Residual return reversals: European evidences

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Abstract

This paper revisits the performance of residual return reversal strategy for European stock markets during the time period 1990-2016. We confirm recent results for US data and find evidences of higher performance of residual return reversal strategy than those of conventional one. The residual return reversal in the EU are robust to market microstructure biases. However, the results are heterogeneous across countries, are robust in France and Germany, but seem to be fragile in smaller countries. We also find a strong significant and positive relation between residual reversal return and market volatility, which supports for the hypothesis that short-term reversal is associated to liquidity provision.

Asset pricing models; short-term reversal; residual return reversal; Anomalies.
JEL classification: G12.

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1 Introduction

In a recent study, Blitz et al. (2013) document that reversal strategy based on the residual return obtained from the Fama and French (1993) three-factor model yields risk-adjusted returns are twice as large as those of Jegadeesh (1990) reversal strategy. They argue that the time-varying factor exposures to Fama and French factors have a negative effect to Jegadeesh (1990) reversal strategy. The residual return does not exhibit time-varying factor exposures, explaining the higher performance of residual reversal strategy.

Prior literatures argue that short-term reversal returns can be attributed to trading frictions in securities markets that weaken the arbitrage mechanism. Kaul and Nimalendran (1990) and Conrad et al. (1997) argue that most of Jegadeesh (1990) short-term reversal returns fall within bid-ask bounce. Avramov et al. (2006) show that the Jegadeesh (1990) return reversal is confined to illiquid stocks. In this paper, one of our objectives is to examine the robustness of Blitz et al. (2013)'s results on European stock market database. In particular, we first compare the reversal profits generated by Jegadeesh (1990) and Blitz et al. (2013) method using both time-series and cross-sectional methodology. The comparison is conducted not only across European countries but also within each country during the time period 1990-2011. Second, we examine whether residual return reversal profits are related to market micro-structure bias.

We find that similar to the evidences obtained in U.S, the residual return reversal strategy provides higher performance than the conventional one for E.U sample as well as for each individual country. Importantly, we find that residual reversals in E.U are still significantly present among stocks that are large in market capitalization, illiquid and have low idiosyncratic volatility. However, looking in more detail, we find that the results obtained in E.U is strongly influenced by France and Germany, where residual reversal effects manifest strongly. In contrast, the residual return reversals in smaller countries seem to be concentrated only in illiquid stock (i.e small stocks). The results from the cross-sectional regressions of return corroborate with these findings.

The other important question, which we also address in the paper, is to identify the economic source of short-term reversal in E.U market. Campbell et al. (1993) show that short-term stock return reversal is related to the return to supplying liquidity. Hameed and Mian (2014), Nagel (2012) and Da et al. (2014) find that the reversal return is higher during the period of market distress when the liquidity constraint is more likely to be binding. Following these authors, we employ market volatility as a proxy for liquidity shocks to investigate the relation between liquidity and residual return reversal. Consistent with the evidence obtained in the U.S (e.g. Hameed and Mian (2014) and Da et al. (2014), we find a positive and significant relation between E.U residual reversal return and market volatility. The results are not affected when we control for exposures to common risk factors.

Identifying the causes of short-term reversal has important implication for empirical asset pricing tests, and more generally for understanding the limits of market efficiency. And since the debate on the existence and the driver of return reversal remains unresolved, the empirical results obtained from other sample are important to understand this anomaly. In summary, our study from the EU sample suggests that the EU residual reversal is robust to market structure bias and are pervasive across time. However, this argument is not true for all the countries in E.U areas. Except for Germany and France where the reversal effects are robust, the residual return reversal in the smaller countries seem to be fragile and concentrate in small stocks. Also, our findings indicate that residual return reversal in E.U stock market is driven by liquidity provision.

The rest of the paper is organized as follows. In Section 2, we describe the data. Section 3 presents our main findings on residual return reversal. In this section, we also examine the relation between the market volatility and residual return reversal. Section 4 concludes.

2 Data

Our sample consists of firms from 11 European countries belonging to the European Monetary Union: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherland, Portugal, and Spain. We obtain data from Thomson Data Stream (TDS). We download only securities that are identified as equity, are listed as 'primary quote' in the domestic exchange, and trade in local currency. In our sample, returns are converted into euros. We employ both the active and dead equity [2]. We choose the monthly market rate reported by Frankfurt bank as the risk-free rate [3]. A detailed description of the variables is available in Appendix A. Table 1 presents the summary statistic for the countries included in the European sample. We see that the three largest equity markets in the sample are Germany, France and Italy. The remaining countries are smaller in terms of the number of firm and/or the total market equity.

