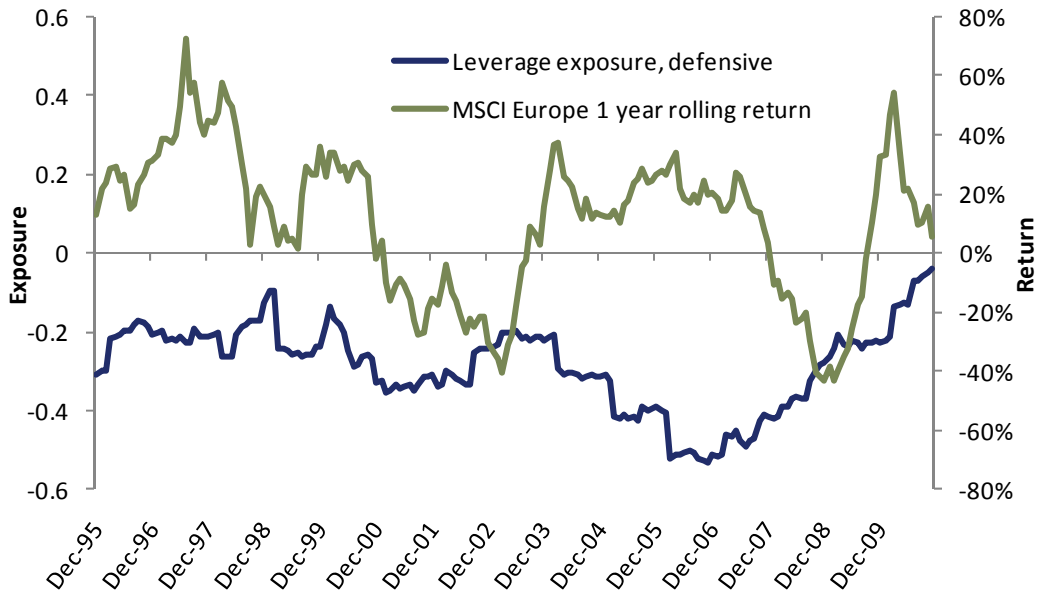
Exhibit 9: Exposure of the aggregate defensive sector to the Dividend Yield factor and MSCI Europe Index 1 year rolling return, Dec 1995 – Nov 2010



Source: MSCI, Barra EUE3 model, based on monthly data

[12] In the Barra EUE3 model, the only descriptor entering the definition of the Dividend Yield factor exposure is dividend yield.

Exhibit 10: Exposure of the aggregate defensive sector to the Leverage factor and MSCI Europe Index 1-year rolling return, Dec 1995 – Nov 2010

