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Revisiting the momentum factor in the U.K. stock market

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Abstract

The objective of this study is to examine the Carhart (1997) four-factor asset pricing model to revisit whether the momentum factor is indeed priced in the U.K. equity market, over the period from October 1980 through June 2016. The study applies the state-of-the-art two-pass cross-sectional regression methodology of Lewellen et al. (2010). I find the momentum factor is not priced. The result is robust using a shorter sample that excludes the recent financial crisis data.

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1. Introduction

Several studies use the Carhart (1997) four-factor asset pricing model in practical applications that require the estimation of the U.K. equity market returns, Gregory *et al.* (2013), Fletcher (2014), Davies *et al.* (2015), among many others. However, a recent study by Ruenzi and Weigert (2018) proposes a risk-based explanation of the momentum anomaly on equity markets, and finds, especially for the U.K., that augmenting the Fama and French (1993) three-factor asset pricing model with Weigert (2016) crash sensitivity factor reduces the momentum effect in the U.K. equity market from a 5% statistically significant 16% per annum to an insignificant 11.9%.

The empirical finding in Ruenzi and Weigert (2018) motivates this study to examine the Carhart (1997) four-factor asset pricing model to revisit whether the momentum factor is indeed priced in the U.K. equity market, over the period from October 1980 through June 2016. The study use the state-of-the-art two-pass cross-sectional regression methodology of Lewellen *et al.* (2010, LNS, henceforth), and find that the momentum factor is not priced. The result is robust using a monthly sub-sample that excludes the recent financial crisis data.

The study extends the asset pricing literature by providing an updated general result of the momentum premium theory in the U.K. stock market that can be used as a reference point for academic researchers, portfolio managers, and individual investors.

The rest of the study is organized as follows: Section 2 contains the methodology. Section 3 describes the data and provides descriptive statistics. Section 4 provides the empirical results and analysis. Section 5 is the robustness. Finally, section 6 concludes.

2. Methodology

The study applies the LNS two-pass cross-sectional regression methodology to examine the Carhart (1997) four-factor asset pricing model. Specifically, the model is required to explain the cross-sectional variation in the monthly equally-weighted excess returns to the 25 portfolios sorted on size and book-to-market plus 5 portfolios sorted on standard deviation of prior 12-month returns.[1] I impose the theoretical restriction that the zero-beta rate is equal to the risk-free rate and include the momentum factor as one of the test assets. I also use the Generalized Least Squares cross-sectional regression approach. In testing the null hypothesis that the factor risk-premia is equal to zero, I use Kan *et al.* (2013, KRS, henceforth) test to assess for possible misspecification.[2]

3. Data and Descriptive Statistics

Data on the test assets and the portfolios used to construct the factors cover the period from October 1980 through June 2016. I use the total return on the FT All Share Index as a market return and the three-month U.K. Treasury bill rate as a risk-free rate. For a detailed explanation of the test assets and factors construction, I refer the reader to Gregory *et al.* (2013) paper's section 3(*iii*) points 1 and 3 for the test assets[3] and section 3(*ii*)(a) for the factors.[4] All data are obtained from the Xfi Centre for Finance and Investment – University of Exeter website.[5] Table I shows that the mean excess returns to the test assets varies between 0.33% and 1.27%, while the standard deviation varies between 3.83% and 7.24%. I notice

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[1] Data on the 5 portfolios sorted by industry is not available.

[2] The test is given in Equation (IA.244) in the internet appendix for "Pricing model performance and the two-pass cross-sectional regression methodology" of KRS.

[3] I convert the 25 portfolios sorted on standard deviation of prior 12-month returns into quintiles portfolios. i.e. quintile 1 is the average return for portfolios 1 to 5, and do the same for the rest.

[4] The test assets and the portfolios used in constructing size, value, and momentum factors are equally-weighted returns.

[5] http://business-school.exeter.ac.uk/research/centres/xfi/famafrench/files/

that the spread in mean excess returns for the five portfolios sorted on standard deviation of prior 12-month returns is equal to 0.51%.

Table I: Descriptive statistics for the test assets.

Panel A is for the monthly equally-weighted excess returns to the 25 portfolios sorted on size and book-to-market with small to big size portfolios on the vertical side and low to high growth portfolios on the horizontal side. Panel B is for the monthly equally-weighted excess returns to the 5 portfolios sorted on standard deviation of prior 12-month returns. V1 is the portfolio with the lowest prior standard deviation, V5 is the portfolio with the highest. Statistics reported are the Mean excess returns and Standard Deviation.

Panel A

Mean Excess Return (%)						Standard Deviation (%)					
	Low	2	3	4	High		Low	2	3	4	High
Small	0.39	0.61	0.77	0.94	1.27	Small	6.62	5.54	5.31	5.20	5.23
2	0.33	0.57	0.62	0.70	0.93	2	6.42	6.13	5.40	5.84	7.24
3	0.41	0.35	0.60	0.63	0.96	3	6.70	6.09	5.87	6.34	6.68
4	0.51	0.55	0.72	0.69	0.90	4	6.12	5.70	5.62	6.39	6.76
Big	0.35	0.44	0.54	0.62	0.85	Big	5.49	5.07	5.08	5.26	5.64

Panel B

Portfolio	V1	V2	V3	V4	V5
Mean Excess Return (%)	0.82	0.75	0.82	0.82	1.26
Standard Deviation (%)	3.83	4.64	5.25	5.46	6.90

Table II shows that the market factor has a mean of 0.51% per month with standard deviation of 4.46%. Both size and value factors have a mean of 0.18% and 0.46% with a standard deviation of 2.85% and 3.19%, respectively. The momentum factor has the highest mean of 0.87% with standard deviation of 3.99%.