****Insert of Table 1 about here ****

3 Results

3.1 Reversal returns

At the end of each month t, we identify the top and bottom 20 percent of stocks based on their returns in month 't', Jegadeesh (1990) reversal strategy (JS) consists of buying stocks in the bottom quintile and sells stocks in the top quintile. The monthly return from JS strategy in month 't+1' produces our measure of monthly reversal profit. The monthly return of Blitz et al. (2013) reversal strategy (DS) is obtained the same way. The only difference is

[2] We apply the method of Ince and Porter (2006) to filter the data in order to reduce the influence of data errors in Datastream. We also follow Ang et al. (2009) to exclude very small firms by eliminating the 5% of firms with the lowest market capitalization in each country. The results of the paper does not depend on this exclusion.

[3] This rate is available at the website of Deustche Bundesbank in the time-series database.

that the stocks are ranked using the residual return obtained from Fama and French (1993) three-factor model. We also report the risk-adjusted returns (α_{ff4}), where monthly reversal returns are regressed on Fama-French-Carhart four factors [4].

Table 2 reports the results for E.U sample and individual country in E.U areas. Since some markets are characterized by either small number of firms or small size, to ensure that the portfolios are well diversified, we group them together. In particular, we report the results for Germany, France and Italy separately and the remaining countries are examined in ensemble (Others). The results reported in Table 2 allow us to examine the comparison between two strategies not only across E.U but also within each country. The risk-adjusted profits allow us to judge the economical significant of each strategy.

From Table 2, for the JS strategy, we find a significant profit of 0.61% (t-statistic = 2.32) per month for the E.U sample. The risk-adjusted profit (α_{ff4}) is slightly higher, about 0.78% (t-statistic = 2.69) per month. Looking across the countries within the E.U, the magnitude of return reversals varies much from country to country. For example, reversal return is large and

[4] The construction of the Fama and French three factors and Carhart (1997) four-factors for European sample and each countries or group of countries in the sample follow Fama and French (1993)'s methodology with a small difference on size breakpoints. Fama and French (1993) actually use the median of NYSE market capitalization to construct the factors. However, Schmidt et al. (2011) have shown that for the E.U sample, which is similar to ours, that the 80th percentile is very similar to the size breakpoint employed by Fama and French (1993). Following Schmidt et al. (2011), in this paper, we use the 80th percentile size breakpoint to construct Fama and French factors and momentum factors

strongly significant in France, about 1.79% (t-statistic = 6.27) per month, but small and insignificant in Italy and Others, about 0.15% (t-statistic = 0.50) and 0.10% (t-statistic = 0.27) respectively. Thus, the significance of return reversal of the whole sample is strongly driven by the one realized in France.

**** Insert of Table 2 about here ****

The situation is different when residual return is employed to form reversal strategy. The profit of DS strategy for E.U stock market is about 1.21% (t-statistic = 6.47) per month, which is much higher than that generated by the conventional reversal strategy. The Fama-French-Carhart alphas are still large and still significant for all markets. α_{ff4} are 1.21%, 1.51%, 2.21%, 0.80% and 0.82 % for E.U, Germany, France, Italy and Other respectively. More importantly, DS strategy shows a better performance for all the countries or group of country. From the 'DS-JS' row, which reports the difference of return between DS and JS strategy, we see that the results are significantly positive for all sub-samples. For example, additional profit of implementing the reversal strategy based on RRET instead of raw return ranges from 50 bps to 83 bps and are unaffected by adjustment for common risk factors.

3.2 Robustness checks

3.2.1 Micro-structure effect and small cap stocks

Several researchers, including Lo and MacKinlay (1990) and Jegadeesh and Titman (1995), have pointed out that short-term return reversals are plagued by micro-structure biases such as the bid-ask bounce. To address this issue, similar to Jegadeesh (1990) and Hameed and Mian (2014), we investigate the effect of skipping one day between the portfolio formation period and the holding period. In particular, we classify stocks based on their month 't' residual returns and examine these reversal profits during month 't+1' with a one-day delay. This approach, which isolates return reversals from the negative autocorrelation in returns induced by the bid-ask bounce, ensures that RRET reversals are not unduly affected by bid-ask bounce. From row DS_{exc1} of Table 2, we see that the returns from the RRET based reversal strategy show a small reduction. However, the Fama-French-Cahard adjusted return remains economically and statistically significant for all the markets. They are about 0.93%, 1.13%, 1.89%, 0.59% and 0.61% for EU, Germany, France, Italy and Others respectively. This result strongly indicates that the bid-ask bounce has a little effect on residual return reversal.

