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Do Size and Value Premia Vary across Industry and during the Bull and Bear Market Conditions? Evidence from the Euro Area

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The elimination of exchange rate risk and overall integration of the European equity markets have created new opportunities to utilize industry-specific diversification strategies for portfolio and risk management decisions. Using daily return data for five major industries in the Euro area over the period, 2001-2012, our findings show that an industry-specific three-factor Fama and French type model provides a robust explanation of security returns. While, our results further emphasize the widespread influence of the "value" and "size" premiums in the Euro area, we show that the pattern, sign, size, and significance of these factors vary widely across different industries and during the "bull" (2003-2007) and "bear" (2007-2009) market conditions. The size premium predominantly plays a positive, stable and significant role in explaining security returns under different market conditions. On the other hand, the results for the value premium is not convincing. Its estimated coefficients are both positive and significant (30% of all cases), and negative and significant (66% of all cases). Nor does our results provide convincing evidence for the conventional risk-based argument in support of the existence of size and value premiums in the Euro area. Value stocks are generally associated with higher betas than those of growth stocks only during the bear market condition. The betas for small caps are consistently lower than those for the large caps. Finally, the momentum effect does not appear to play a strong rule in explaining security returns in the Euro area.

Keywords: Euro Area; Value Premium; Size Premium; Industry Diversification, GARCH-M

JEL: C22. C52. G12.

I. Introduction

Recently, the elimination of the exchange rate risk within the Euro area, the harmonization of monetary and regulatory policy rules among the member states, and the subsequent financial market integration have provided an intriguing opportunity to re-examine the key underlying risk factors that determine security returns in the European equity markets. Such structural changes have also continued to affect portfolio selection rules, risk management strategies and approaches to cost of capital determination in the Euro area. As the long standing skepticism about the predictions and relevance of the Capital Asset Pricing Model (CAPM) has continued to persist, researchers have focused on alternative empirical models to explain security returns in a global setting (see for example, Stultz and Wasserfallen (1995). One such extension is the three-factor model proposed by Fama and French (1992,1993, 1995, and 1998) which underlies the observation that stocks with small market capitalization and those with high book to price (market value) ratios have conventionally yielded higher returns (presumably reflecting their higher systematic

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risk) than those predicted by the traditional CAPM. The higher returns appear to be related to two additional risk factors capturing size and value characteristics of the sample firms.[1] The "value premium" accounts for the difference in returns between high book to market ratio and low book to market ratio portfolios "High minus Low" (HML) . The "size premium" accounts for the difference in returns between small and big capitalization portfolios "Small minus Big" (SMB). However, in spite of the overwhelming empirical support, the existence and persistence of these premiums have remained a puzzle among researchers and portfolio managers. Black (1993) argued that the relationship between stock returns, size and value premium was a result of data mining. A similar notion was advanced by Kothari, Shanken, and Sloan (1995), who contended that the significant book-to-market relation is due to survivorship bias. Using a dynamic risk-based model, Lettau and Wachter (2007) showed that growth firms (long-horizon equity) correlate more with the discount rate than do value firms (short-horizon equity) which correlate more with cash flows. They concluded that value stocks do not appear to be riskier than growth stocks.

Focusing on international data, Fama and French (1998) tested the global version of their model for a number of different world markets, concluding that value stocks were associated with higher returns than growth stocks. Other studies provided further support for the significance of size and value premiums as well as exchange rate risk for security markets in Australia, Hong Kong, Italy, Japan, Korea, Malaysia, and the Philippines (see, for example, Chan, Hamao, and Lakonishok (1991), Halliwell et al. (1999), Capaul, Rowley, and Sharpe (1993), Murgia et al. (2000), and Drew and Veeraraghavan (2003)).

More recently, researchers have focused on whether the pricing effects of value and size factors are mostly due to country-specific (local) portfolios rather than market wide risk factors suggested by Fama and French (1998). Griffin (2002) and Mirza (2011) show that the Fama and French factors are, in fact, country specific for the U.S., the U.K, Canada, and Japan. Building on the work by Griffin (2002), Moerman (2005) contends that integration of European equity markets suggests that portfolio returns could be better explained by an industry-specific three-factor model than both the Euro-wide and the country-specific versions. He tests different versions of the Fama and French three-factor model using both country and industrial data in the Euro Area from 1991-2002. Focusing on alternative models' overall explanatory performance, his results show that the Euro Area three-factor model underperforms the country three-factor model in explaining both country-based and industry-based portfolios. He does not, however, explore the dynamics and relative performance of size and value premiums for alternative models under different market environments. Petkova and Zhang (2005) find that the economic fundamentals of value firms respond negatively and quite forcefully to economic shocks while this is not true for growth stocks. Their results support the conventional risk-based argument for the higher observed returns on value portfolios, at least in the adverse states of the world.

In this paper, we focus on some key asset pricing questions in the Euro Area: do value and size premiums exist in the Euro Area; are these factors determined by Euro-wide influences or they are industry-specific; are their persistence influenced by different market environments, such as the "bull" and "bear" markets prevailing in the recent past; and, finally, are value and size effects generated by a momentum effect

[1] For US empirical evidence, see, for example, Banz (1981), Bhandari (1988), Lakonishok, Shleifer and Vishny (1994), and Fama and French (1992, 1993, 1995, and 1997)).