Table II: Descriptive statistics for the factors.

MKT is the market factor. *SMB* and *HML* are the size and the value factors, respectively. *UMD* is the momentum factor. Statistics reported are the Mean and Standard Deviation.

Factors	*MKT*	*SMB*	*HML*	*UMD*
Mean (%)	0.51	0.18	0.46	0.87
Standard Deviation (%)	4.46	2.85	3.19	3.99

From Table III, I notice that the correlation between the momentum factor and each of the size and the value factors is equal to -0.01 and -0.47, respectively.

Table III: The correlation coefficients among the factors.

MKT is the market factor. *SMB* and *HML* are the size and the value factors, respectively. *UMD* is the momentum factor.

	MKT	*SMB*	*HML*	*UMD*
MKT	1.00			
SMB	-0.31	1.00		
HML	-0.05	-0.08	1.00	
UMD	-0.16	-0.01	-0.47	1.00

4. Empirical Results and Analysis

Table IV shows that the momentum factor beta is statistically significant for 27 out of the 30 portfolios, at 5% significance level. It also has a positive spread of 0.32 with a mean of -0.15 and standard deviation equal to 0.07.

Table IV: The momentum factor betas.

The table reports the momentum factor betas, b_{UMD}, and their corresponding GMM t-statistics of Cochrane (2005), t-stat, obtained from the LNS first-pass time-series regressions. Panel A is for the monthly equally-weighted excess returns to the 25 portfolios sorted on size and book-to-market with small to big size portfolios on the vertical side and low to high growth portfolios on the horizontal side. Panel B is for the monthly equally-weighted excess returns to the 5 portfolios sorted on standard deviation of prior 12-month returns. V1 is the portfolio with the lowest prior standard deviation, V5 is the portfolio with the highest.* represents the significance at 5% significant level.

Panel A											
	b_{UMD}						*t*-stat				
	Low	2	3	4	High		Low	2	3	4	High
Small	-0.14*	-0.11*	-0.17*	-0.07*	-0.13*	Small	-2.38	-3.27	-3.88	-1.79	-4.15
2	-0.12*	-0.28*	-0.10*	-0.05	-0.35*	2	-2.32	-4.23	-2.06	-0.89	-3.12
3	-0.20*	-0.25*	-0.12*	-0.24*	-0.23*	3	-2.93	-3.91	-2.50	-4.32	-2.77
4	-0.14*	-0.16*	-0.09*	-0.19*	-0.26*	4	-2.90	-2.29	-2.08	-2.76	-4.34
Big	-0.15*	-0.10*	-0.02	-0.08*	-0.19*	Big	-3.96	-2.58	-0.68	-1.84	-3.96

Panel B					
Portfolio	V1	V2	V3	V4	V5
b_{UMD}	-0.03	-0.08*	-0.15*	-0.16*	-0.21*
t-stat	-1.36	-2.55	-3.13	-4.81	-3.97

Table V shows that the null hypothesis that the momentum factor risk-premia is equal to zero is not rejected. Overall, the momentum factor is not priced in the U.K. equity market.

Table V: The momentum factor risk-premia.

The table reports the momentum factor risk-premia, λ_{UMD}, and its corresponding KRS t-ratio, t_{KRS}, obtained from the LNS second-pass cross-sectional regression methodology. I use one-lag Newey and West (1987) to correct for the effect of heteroskedasticity and autocorrelation in the residuals.

λ_{UMD} *(%)*	0.51
t_{KRS}	1.09

5. Robustness

Daniel and Moskowitz (2016) find that momentum strategies experience negative returns, in panic states, following market declines and when market volatility is high. Given that the recent financial crisis is such a massive event, it is reasonable to provide a robustness test using the pre-crisis data. I consider a monthly sub-sample that ends in December 2007. To briefly summarized, the main finding that the momentum factor is not priced in the U.K. equity market is robust using a sub-sample that excludes the recent financial crisis data.[6]

6. Conclusion

The recent evidence of the risk-based explanation of the momentum anomaly on equity markets reported in Ruenzi and Weigert (2018) put into question whether the momentum factor can be used in practical applications that requires the estimation of the U.K. equity market returns (See Gregory *et al.* 2013, Fletcher 2014, Davies *et al.* 2015, among many others).

The objective of this study is to examine the Carhart (1997) four-factor asset pricing model to revisit whether the momentum factor is indeed priced in the U.K. equity market, over the period from October 1980 through June 2016. The study applies the state-of-the-art two-pass cross-sectional regression methodology of LNS and finds the momentum factor is not priced. The result is robust using a monthly sub-sample that excludes the recent financial crisis data.

Gregory *et al.* (2013) use both the basic and the Cremers *et al.*'s (2012) value-weighted versions of the momentum factor as an additional risk factor to the Fama and French (1993) three-factor asset pricing model in estimating the U.K. equity market returns. It should be emphasized that I only use the basic version of the factor. Whether the Cremers *et al.*'s (2012) value-weighted version of the momentum factor is indeed priced in the U.K. equity market, using the methodology employed in this study, is subject for further empirical investigation.

[6]The results are available upon request.

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