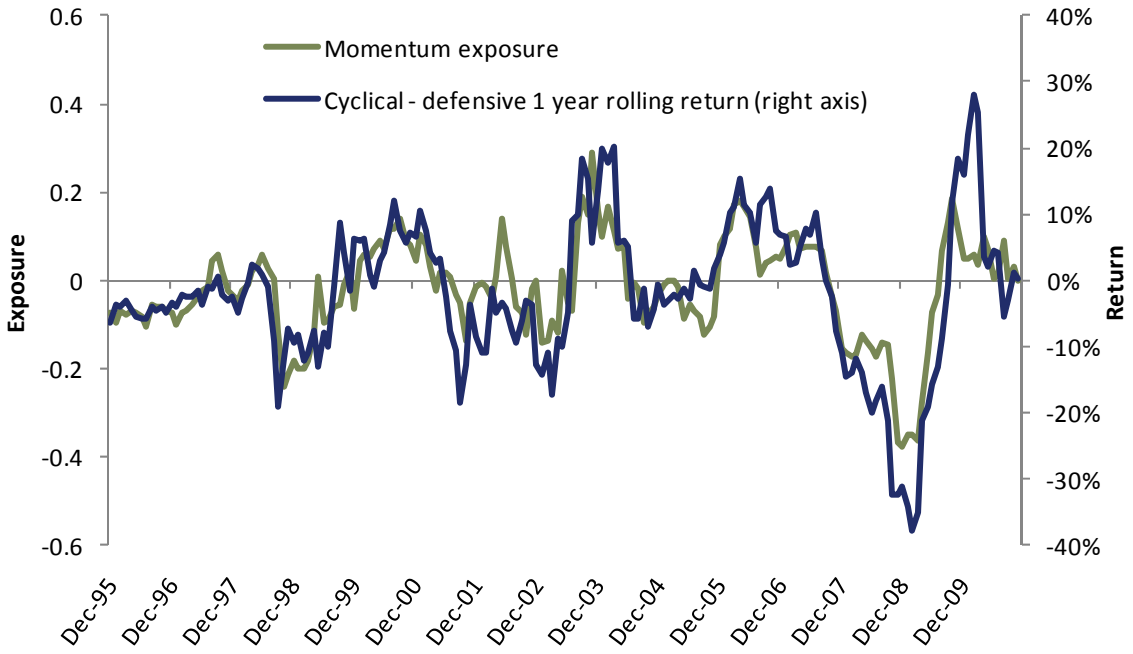


Source: MSCI, EUE3 model, based on monthly data

By comparison, the Leverage factor[13] behaved in a different way (see Exhibit 12), with the defensive aggregate having its lowest Leverage exposure during the prolonged bull market of 2004-2008. While there are notable differences in the values of exposures across sectors –with Utilities and Telecom being typically positive and Health Care and Energy being typically negative—they all tended to follow the same cycle, especially since the early 2000s. As Exhibit 12 illustrates, companies in all defensive sectors decreased their leverage (compared to the overall market) during the first half of the 2004—2008 bull market, as evidenced by the decreasing Leverage exposure between 2004 and 2006, and then they started taking on debt again in 2007. Interestingly, this trend of increasing leverage relative to the broad market average was not interrupted by the onset of the global financial crisis in 2008.

[13] In the Barra EUE3 model, the descriptors entering the definition of the Leverage factor exposure are: book leverage ratio based on book value of equity and market leverage ratio based on market value of equity.

Exhibit 11: Exposure of the aggregate cyclical sector to the Momentum factor and 1 year rolling return of the cyclical aggregate relative to the defensive aggregate, Dec 1995 – Nov 2010



Source: MSCI, Barra EUE3 model, based on monthly data

Finally, Momentum stands out clearly as a factor where one might expect regular sign changes in exposure: the descriptors entering its definition measure recent relative performance of a stock compared to the estimation universe.[14] Exhibit 13 illustrates this behavior by showing the extremely close co-movement of the cyclical aggregate's exposure to the Momentum factor with the relative performance of the cyclical aggregate versus the defensive aggregate. Although in some periods Momentum exposure flips sign quite erratically, we can easily identify, for example, the run-up to the IT bubble and its subsequent decline in early 2001.

[14] In the Barra EUE3 model, the descriptors entering the definition of Momentum exposure are: alpha from a regression of weekly returns on the estimation universe returns, cumulative excess returns over the previous 12 and 6 months lagged by one month.

Client Service Information is Available 24 Hours a Day

clientservice@msci.com

Americas

Americas	1.888.588.4567 (toll free)
Atlanta	+ 1.404.551.3212
Boston	+ 1.617.532.0920
Chicago	+ 1.312.675.0545
Montreal	+ 1.514.847.7506
Monterrey	+ 52.81.1253.4020
New York	+ 1.212.804.3901
San Francisco	+ 1.415.836.8800
Sao Paulo	+ 55.11.3706.1360
Stamford	+1.203.325.5630
Toronto	+ 1.416.628.1007

Europe, Middle East & Africa

Cape Town	+ 27.21.673.0100
Frankfurt	+ 49.69.133.859.00
Geneva	+ 41.22.817.9777
London	+ 44.20.7618.2222
Milan	+ 39.02.5849.0415
Paris	0800.91.59.17 (toll free)

Asia Pacific

China North	10800.852.1032 (toll free)
China South	10800.152.1032 (toll free)
Hong Kong	+ 852.2844.9333
Seoul	+798.8521.3392 (toll free)
Singapore	800.852.3749 (toll free)
Sydney	+ 61.2.9033.9333
Tokyo	+ 81.3.5226.8222

Notice and Disclaimer

About MSCI

MSCI Inc. is a leading provider of investment decision support tools to investors globally, including asset managers, banks, hedge funds and pension funds. MSCI products and services include indices, portfolio risk and performance analytics, and governance tools.

The company's flagship product offerings are: the MSCI indices which include over 148,000 daily indices covering more than 70 countries; Barra portfolio risk and performance analytics covering global equity and fixed income markets; RiskMetrics market and credit risk analytics; ISS governance research and outsourced proxy voting and reporting services; FEA valuation models and risk management software for the energy and commodities markets; and CFRA forensic accounting risk research, legal/regulatory risk assessment, and due-diligence. MSCI is headquartered in New York, with research and commercial offices around the world.