reflecting systematic short term gains (or losses) relative to the market as a whole. Our contributions to the existing literature is in several fold. First, we apply the GARCH-M (1, 1) model to a more recent industry-based return data from 12 Euro countries over the period 2001-2012. The GARCH-M (1, 1) model with non-normal error distribution is a powerful toll in modeling non-linearity of stock returns. By allowing the variance of the error term to change over time, this model provides more accurate estimates of returns than those provided by OLS. Second, following Griffin (2002) and Moerman (2005), we use an industry-based approach in examining the Euro Area portfolio returns, contending that regulatory changes should induce investors to take an industry-based approach in examining the Euro Area portfolio returns. Third, we test the impact of different risk factors on industry-based excess return both during the bull market (2003-2007) and the bear market (2007-2009). Changes in market conditions and investors' perception may alter the potential valuation impact of a firm's market capitalization and its growth opportunities (Jalilvand and Kim (2013)). This distinction will further allow us to examine the momentum effect in Euro security returns. Fourth, we use two measures of value and growth stocks by subdividing the sample into strong value and growth categories representing the top 20% companies in the TMI Euro index. Fifth and finally, the Euro zone STOXX indices are used to provide a more representative set of variables to identify value firms. Specifically, unlike previous studies which have commonly used one or two factors in identifying value firms, we use six factors; namely, projected price/earnings (P/E) ratio, projected earnings growth, trailing P/E ratio, trailing earnings growth, price/book (P/B) ratio, and dividend yield to construct value stocks.
The paper is organized as follows. In section 2, the model and the econometric methodology applied to industry-based rather than country-based returns are presented. Section 3 provides the empirical results, and section 4 offers concluding remarks.

II. Empirical Model and Data

Data

We use the daily return data provided by STOXX indices for the five major industries in the Euro Area: Basic Materials, Consumer Goods, Consumer Services, Financials, and Industrials for the period 2001-2012.[2] The benchmark used in this paper is the TMI Euro index consisting of 595 stocks. The size premium is defined as Euro large cap minus Euro small cap, while value premium is defined as Euro value stocks minus Euro growth stocks.[3] The value and growth stocks are further subdivided into strong value and strong growth categories representing the top 20 strongest value and growth stocks in the TMI index, respectively. Consequently, an additional premium was calculated, namely, strong value premium to measure excess return of Euro strong value stocks over Euro strong growth stocks. Jalilvand and Kim (2013) and Brown and Peterson (2011) find that under turbulent market environments such as the Dot.Com bubble (1999-2002) and the sub-prime mortgage crisis (2007-2009),

[2] The EURO STOXX Indices, Europe's leading Blue-chip index for the Eurozone, covers stocks from 12 Eurozone countries: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal and Spain. The EURO STOXX 50 Index is licensed to financial institutions to serve as underlying for a wide range of investment products such as Exchange Traded Funds (ETF), Futures and Options, and structured products worldwide.
[3] See table 1 for more detailed explanation on how SMB and HML are measured.

some firms tend to use more flexible slack resources to finance growth opportunities while others attempt to entrench by accumulating cash and liquid assets to create a buffer against the risk of financial distress. Such decisions may well change the firm's risk profile and investors' perception and, hence, alter the role that value and growth stocks may play in explaining asset prices. During the sample period, there are two major shifts in the equity return series due to a strong bull market (2003-2007) and a strong bear market characterized by the sub-prime mortgage crisis (2007-2009). We select the lowest and highest returns in the Europe TMI index to define starting and ending points for the bull and the bear markets. Finally, the 1-day interbank interest rate for the Euro zone, EONIA, is obtained from the ECB database for the period of analysis.

The Model

We start with the three-factor model developed by Fama and French (1992, 1993, 1995, and 1997). Recognizing that an important implication of the European Monetary Union and the resulting highly integrated equity markets is that industry factors may logically become more important relative to country-specific factors and following Moerman (2005), we apply an industry-based three-factor model to explain security returns in the Euro area. The following time series regression equation is used:

$$R_{it} - R_{ft} = \alpha_i + \beta_{iM}\left(R_{Mt} - R_{ft}\right) + \beta_{is}SMB_t + \beta_{ih}HML_t + \varepsilon_{it} \quad (1)$$

Where $R_{it} - R_{ft}$ is the excess return on the industry index, R_{ft} is the EONIA rate of return, R_{Mt} is the Return on the TMI index, SMB_t is the size premium defined as the difference between returns on small cap and large cap indices, $\text{and } HML_t$ is the value premium defined as the difference between returns on the two definitions of the value and growth indices. β is the parameter estimate for the risk factors and α forms the time-series regression estimate used to calibrate how rapidly stock prices respond to new information (see for example, Loughran and Ritter (1995), Mitchell and Stafford (2000)). It is also used to measure either the special propriety information or a particular set of skills portfolio managers may hold (Carhart's (1997)) in generating abnormal returns.

Econometrically, we use GARCH-M model of Engle, Lilien, and Robins (1987) to estimate the parameters in equation (1). The GARCH –M approach takes into consideration that stock returns may be influenced by their volatility. The GARCH-M is an extension of the basic GARCH framework which allows the conditional mean return to depend on its conditional variance or standard deviation. The GARCH model is used with Students t-distribution. The GARCH-M (1, 1) model can be written as:

$$x_t = u + \lambda\sigma_t + a_t \quad (2)$$

$$\sigma_t^2 = \alpha_0 + \sum_{i=1}^{p} \alpha_i \, a_{t-i}^2 + \sum_{j=1}^{q} \beta_j \, \sigma_{t-j}^2 \quad (3)$$