To examine whether the residual return tilts the portfolio exclusively towards small stock that are subject of both higher trading friction and greater transaction cost, we reexamine the RRET based strategy's return with the sample which is excluded stocks in the 1st quintile of market capitalization.

As expected, the RRET based strategy yields lower returns in the new sample (row DS_{excS}). The Fama-French-Cahard risk-adjusted return remains highly significant for EU, Germany, France and Italy, about 0.79%, 1.09%, 1.54% and 0.65% respectively. However, the result is different for smaller countries (Others). In particular, the DS strategy's profit is small and not significant, about 0.20% (t-statistic = 0.98). This statistic suggests that the profit of residual reversal strategy for the group of smaller countries is principally contributed by the small stocks.

3.2.2 Arbitrage activity, skewness and liquidity effect

So far, the reversal returns have been analyzed at the portfolio level. In this section, we employ an alternative approach, which is more powerful and effective and allow us to control many variables simultaneously. In particular, we examine the DS strategy's return by estimating the following cross-sectional regressions,

$$R_t = a_{0,t} + a_{1,t}DL_{t-1} + a_{2,t}DH_{t-1} + a_{3,t}BETA_{t-1} + a_{4,t}ME_{t-1} + a_{5,t}BM_{t-1} + a_{6,t}R12_{t-1} + a_{7,t}DMAX_{t-1} + a_{8,t}SK_{t-1} + a_{9,t}ILQ_{t-1} + \epsilon_t \quad (1)$$

Where R_t is stock return in month 't'. DL_{t-1} and DH_{t-1} are dummies that indicate whether stock is held, either long or short in month 't-1'. In particular, $DL_{t-1}(DH_{t-1})$ equals one if stock i's residual return is in the bottom (top) 20% and is zeros otherwise. ME is log of market capitalization; BM is log of book-to-market ratio; R12 is the cumulative return over 12 months from t-2 to t-13; DMAX is the daily extreme return in the previous month; SK is the skewness of stock return; and ILQ is the illiquidity [5].

Coefficients on the dummies allow us to examine the return of DS strategy in controlling the other effects. According to Fama (1976), the coefficient estimate $a_{1,t}$ can be interpreted as the month 't' return to a zero-investment that is long DL stocks while hedged out all other effects. Our particular interest is the spreads of $a_{1,t}$ and $a_{2,t}$. These spreads provide us the magnitudes of DS strategy returns. We obtain a similar Fama-French-Carhart risk adjusted reversal strategy returns by adding the BETA, ME, BM and R12 to the regression. Theoretical asset pricing model proposed by Harvey and Siddique (2000) predict that stocks with higher skewness has lower expected returns, hence, in the regression (1) we also add SK as a control variable. To test the role of arbitrage constraints (Jeffrey Pontiff (2006) and Shleifer and Vishny (1997)) and the liquidity (Avramov et al. (2006)) on the RRET strategy's return we employ ILQ and idiosyncratic volatility to control these effects [6].

Table 3 reports the time-series average of the slope coefficients in regression (3). From EU sample, we see that, in general, the coefficients on the control variables are as expected – value, momentum, skewness and DMAX effects are significant and have a correct sign. The size and Illiquidity effects are in

[5] A detailed description of the construction of variables is available in Appendix A

[6] We employ DMAX proposed by Bali et al. (2011) instead of Ang et al. (2006)'s idiosyncratic volatility as a proxy for the arbitrage effect. In fact, Bali et al. (2011) argue that idiosyncratic volatility is just a proxy for DMAX effect. In particular, in Bali et al. (2011) the cross-sectional relation between idiosyncratic volatility and expected return become insignificant after controlling for DMAX. Christian (2014) and Annaert et al. (2013) whose sample are similar to ours, confirm Bali et al. (2011)'s findings in European sample

correct sign but not significant. The results associated to size and illiquidity are consistent with Christian (2014) and Annaert et al. (2013). Of greater interest are the coefficients associated with DL_{t-1} and DH_{t-1}. The estimated coefficients show that the magnitude of RRET based reversal strategy in E.U sample is large, about 0.94% per month and strongly significant with t-statistic of 6.06 after inclusion of the control variables. We obtain the consistent results for Germany, France and Others. They are 1.17% (t-statistic = 6.59), 1.93% (t-statistic = 12.10), 0.64% (t-statistic = 3.11). However, for Italy, the return from the residual return based strategy become marginal significant after controlling for these variables, about 0.43% (t-statistic = 1.76) [7].

