Manipulated Information Dissemination and Risk-Adjusted Momentum Return in the Chinese Stock Market

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Abstract. We study the manipulated information dissemination and risk-adjusted momentum return in the Chinese stock market. In this paper, we employ excess media coverage as a proxy for manipulated information dissemination. The raw momentum returns are negative across all degrees of manipulated information dissemination, but turn into significantly positive after controlling for risks. These outcomes hint that the manipulations of information dissemination contribute to price instabilities, so raw momentum returns are negative but turn into positive owing to risk adjustments. Moreover, we also discover that the stocks with high manipulated information dissemination exhibit big size characteristic and resist market risk well.

Keywords: Manipulated information dissemination · Risk adjustments · Momentum

1 Introduction

As is known to all, the stock price movements actually stem from the changes in information. Information dissemination has crucial impacts on the stock markets [1, 2]. In details, information dissemination improves the incorporation of news into prices [3]. Similarly, some studies hold that information dissemination enhances stock price efficiency [4]. Hence, information dissemination really deserves our detections.

The Chinese stock market exhibits significantly negative momentum returns no matter how long the formation and holding periods are [5]. If a market has significantly positive momentum returns, there is a clear pattern of continuation in stock prices. Stock prices are likely to maintain their past trends and show stable characteristic under positive momentum returns. On the contrary, stock prices easily reverse and present volatile patterns if a market has significantly negative momentum returns, suggesting that price reversal and contrarian are prevalent in this market. The stock prices are greatly volatile in China. Momentum is a result of gradual information dissemination and momentum returns are larger within the stocks accompanied with slow information

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dissemination [6, 7], which suggests that stock price stability is negatively related to the information dissemination.

Some literatures have studied information dissemination in the Chinese stock market. For instance, price changes are driven by information diffusion and no price reversal will be perceived in the short run [8]. Besides, information dissemination can explain the increases in idiosyncratic volatility in China [9]. These discoveries again imply information dissemination is related to stock price stability. We are interested in the artificially manipulated information dissemination, which is measured as excess media coverage in this paper. Therefore, we shed light on the relationship between manipulated information dissemination and momentum return by portfolio approach and risk adjustment analyses in the Chinese stock market.

Media coverage can be regarded as a proxy for information dissemination and it affects stock prices and returns [10]. In the Chinese stock market, the promotions in media coverage positively affect stocks [11]. That is, the stock returns increase with media coverage. This finding suggests that media coverage enhances stock price stability.

The credible news from media significantly influences an IPO corporation's stock returns and the uncertain tone from news may do harm to the corporation [12]. In addition, the trends of stock prices are positively correlated with the tones from media reports [13]. From the perspective of news tone, media coverage is also able to stabilize stock prices. In the above veins, it seems that the discussions on relationship between information dissemination and stock prices do not reach very consistent outcomes. Therefore, this contradiction in the literature also stimulates our motivation to carry out this research.

The remainder of this paper is organized as follows. We introduce the calculations of momentum, excess media coverage, construction procedures of different portfolios and data in Sect. 2. Section 3 contains the empirical findings. Section 4 concludes this paper.

2 Empirical Setup and Data

In this section, we describe the computations of excess media coverage, momentum return and the construction details of different portfolios. Moreover, momentum return computations include two parts.

First, raw momentum returns computations is based on rolling procedure [14]. Second, three factor models including CAPM, three-factor model [15] and four-factor model [16] are used to compute the risk-adjusted momentum returns.

The momentum portfolios consist of the portfolio from independent classifications and the portfolios from the dependent classifications. In this regard, we are able to dissect the relationship between manipulated information dissemination and momentum return completely.

2.1 Excess Media Coverage Computations

The proxy for manipulated information dissemination is excess media coverage and it is calculated by the logics as follows [17].

$$ln(1 + no.art.)_i = \alpha + \sum_{n=1}^{4} \beta_n Exp_{n,i} + \varepsilon_{i,media} \tag{1}$$

where $ln(1 + no.art.)_i$ is the natural log of the number of articles of stock i, $\sum_{n=1}^{4} \beta_n Exp_{n,i}$ contains the explanatory variables and their coefficients. They are the natural log of market capitalization, a dummy is defined as 1 when a stock is indexed in *CSI* 300 and 0 otherwise, a dummy is defined as 1 when a stock is listed in Shenzhen stock exchange and 0 otherwise and the natural log of the number of analysts.

2.2 Raw Momentum Return Computations

In each month t, we rank the stocks into z groups by stock returns during the past t-6 to t-1 months. The $\frac{1}{z}$ stocks with highest past returns are winner portfolio, while the $\frac{1}{z}$ stocks with lowest past returns are loser portfolio. We create a long position for winner portfolio and a short position for loser portfolio to make momentum portfolio in each month t.

Within the future $t + 1$ to $t + 6$ months, we maintain the positions produced in month t and calculate the average return of winner portfolio, $R_W^{t+1,t+6}$ and loser portfolio, $R_L^{t+1,t+6}$. Finally, a time series of $R_W^{t+1,t+6} - R_L^{t+1,t+6}$ is generated by the rolling procedure.

2.3 Capital Asset Pricing Model

$$ER_{i,t} = \alpha_i + \beta_{mkt,i} EMKT_t + e_{i,t} \tag{2}$$

where $ER_{i,t}$ is the stock return in excess of risk-free rate, $EMKT_t$ is the market return in excess of risk-free rate.

2.4 Three-Factor Model

$$ER_{i,t} = \alpha_i + \beta_{mkt,i} EMKT_t + \sum_{p=1}^{2} \beta_{p,i} Factor_{p,t} + e_{i,t} \tag{3}$$

where $\sum_{p=1}^{2} \beta_{p,i} Factor_{p,t}$ denotes the size, book-to-market factor and related coefficients. They are SMB_t (return differences between small and big stocks), and HML_t (return differences between high book-to-market and low book-to-market stocks).