$$a_t = \sigma_t \times \varepsilon_t \quad (4)$$

$$\varepsilon_t \sim P_v(0,1) \quad (5)$$

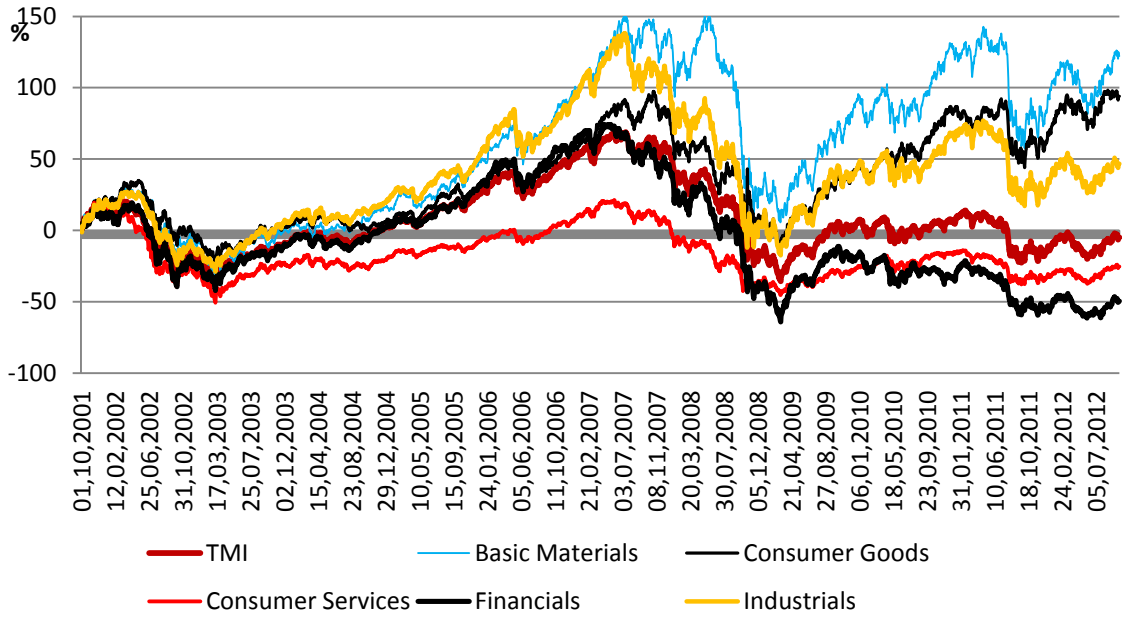
Where x_t is the time series value at time t, μ is the mean of GARCH model, λ is the volatility coefficient (risk premium) for the mean, a_t is the model's residual at time t, σ_t is the conditional standard deviation or volatility at time t, p is the order of the ARCH component model, α_i coefficients are the parameters of the ARCH component model, q is the order of the GARCH component model, β_j coefficients are the parameters of the GARCH component model, ε_t is the standardized residual, where $[\varepsilon_t] \sim i.i.d$, $E[\varepsilon_t] = 0$, $VAR[\varepsilon_t] = 1$, and P_v is the probability distribution function for ε_t. Finally, with Student's *t*- distribution, $P_v = t_v(0,1)$, $v > 4$.

Iii. Empirical Results

Summary Statistics

Figures (1) - (3) show the cumulative return trend-lines for the five industries, value and growth as well as small and large cap portfolios vs. the benchmark (TMI) in the Euro Area over the entire period, 2001-2012. As shown in Figure (1), Basic Materials, Consumer Goods and Industrials have achieved higher returns than the TMI index while the reverse has been true for Consumer Services and Financials. The results during the bull market (2003-2007) are different as returns for Basic Materials, Financials and Industrials have been higher than those achieved by Consumer Goods and Consumer Services. The results for the bear market are the same as those for the entire period.

Figure (1). Cumulative Return by Industry vs. TMI benchmark in the Euro Area: 2001-2012



The results in Figure (2) show that growth portfolios have yielded higher cumulative returns than those of value and benchmark portfolios. These results are contrary to the previous findings (see, for example, Fama and French (1992) and Arshanapalli et al. (1998)). Further, there are no differences in the pattern of portfolio returns in the bull (2003-2007) or the bear (2007-2009) markets.

Figue 2. Cumulative Returns for Value and Growth rStock Portfolios in the Euro Area: 2001-2012