****Insert of Table 3 about here ****

3.3 The sources of short-term reversal

Grossman and Miller (1987) and Campbell et al. (1993) predict that the short-term reversal of stock return could be related to the price pressure connected to liquidity shocks. Following these models, return reversal appears when non-informational trading is absorbed by liquidity suppliers. In this section, following Da et al. (2014), we employ the realized volatility to proxy for period of market disturbance which is calculated by the volatility of daily

[7] In an un-tabulated result, we consider several specifications of the regression. The results does not change from one specification to others. Since our primary interest is the estimated coefficients for the full specification, for brevity, we only report the estimated results of the full specification for each sample in Table 3

returns on the on the value weighted market portfolios [8]. Our empirical model takes the following form

$$P_{i,t} = c_{0,i} + c_{1,i}RVOL_{t-1} + c_{2,i}FF4_{t,i} + \epsilon_{i,t} \text{ (2)}$$

Where $P_{i,t}$ is the RRET reversal strategy profit for market 'i' in month t; i stands for E.U, Germany, France, Italy and the group of remaining. RVOL is lagged of one month realized volatility for whole sample. We also consider the effect of controlling for common risk factors in each market via the Fama and French factors ($FF4_{i,t}$). The system of 5 equations is estimated by Seemingly Unrelated Regressions, allowing the intercept to differ across markets.

Table 4 reports our results of estimation. We find that reversal profits are significantly and positively related to the market volatility. For example, the estimated coefficients of $RVOL_{t-1}$ for whole sample, Germany, France, Italy and Others are respectively 0.04 (t-statistic = 2.80), 0.05 (t-statistic = 3.10), 0.05 (t-statistic = 3.03), 0.08 (t-statistic = 3.73) and 0.04 (t-statistic = 2.03). If we consider the high value of volatility are related to market stress and liquidity constraints as in Nagel (2012), the estimated results suggest that the reversal profits are more likely reflecting compensation for liquidity provision since they are higher when the level of illiquidity (proxied by the realized volatility) is high. Overall, the results are consistent with those of Da et al. (2014) and Hameed and Mian (2014) for U.S stock market.

****Insert of Table 4 about here ****

[8] $RVOL_t = \sqrt{(\frac{260}{N_t}) \sum_{i=1}^{N_t} R_i^2}$ where N_t is the number of trading in month t

4 Conclusion

In this paper, we examine the comparative performance between Jegadeesh (1990) reversal strategy and residual reversal strategy outside the United States. With an extensive and carefully filtered sample of euro area stocks, we find that higher performance of residual reversal strategy is not only present in across E.U sample but also in individual country in the studied sample.

The residual return reversal in the E.U sample are robust to market micro structure biases. Moreover, the profit of residual reversal strategy preserves after controlling for the liquidity, arbitrage effect as well as a set of established return predictors, such as the BETA, ME, BM, momentum, and skewness. However, we document that the result obtained from the E.U sample is strongly influenced by France and Germany, where the residual return reversal effect manifestly strongly. In contrast, for smaller countries in the sample, the return obtained in residual return strategy seems to be fragile. For example, in Italy, the reversal profit is not significant at the conventional level after controlling for various related variables. For other smaller countries in E.U, the residual reversal profits are generated principally from the small stocks.

We also investigate the underling source of the return reversals for E.U area. In particular, we find a strong significant and positive relation between return of residual reversal strategy with market volatility. Our results are in line with the hypothesis that short-term reversal is associated to liquidity provision (Campbell et al. (1993), Brunnermeier and Pedersen (2009), Nagel (2012), among others).

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Appendix A: Data construction

For all the companies in the sample, we download the end-of-month return index (including dividends), market value, and book-to-market ratio (Worldscope item 05476). We choose the monthly market rate reported by Frankfurt bank as the risk-free rate. This rate is available at the website of Deustche Bundesbank in the time-series database.. Our sample covers the period of 1990.01 to 2016.12. We apply the method of Ince and Porter (2006) to filter the data in order to reduce the influence of data errors in Datastream. We also follow Ang et al. (2009) to exclude very small firms by eliminating the 5% of firms with the lowest market capitalization in each country.