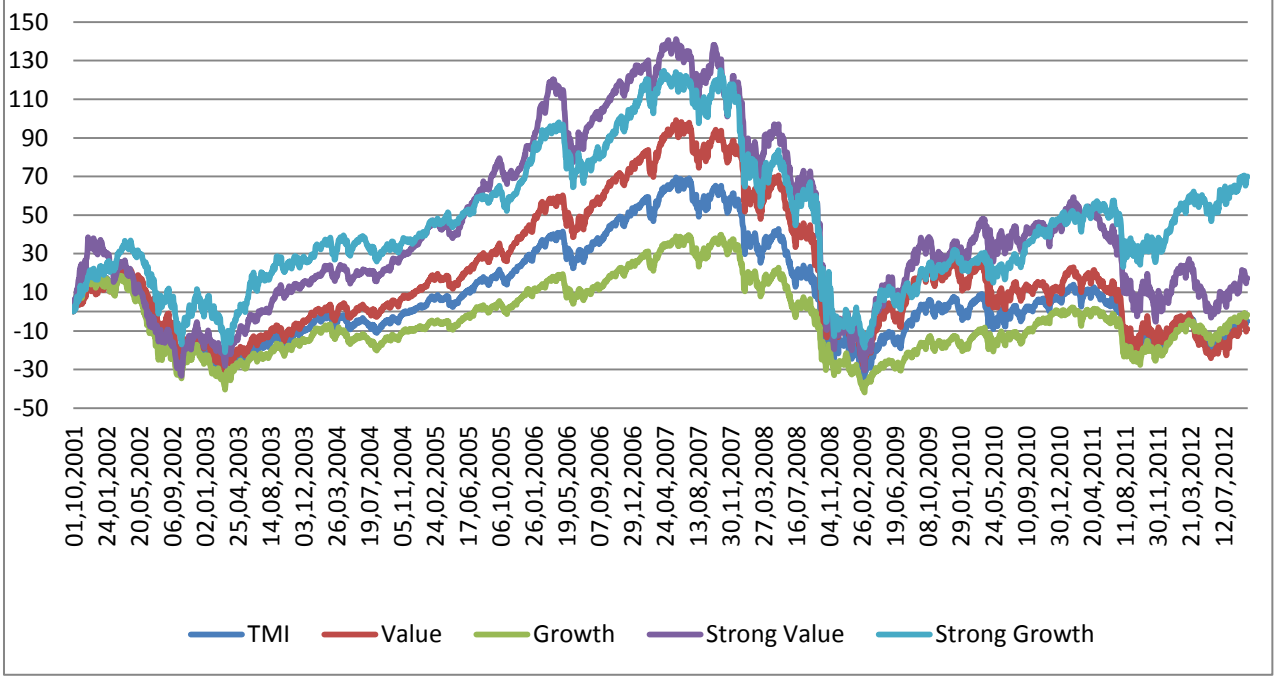


Figure (3) indicates a clear size premium in the Euro industry-based returns which is independent of the bull and the bear market conditions. These results are consistent with the previous findings reported earlier.

Figure 3. Accumulateed return of Small and Large Cap in the Euro Area, 2001-10-01 to 2012-10-03

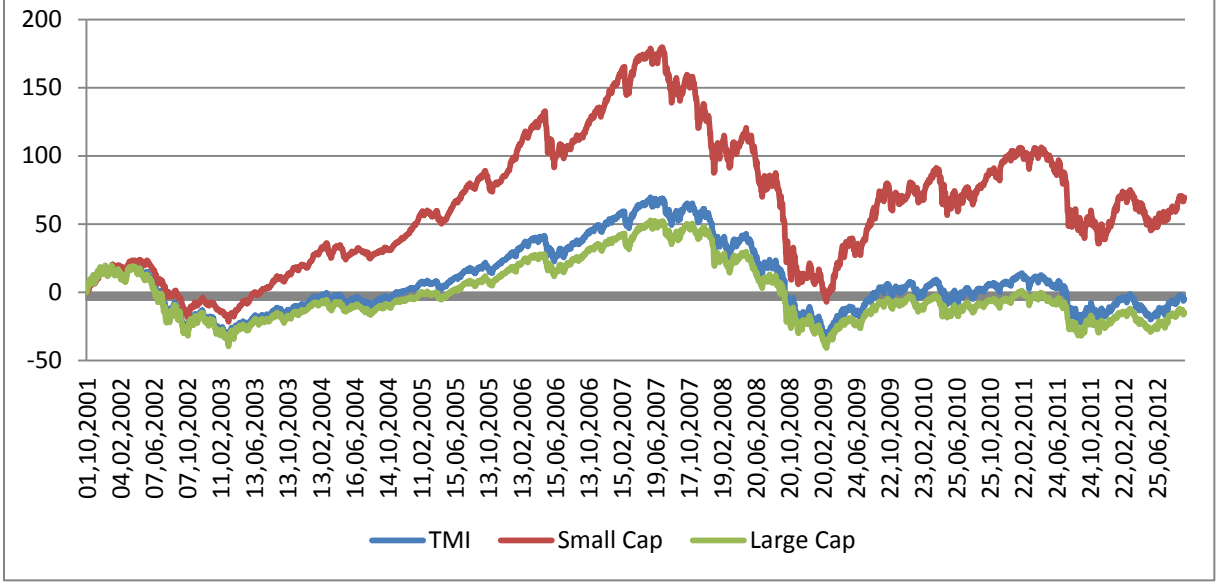


Table (1) provides summary statistics on excess returns and cumulative returns for the five industries, TMI index, value stocks, growth stocks, small cap, and large cap stocks. We have also calculated the mean, standard deviation (a proxy for total risk), rewards-to-risk ratio (RTR), skewness, excess kurtosis, minimum, maximum, and

asymptotic test χ^2 for the entire sample period. The data reveals that all return series are highly non-normal with high excess kurtosis that could be due to the impact of the bull and bear markets. These observations provide a strong case for using the GARCH approach to take into consideration that stock returns may be influenced by their volatility.

As observed in Figures (1) - (3), the results in table (1) also show that portfolio returns vary widely across different industries and under different market environments. For the full sample, the cumulative return on the value portfolio was lower than that of the benchmark while the reverse was true for the growth portfolio. Also, for the same period, the small cap portfolio return was significantly higher than that of the large cap portfolio. For the full sample, these result suggest a positive size premium and a negative value premium (i.e. growth stocks yield higher returns than value stocks). Overall, the superior performance of the growth portfolio may reflect the observation that growth firms perform best in the latter stages of the economic cycle (the Great Recession began at the end of 2007). Also growth firms may benefit from a "momentum" effect as the economy strengthens.

On the other hand, the value portfolio yields higher returns than growth, strong growth, large-cap, and blend stock portfolios in the bull market (2003-2007). The Small-cap portfolio has generated higher return than the large-cap and blend index in full sample and in the bull market environment while the large-cap portfolio provides higher returns than small-cap and blend index in the bear market (2007-2009). These results hold for strong value and strong growth stocks as well. Overall, they suggest there may be a size premium and a positive value premium (i.e. value stocks outperform growth stocks) in the bull market. However, for the bear market, the results suggest a negative size (i.e. large cap outperform small cap) and value premium (i.e. growth stocks outperform value stocks).[4] Further, the momentum effect is not present in all sectors, except in the Basic Materials which has consistently performed better both in the bear and bull markets.