Following Blitz et al. (2013), we compute the residual return (RRET) by performing rolling regression using Fama and French (1993) model. The residual return (RRET) at 't' is measured as the residual term scaled by the standard deviation of return over the estimated period. If not all 36 months are available, RRET is set to missing. The other variables used in this study are defined as follow. Momentum (R12) is the cumulative prior thirteen-month stock returns, skipping the most recent month (Jegadeesh and Titman (1993). Following Bekaert et al. (2007), we measure liquidity as the proportion of zero returns observed over the last 260 trading days prior to month 't'. We did not use the Amihud (2002)'s measure as it would result in a major loss of observations (see Annaert et al. (2013)). Following Bali et al. (2011), extreme return (DMAX) is the maximum daily stock return over the previous month. We use the skewness coefficient (SK) of the last 260 daily returns prior to month t as a proxy for expected skewness (65 days minimum).

The construction of the Fama and French three factors and Carhart (1997) four-factors for European sample and each countries or group of countries in the sample follow Fama and French (1993)'s methodology with a small difference on size breakpoints. Fama and French (1993) actually use the median of NYSE market capitalization to construct the factors. However, Schmidt et al. (2011) have shown that for the E.U sample, which is similar to ours, that the 80th percentile is very similar to the size breakpoint employed by Fama and French (1993). Following Schmidt et al. (2011), in this paper, we use the 80th percentile size breakpoint to construct Fama and French factors and momentum factors.

Table 1: Summary statistics

Country	Firms	Weight(%)
Austria	83	1.55
Belgium	132	4.78
Finland	91	2.64
France	658	29.36
Germany	639	28.52
Greece	188	1.29
Ireland	47	1.35
Italy	211	11.15
Netherlands	136	9.01
Portugal	72	1.10
Spain	129	9.24

Note: This Table reports the average number of firm and country's average percentage in term of total market equity for the countries included in the European sample. The sample period is from 1990.01 to 2016.12.

Table 2: Reversal returns

	EU		GER		FR		ITALY		OTHERS	
	m	*ff4*	m	*ff4*	m	*ff4*	m	*ff4*	m	*ff4*
JS	0.615	0.781	0.681	0.628	1.791	1.779	0.156	0.366	0.103	0.388
	(2.32)	(2.69)	(2.50)	(1.71)	(6.27)	(5.33)	(0.50)	(1.31)	(0.27)	(1.18)
DS	1.210	1.211	1.514	1.507	2.292	2.212	0.801	0.798	0.719	0.824
	(6.47)	(6.17)	(9.03)	(7.23)	(13.73)	(13.15)	(3.15)	(3.38)	(2.84)	(3.36)
DS-JS	0.595	0.429	0.833	0.878	0.501	0.433	0.644	0.433	0.616	0.436
	(4.42)	(2.54)	(4.14)	(3.00)	(2.27)	(1.63)	(3.61)	(2.54)	(2.71)	(1.69)
DSexcS	0.781	0.797	1.057	1.088	1.641	1.545	0.684	0.656	0.205	0.333
	(4.21)	(4.33)	(7.27)	(6.36)	(10.08)	(9.57)	(2.88)	(3.04)	(0.98)	(1.62)
DSexc1	0.938	0.927	1.123	1.132	1.988	1.898	0.588	0.594	0.513	0.615
	(5.35)	(5.08)	(6.69)	(5.73)	(11.89)	(11.43)	(2.34)	(2.58)	(2.23)	(2.76)

Note: This Table reports the returns of conventional and residual return reversal strategy for European sample (EU), Germany (GER), France (FR) and Other, which is the group of remaining countries described in Table 1. Stocks are sorted alternatively into quintile portfolios based on previous monthly return and residual return, which is estimated from Fama and French (1993) three-factor model. Conventional (JS) and residual return (DS) reversal strategy's profits are the spread of return between lowest and highest quintile portfolios. DS_{exc1} is the return of DS, which is implemented with a day gap between the formation month 't' and the holding month 't+1' and DS_{excS} is the return of DS strategy obtained from the sample that are excluded the stocks with market equity lower than 20% market equity break points. α_{ff4} is the Fama-French-Cahard four factor risk adjusted return. The reported t-statistic (in parentheses) are Newest West (1987) corrected. The sample period is from 1990.01 to 2016.12. The sample period is from 1990.01 to 2016.12.