The results in Table (1) also show that the standard deviation of the value stocks returns has been consistently higher than that of the growth stocks over the entire period. To include risk in our analyses more systematically, we have computed the rewards-to risk ratio using the excess return and the total risk measured by the standard deviation for the full sample over the entire period. These results are reported in the fourth column of Table (1). The results support the previous finding in that Basic Materials outperform all the other sectors and growth and strong growth stocks outperform the value and strong value portfolios, respectively. In addition, the small cap portfolio outperforms both large cap and the benchmark portfolios during the whole sample period.

{Insert Table (1) About Here}

If the risk-based view of size and value premiums is correct, we should also expect beta values for small cap portfolios to be higher than those of the large cap portfolios under different market conditions. Table (2) reports the estimated beta using the CAPM for the full sample, bull and bear markets (equations 2-4). For comparison, we used both OLS and GARCH-M (1, 1) estimates. As shown in the table, for the whole sample, the bull and the bear markets, the betas for small caps are consistently lower than those for the large caps. These results contradict the risk-based view

[4] The mixed result in different states of the economy on the relationship between value and growth portfolios might also be explained by the difficulty in timing the market. Since the full sample period is very volatile, the market has been difficult to time.

explanation of the size effect advanced in the previous literature. On the other hand, consistent with the previous literature, the betas for value portfolios are consistently larger than those for growth ones. However, the magnitude of the differences are the largest during the bear market condition. These findings are in the line with Petkova and Zhang (2005) who suggest that value stocks are riskier than growth stocks, at least in the adverse states of the world.[5] The size and value premium effects are further examined in the next section using the Fama and French three factor model.

{Place Table (2) About Here}

GARCH Results

The GARCH-M (1,1) results provide evidence on the behavior of Euro equity returns in a number of important areas. First, it shows whether the value and size effects are significant (and have the expected sign) across different industries and under different market conditions. Second, it verifies whether there are untapped opportunities to generate excess return by analyzing the coefficient for the intercept. If the intercept is significant and different from zero, the model can be used to earn excess return as there are still other unaccounted factors which are not included in the model. Finally, it will also shed light on whether the historic volatility is significant for determining portfolio returns in the Euro area. The historic volatility around the mean returns is labeled as σ^2 in the tables (4) – (6).
The model's fit to the Euro area returns is further evaluated using HMSE and AIC measures. HMSE (Heteroscedasticity-Adjusted Mean Square Error) is a loss function with lower values signifying a model's robustness for forecasting volatility. The Akaike Information Criteria (AIC) is a measure of the relative goodness of fit of a statistical model. A lower AIC value is better in terms of limiting the model's information loss. We also test the possibility that the model is IGARCH and report (a1+b1). If (a1+b1) is equal to one the model is IGARCH.

Table (3) reports the GARCH-M (1, 1) results using both definitions of value and growth stocks for the full sample period. The results for the "broad" and "strong" definition of value and growth stocks are reported in the top and bottom panels of tables (3) – (5), respectively. The results suggest that, in most cases, the second (strong) definition of value and growth provides slightly better fit for the return equations in terms of AIC and HMSE criteria. However, since the strong definition neither provides conclusive results across three market conditions nor represents the majority of the stocks in the Euro market, we mainly focus on the results for the broad definition of value and growth stocks and provide the evidence for the strong definition for comparison purposes only. Focusing on the top panel of table (4), we notice that the estimates for the α coefficient are close to zero and insignificant for all sectors. The insignificance of the coefficients tend to support the overall empirical relevance of the Fama and French three-factor model. Further, there is a positive and significant size effect for all sectors, with Industrial sector having the largest coefficient of (0.452). While the value premium is significant and negative for Consumer Goods, Consumer Service and Industrials, its coefficient is significant and

[5] Conventionally, growth stocks represent companies that are currently thriving, while value stocks commonly represent companies in trouble; hence, the price of the former may be higher than the price of the latter. Since investors attempt to avoid risk in falling markets, they are prepared to pay extra for quality shares and invest in growth shares. In a bull market, investors are prepared to take a higher risk and to invest in value shares.

positive for the Financials, and insignificant for the Basic Materials. In sum, for the whole sample and over the entire period, both the size and value premiums seem to be important factors (thought with different signs) in determining the industry returns in the Euro area. We continue to examine whether these results holds for the bull (2003-2007) and bear (2007-2009) markets using the same methodology.

{Place Table (3) About Here}

Focusing on the bull market, top panel of Table (4), the results show that estimates of α are also close to zero and insignificant for all sectors. Furthermore, the size premium is significant in three sectors: Basic Materials, Consumer Service and Industrials. The results also show that the value premium is positive and significant in only two industries: Basic Material and Financials. However, the coefficients are, on average, significantly lower than those for the full sample period. Regarding the bear market, the results in Table (5) also show that the estimates of α are close to zero and insignificant. The coefficient of size premium is positive and significant for four industries: Basic Material, Consumer Services, Financials, and Industrials. For the value premium, the coefficients are significant and positive for Basic Material and Financials, and negative and significant for the rest of the industries. Unlike the case in the bull market, the coefficients are, on average, significantly larger than those in the full or bull sample periods.

{Place Tables (4) & (5) About Here}

Iv. Conclusions

During the last decade, the elimination of exchange rate risk and overall integration of the European equity markets have created new opportunities for using industry-specific diversification and portfolio strategies. Using the GARCH-M (1,1) model on daily return data from the STOXX indices for five major industries in the Euro area, our findings show that an industry-specific three-factor Fama and French type model provides a robust explanation of security returns in the European equity markets over the period 2001-2012. The model's intercept coefficients (α) are insignificant under varying samples, different market conditions, and across different industries. While, we provide further support on the widespread influence of the "value" and "size" premiums in the Euro market, the pattern, sign, size, and significance of these factors vary widely across different industries and market conditions. The size premium predominantly plays a positive, stable and significant role in explaining security returns. On the other hand, the results for the value premium is mixed. The estimated coefficient of the value premium were found to be negative and significant in over 60 percent of the cases examined in this study. The magnitude of value and size coefficients are also significantly larger during the bear market than those in the bull or full sample periods.