Table 3: Cross-sectional regressions of monthly stocks returns on residual return and controls

	intercept	L	H	BETA	ME	BM	R12	SK	ILQ	DMAX	L-H
EU	-0.410	0.751	-0.194	-0.017	0.005	0.701	0.014	-0.052	0.371	-0.048	0.945
	(-0.96)	(9.04)	(-1.95)	(-0.11)	(0.18)	(10.89)	(5.91)	(-3.90)	(1.37)	(-4.43)	(6.06)
GER	-0.869	0.963	-0.207	-0.031	0.060	0.431	0.013	-0.056	0.657	-0.039	1.170
	(-1.71)	(8.18)	(-1.75)	(-0.17)	(1.85)	(7.08)	(5.91)	(-2.73)	(2.03)	(-2.57)	(6.59)
FR	0.236	1.323	-0.603	0.164	-0.041	0.824	0.011	-0.090	0.461	-0.059	1.927
	(0.42)	(13.45)	(-5.85)	(0.94)	(-0.90)	(8.75)	(4.22)	(-3.34)	(1.26)	(-5.06)	(12.10)
ITALY	-0.530	0.341	-0.090	0.311	-0.001	0.764	0.015	-0.068	-0.097	-0.089	0.431
	(-0.81)	(2.19)	(-0.57)	(1.17)	(-0.02)	(5.56)	(4.34)	(-1.04)	(-0.18)	(-3.36)	(1.76)
Others	-0.384	0.604	-0.039	-0.359	0.021	0.800	0.015	-0.058	-0.167	-0.014	0.643
	(-0.76)	(4.86)	(-0.31)	(-1.98)	(0.46)	(9.49)	(5.07)	(-2.44)	(-0.51)	(-0.72)	(3.11)

Note: This table shows average coefficient estimates from cross-sectional regressions below

$R_t = a_{0,t} + a_{1,t}DL_{t-1} + a_{2,t}DH_{t-1} + a_{3,t}BETA_{t-1} + a_{4,t}ME_{t-1} + a_{5,t}BM_{t-1} + a_{6,t}R12_{t-1} + a_{7,t}DMAX_{t-1} + a_{8,t}SK_{t-1} + a_{9,t}ILQ_{t-1} + \epsilon_{i,t}$

Where $DL_{t-1}(DH_{t-1})$ equals one if stock i's residual return is in the bottom (top) 20% and is zeros otherwise. The set of control variables includes BETA, ME (logarithm of market equity), log of book-to-market (BM), previous 12 cumulative return from t-2 to t-13 (R12), skewness (SK), illiquidity (ILQ) and extreme daily return in the previous month (DMAX). The estimated results are reported separately for European sample, Germany (GER), France (FR) and Others, which is the group of remaining countries described in Table1. The sample period is from 1990.01 to 2016.12.

Table 4: Residual reversal and market volatility

	constant	RVOL	MKT	SMB	HML	MOM
EU	0.007	0.042	-0.020	-0.045	0.063	-0.114
	(2.53)	(2.80)	(-0.71)	(-1.01)	(1.85)	(-4.10)
GERMANY	0.008	0.049	0.091	0.034	-0.007	-0.060
	(2.60)	(3.10)	(2.71)	(0.66)	(-0.19)	(-1.94)
FRANCE	0.014	0.052	0.044	0.074	0.110	-0.038
	(4.23)	(3.03)	(1.36)	(1.59)	(2.85)	(-1.21)
ITALY	-0.007	0.079	0.066	0.110	0.133	-0.091
	(-1.59)	(3.73)	(1.84)	(1.83)	(2.32)	(-2.21)
OTHERS	0.002	0.043	-0.003	-0.082	0.046	-0.118
	(0.47)	(2.03)	(-0.07)	(-1.50)	(1.02)	(-2.99)

Note: This table presents the results of the following monthly seemingly related regressions,

$$P_t = c_{0,t} + c_{1,t} RVOL_{t-1} + c_{2,t} FF4_t + \epsilon_{i,t}$$

Where $P_{i,t}$ is the residual reversal return for EU sample, Germany, France, Italy and Others which includes the remaining markets detailed in Table 1 in month 't'; $RVOL_{t-1}$ is the realized market volatility, which is measured as the annualized standard deviation of daily return of value weighted returns of stocks. The vector $FF4_{i,t}$ is the Fama-French-Carhart four factor of each sample. The period of study ranges from 01.1990 -12.2016.