Nor does our results provide convincing evidence for the risk-based view in support of the existence of size and value premium effects. Value stocks are generally associated with higher betas than those of growth stocks only during the bear market condition. The betas for small caps are consistently lower than those for the large caps. Finally, the momentum effect is only present in the Basic Materials industry which has consistently outperformed others under all market conditions.

Overall, our results call for a more cautious use of the three-factor model in the European equity markets. Our findings show that there are significant industry related effects in play, and investors' perception of the economic consequences of holding value and small cap stocks may vary across different market conditions. Further

research is also needed to improve the econometric efficiency of the model by going beyond the historical risk effect and accounting for interactions between different industries in the Euro area.

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Table (1).Summary Statistics: Industry Excess Returns and TMI Index in the Euro Area: 2001-2012.

	The first difference log excess return: whole sample							**Return for period**			
Industry	**Mean**	**Std,**	**RTR**	**Skew**	**Ex, Kurt**	**Min**	**Max**	**Norm,χ2(2)**	**Full %**	**Bull %**	**Bear %**
Basic Materials	0,0002	0,0161	0,0123	-0,0856	5,1711	-0,0862	0,1120	1206,5 [0,0000]**	122	240	-57,1
Consumer G	0,0002	0,0144	0,0105	1,0436	25,0140	-0,1468	0,2156	6675,4 [0,0000]**	94	128	-52,7
Consumer S	-0,0002	0,0130	-0,0002	-0,0737	4,0752	-0,0766	0,0849	862,65 [0,0000]**	-25,3	54	-53,3
Financials	-0,0003	0,0193	-0,0179	0,2231	5,4764	-0,0987	0,1509	1264,5 [0,0000]**	-49,5	155	-77
Industrials	0,0001	0,0153	0,0033	-0,0948	5,6782	-0,0987	0,1509	1264,5 [0,0000]**	46,5	208	-63,9
Value	-0,0001	0,0156	-0,0077	0,0420	5,7892	0,0912	0,1053	1414,5 [0,0000]**	-9	167	-64
Growth	-0,0001	0,0139	-0,0055	0,0061	3,7767	-0,0756	0,0900	776,59 [0,0000]**	-1,7	107	-58
Strong Value	-0,0001	0,0161	-0,0012	-0,0346	5,6419	-0,0939	0,0968	1366,3 [0,0000]**	17,2	189	-69,6
Strong Growth	0,0001	0,0140	0,0074	-0,2236	6,7139	-0,1207	0,1181	1672,8 [0,0000]**	70,1	139	-62,5
Small cap	0,0001	0,0120	0,0085	-0,3845	5,0851	-0,0768	0,0920	1051,0 [0,0000]**	69,3	234	-65,8
Large Cap	-0,0001	0,0152	-0,0092	0,0404	4,3726	-0,0817	0,1007	957,66 [0,0000]**	-15,1	125	-60
TMI	-0,0001	0,0144	-0,0069	-0,0167	4,4145	-0,0821	0,0987	971,89 [0,0000]**	-5	142	-60,9
Value Premium	0,0000	0,0061	-0,0033	0,0983	54,2600	-0,0856	0,1043	17883, [0,0000]**			
Strong Value P	-0,0001	0,0085	-0,0012	0,1983	3,4228	-0,0507	0,0475	644,48 [0,0000]**			
Size Premium	0,0002	0,0079	0,0304	-0,3778	4,3864	-0,0541	0,0381	846,08 [0,0000]**			

TMI = STOXX Euro index consisting of 595 stocks. Basic Materials, Consumer G, Consumer S. Financials, Industrials = industries in the STOXX TMI Euro index. Value = value stocks in the STOXX TMI index, Growth = growth stocks in the STOXX Euro TMI index. Strong Value = the 20 strongest value stocks in the STOXX Euro TMI index. Strong Growth = the 20 strongest growth stocks in the STOXX Euro TMI index. Size Premium = STOXX Euro large cap minus STOXX Euro small cap, Value Premium = STOXX Euro Value minus STOXX Euro Growth, Strong Value Premium = STOXX Euro Strong Value minus STOXX Euro Strong Growth.

Table (2). Estimated Beta Coefficients: Euro Industry Portfolio Returns, 2001-2012

		GARCH-M (1,1)			OLS	
Beta	Full Sample	Bull (2003-07)	Bear (2007-09)	Full Sample	Bull (2003-07)	Bear (2007-09)
	Coeff	Coeff	Coeff	Coeff	Coeff	Coeff
Basic Materials	1.0255 (0.00)	1.0540 (0.00)	1.0827 (0.00)	1.0056 (0.00)	1.0394 (0.00)	1.0961 (0.00)
Consumer Goods	0.9079 (0.00)	0.9826 (0.00)	0.9015 (0.00)	0.8342 (0.00)	0.9764 (0.00)	0.7235 (0.00)
Consumer Service	0.8050 (0.00)	No Conv	0.8123 (0.00)	0.8294 (0.00)	0.9177 (0.00)	0.7901 (0.00)
Financials	1.1388 (0.00)	1.0734 (0.00)	1.2324 (0.00)	1.2626 (0.00)	1.0838 (0.00)	1.2595 (0.00)
Industrials	1.0298 (0.00)	0.9878 (0.00)	1.1770 (0.00)	0.9868 (0.00)	0.9392 (0.00)	1.1383 (0.00)
Value	1.0370 (0.00)	1.0254 (0.00)	1.0256 (0.00)	1.0621 (0.00)	1.0246 (0.00)	1.1015 (0.00)
Growth	0.9865 (0.00)	1.0135 (0.00)	0.9369 (0.00)	0.9388 (0.00)	1.0141 (0.00)	0.8971 (0.00)
Strong Value	0.9545 (0.00)	0.7964 (0.00)	1.0882 (0.00)	1.0228 (0.00)	0.7856 (0.00)	1.1445 (0.00)
Strong Growth	0.8364 (0.00)	0.8829 (0.00)	1.0174 (0.00)	0.8756 (0.00)	0.8820 (0.00)	0.8971 (0.00)
Small cap	0.7497 (0.00)	0.6337 (0.00)	0.8751 (0.00)	0.7388 (0.00)	0.6438 (0.00)	0.8415 (0.00)
Large Cap	1.0460 (0.00)	1.0680 (0.00)	1.0131 (0.00)	1.0499 (0.00)	1.0646 (0.00)	1.0253 (0.00)
Value Premium	0.0565 (0.00)	0.0154 (0.16)	0.0942 (0.00)	0.1232 (0.00)	0.0105 (0.00)	0.2043 (0.00)
Strong Value P.	0.0996 (0.00)	-0.1034 (0.00)	0.0511 (0.00)	0.1472 (0.00)	-0.096 (0.00)	0.1164 (0.00)
Size Premium	-0.297 (0.00)	-0.1034 (0.00)	-0.138 (0.00)	-0.311 (0.00)	-0.420 (0.00)	-0.183 (0.00)

The first entry in each cell refers to the coefficient value and the second entry refers to p value. See footnote below table 1. Because of non-convergence estimate in two cases we use an OLS estimate combined with GARCH.

Table (3). Garch-M (1,1) Results: Full Sample, 2001-2012

	Const.	**Bench.**	**SMB**	**HML**	**a0**	**a1**	**b1**	σ			
Panel I	**Coeff**	**Coeff**	**Coeff**	**Coeff**	**Coeff**	**Coeff**	**Coeff**	**Coeff**	**HMSE**	**AIC**	**a1+b1**
Basic Materials	0.0004 0.22	1.074 0.00	0.217 0.00	-0.001 0.98	0.0001 0.17	0.032 0.01	0.963 0.00	-0.029 0.64	6.83	-7.41	0.99
Consumer Goods	0.0003 0.26	0.942 0.00	0.028 0.07	-0.404 0.00	0.0001 0.00	0.102 0.00	0.874 0.00	-0.031 0.60	5.06	-8.01	0.97
Consumer Service	-0.0003 0.23	0.860 0.00	0.092 0.00	-0.240 0.00	0.0001 0.02	0.042 0.00	0.951 0.00	0.039 0.54	5.47	-8.18	0.99
Financials	-0.0002 0.17	1.154 0.00	0.036 0.01	0.539 0.00	0.0001 0.03	0.074 0.00	0.924 0.00	-0.010 0.81	4.37	-8.22	0.99
Industrials	-0.0003 0.17	1.148 0.00	0.452 0.00	-0.099 0.00	0.0001 0.05	0.045 0.00	0.951 0.00	0.076 0.20	3.77	-8.31	0.99
Panel II **Strong Value and growth**	**Const.**	**Bench.**	**SMB**	**SHML**	**a0**	**a1**	**b1**	σ			
	Coeff	**Coeff**	**Coeff**	**Coeff**	**Coeff**	**Coeff**	**Coeff**	**Coeff**	**HMSE**	**AIC**	**a1+b1**
Basic Materials	0.0005 0.19	1.074 0.00	0.217 0.00	-0.040 0.01	0.0001 0.14	0.031 0.00	0.964 0.00	-0.034 0.58	6.88	-7.41	0.99
Consumer Goods	0.0003 0.21	0.925 0.00	0.036 0.02	-0.113 0.00	0.0001 0.01	0.106 0.00	0.873 0.00	-0.037 0.49	4.57	-7.92	0.98
Consumer Service	-0.0002 0.29	0.842 0.00	0.108 0.00	-0.071 0.00	0.0001 0.03	0.051 0.00	0.942 0.00	0.030 0.63	4.62	-8.12	0.99
Financials	-0.0001 0.66	1.153 0.00	0.040 0.01	0.124 0.00	0.0001 0.06	0.075 0.00	0.925 0.00	-0.024 0.49	3.95	-7.96	0.99
Industrials	-0.0002 0.21	1.142 0.00	0.461 0.00	-0.034 0.00	0.0001 0.06	0.045 0.00	0.951 0.00	0.069 0.24	3.64	-8.30	0.99

Bench = Excess return between STOXX Euro TMI index and EONIA, SMB = STOXX Euro large cap minus STOXX Euro small cap, HML = STOXX Euro Value minus STOXX Euro Growth, SHML = STOXX Euro Strong Value minus STOXX Euro Strong Growth.

Table (4). GARCH M (1,1) Results: Bull Period, 2003-2007

Panel I	**Const.**	**Bench.**	**SMB**	**HML**	**a0**	**a1**	**b1**	σ			
	Coeff	**Coeff**	**Coeff**	**Coeff**	**Coeff**	**Coeff**	**Coeff**	**Coeff**	**HMSE**	**AIC**	**a1+b1**
Basic Materials	0.0003 0.78	1.126 0.00	0.192 0.00	0.247 0.00	0.0001 0.00	0.215 0.03	0.172 0.44	-0.068 0.80	13.73	-7.99	0.39
Consumer Goods	-0.0003 0.75	0.994 0.00	-0.008 0.76	-0.079 0.04	0.0001 0.20	0.059 0.04	0.902 0.00	0.057 0.83	4.05	-8.60	0.96
Consumer service	-0.001 0.17	0.901 0.00	0.099 0.00	-0.207 0.00	0.0001 0.22	0.045 0.05	0.935 0.00	0.300 0.36	2.96	-8.65	0.98
Financials	0.002 0.72	1.062 0.00	-0.008 0.65	0.345 0.00	0.0001 0.00	0.041 0.03	-0.041 0.00	-0.827 0.39	8.67	-9.41	0.99
Industrials	-0.0001 0.77	1.141 0.00	0.413 0.00	-0.096 0.01	0.0001 0.19	0.035 0.00	0.957 0.00	0.029 0.87	4.21	-8.96	0.99
Panel II Strong Value and Growth	**Const.**	**Bench.**	**SMB**	**SHML**	**a0**	**a1**	**b1**	σ			
	Coeff	**Coeff**	**Coeff**	**Coeff**	**Coeff**	**Coeff**	**Coeff**	**Coeff**	**HMSE**	**AIC**	**a1+b1**
Basic Materials	0.005 0.00	1.124 0.00	0.191 0.00	-0.003 0.91	0.0001 0.00	0.0008 0.75	0.986 0.00	-1.102 0.00	17.41	-7.99	0.99
Consumer Goods	-0.0002 0.84	0.992 0.00	-0.004 0.88	-0.031 0.12	0.0001 0.20	0.057 0.04	0.904 0.00	0.025 0.93	3.87	-8.56	0.96
Consumer Service	-0.0008 0.21	0.895 0.00	0.111 0.00	-0.024 0.23	0.0001 0.16	0.056 0.01	0.921 0.00	0.198 0.41	2.51	-8.64	0.98
Financials	0.0003 0.49	1.055 0.00	-0.011 0.52	0.031 0.02	0.0001 0.16	0.029 0.02	0.959 0.00	-0.142 0.43	5.06	-9.27	0.99
Industrials	-0.0001 0.81	1.139 0.00	0.415 0.00	-0.024 0.13	0.0001 0.18	0.039 0.00	0.952 0.00	0.010 0.95	3.97	-3.98	0.99

Bench = Excess return between STOXX Euro TMI index and EONIA, SMB = STOXX Euro large cap minus STOXX Euro small cap, HML = STOXX Euro Value minus STOXX Euro Growth, SHML = STOXX Euro Strong Value minus STOXX Euro Strong Growth.

Table (5). GARCH M (1,1) Results: Bear Period, 2007-2009

	Const.	**Bench.**	**SMB**	**HML**	**a0**	**a1**	**b1**	σ			
Panle A	**Coeff**	**Coeff**	**Coeff**	**Coeff**	**Coeff**	**Coeff**	**Coeff**	**Coeff**	**HMSE**	**AIC**	**a1+b1**
Basic Materials	0.0017 0.24	1.080 0.00	0.221 0.00	0.267 0.01	0.0001 0.46	0.078 0.01	0.918 0.00	-0.076 0.64	2.73	-6.60	0.99
Consumer Goods	-0.001 0.76	0.91 0.00	-0.063 0.27	-0.607 0.00	0.0001 0.00	0.547 0.00	-0.006 0.89	0.086 0.87	46.37	-7.15	0.54
Consumer Service	-0.001 0.03	0.874 0.00	0.239 0.00	-0.145 0.00	0.0001 0.22	0.134 0.01	0.866 0.00	0.199 0.22	3.56	-7.56	0.99
Financials	0.0001 0.98	1.199 0.00	0.101 0.05	0.546 0.00	0.0001 0.09	0.148 0.01	0.852 0.00	-0.099 0.38	3.66	-7.02	0.99
Industrials	-0.001 0.26	1.23 0.00	0.397 0.00	-0.348 0.00	0.0001 0.16	0.178 0.11	0.772 0.00	0.225 0.28	4.40	-7.50	0.95
Top 20 value and growth											
Panel B Strong Value and growth	**Const.**	**Bench.**	**SMB**	**SHML**	**a0**	**a1**	**b1**	σ			
	Coeff	**Coeff**	**Coeff**	**Coeff**	**Coeff**	**Coeff**	**Coeff**	**Coeff**	**HMSE**	**AIC**	**a1+b1**
Basic Materials	0.002 0.21	1.092 0.00	0.149 0.04	-0.014 0.75	0.0001 0.30	0.091 0.00	0.901 0.00	-0.096 0.54	2.85	-6.57	0.99
Consumer Goods	0.0003 0.68	0.907 0.00	0.090 0.13	-0.060 0.10	0.0001 0.34	0.373 0.06	0.596 0.01	-0.051 0.63	35.73	-7.02	0.96
Consumer Service	-0.0013 0.02	0.865 0.00	0.279 0.00	0.025 0.42	0.0001 0.20	0.130 0.10	0.870 0.00	0.234 0.16	3.73	-7.54	0.99
Financials	0.0001 0.96	1.232 0.00	0.111 0.04	0.354 0.00	0.0001 0.06	0.181 0.12	0.819 0.00	-0.084 0.43	5.88	-7.12	0.99
Industrials	-0.0012 0.15	1.217 0.00	0.431 0.00	-0.090 0.00	0.0001 0.15	0.316 0.09	0.593 0.01	0.278 0.20	4.15	-7.45	0.91

Bench = Excess return between STOXX Euro TMI index and EONIA, SMB = STOXX Euro large cap minus STOXX Euro small cap, HML = STOXX Euro Value minus STOXX Euro Growth, SHML = STOXX Euro Strong Value minus STOXX Euro Strong Growth.