2.5 Four-Factor Model

$$ER_{i,t} = \alpha_i + \beta_{mkt,i}EMKT_t + \sum_{p=1}^{2} \beta_{p,i}Factor_{p,t} + \beta_{w,i}WML_t + e_{i,t} \quad (4)$$

where WML_t represents the momentum factor (return differences between the stocks with highest past returns and those with lowest past returns).

2.6 Momentum Portfolios with Various Classifications

These various classifications will make relatively complete analyses for the effect of manipulated information dissemination (excess media coverage) on risk-adjusted momentum returns. Interactive momentum portfolio is generated from the intersections of independent classifications for the stocks by excess media coverage and stock returns. This kind of momentum portfolio is noted as *Inter (R, C)*.

Break-down momentum portfolio first classifies the stocks by returns and second classifies the stocks by excess media coverage, which is noted as *BD (R, C)*. We first classify the stocks by excess media coverage and second classify the stocks by returns to construct the conditional momentum portfolio. *Con (C, R)* represents this portfolio.

2.7 Data Descriptions

The monthly data is collected from China Infobank and China Stock Markets and Accounting Research (CSMAR). In details, the data period ranges from June 2005 to September 2016.

We find that the Chinese stock market has a significantly negative momentum return of −0.026 (p-value = 0.005) with 6-month formation and holding period, suggesting this market exhibits contrarian. The total mean of excess media coverage is insignificant of 0.004 (p-value = 0.917). The mean of residual is assumed to be zero in OLS regression, which indicates that excess media coverage is normal during our sample period.

3 Empirical Findings

The risk-adjusted momentum returns are regression intercepts of CAPM (1F), three-factor model (3F) and four-factor model (4F) [18, 19]. We want to observe whether momentum returns survive after risk adjustments [20]. We also show the factor coefficients of factor models. Owing to the length of this paper, we do not show the results of raw momentum returns but they are available if required.

3.1 Risk-Adjusted Momentum Returns

This section shows the risk-adjusted momentum returns by the regression intercepts of our factor models. We also offer p-values of the intercepts to confirm the significance of the risk-adjusted momentum returns.

Displayed in Table 1 are the risk-adjusted momentum returns (*MR*). The momentum portfolios are *Inter (R, C)*, *BD (R, C)*, and *Con (C, R)*. The levels of excess media coverage contain three levels: high excess media coverage (*HC*), medium excess media coverage (*MC*) and low excess media coverage (*LC*).

Table 1. Risk-adjusted momentum returns

	1F	*p*-value	3F	*p*-value	4F	*p*-value
Panel A: Risk-adjusted MR in Inter (R, C)						
HC	0.095	0.000	0.106	0.000	0.106	0.000
MC	0.113	0.000	0.109	0.001	0.110	0.001
LC	0.109	0.000	0.108	0.000	0.111	0.000
Panel B: Risk-adjusted MR in BD (R, C)						
HC	0.109	0.000	0.122	0.000	0.120	0.000
MC	0.102	0.000	0.102	0.000	0.105	0.000
LC	0.126	0.000	0.121	0.000	0.123	0.000
Panel C: Risk-adjusted MR in Con (C, R)						
HC	0.111	0.000	0.125	0.000	0.124	0.000
MC	0.118	0.000	0.112	0.000	0.113	0.000
LC	0.113	0.000	0.114	0.000	0.117	0.000

The raw momentum returns that we do not show here are all negative across all levels of excess media coverage. When we control for risks by factor models, all the risk-adjusted momentum returns are significantly positive. These results indicate that the contrarian of the Chinese stock market is not robust if we adjust risk. In other words, the contrarian of Chinese stock market may come from the manipulation of information dissemination, so it disappears after controlling for risk.

3.2 Factor Sensitiveness of Factor Models

We provide the factor coefficients of factor models to detect the factor sensitiveness in this section. The *p*-values are also reported to confirm the significance of factor sensitiveness.

Table 2. Factor sensitiveness of CAPM

	b	*p*-value
Panel A: Coefficients in Inter (R, C)		
HC	0.053	0.725
MC	0.946	0.000
LC	0.388	0.005
Panel B: Coefficients in BD (R, C)		
HC	0.183	0.202
MC	0.298	0.017

(*continued*)

Table 2. (*continued*)

	b	*p*-value
LC	0.866	0.000
Panel C: Coefficients in Con (C, R)		
HC	0.228	0.142
MC	0.840	0.000
LC	0.315	0.033

Displayed in Table 2 are the factor coefficients of CAPM. *b* represents the coefficient of *EMKT*. The momentum portfolios are *Inter (R, C)*, *BD (R, C)*, and *Con (C, R)*. The levels of excess media coverage contain three levels: high excess media coverage (*HC*), medium excess media coverage (*MC*) and low excess media coverage (*LC*).

An interesting outcome occurs in this table. Among *Inter (R, C)*, *BD (R, C)*, and *Con (C, R)*, the factor coefficients of *EMKT* are all insignificant (*p*-values = 0.725, 0.202 and 0.142, respectively) with high excess media coverage. This result implies that the stocks whose information is manipulated to disseminate widely are not affected by the market risk. By contrast, the stocks with medium excess media coverage or low excess media coverage are easily affected by the market risk. For instance, in *Inter (R, C)*, the coefficient is significantly positive of 0.946 (*p*-value = 0) with medium excess media coverage.

Table 3. Factor sensitiveness of three-factor model

	b	*p*-value	*s*	*p*-value	*h*	*p*-value
Panel A: Coefficients in Inter (R, C)						
HC	−0.062	0.677	−0.565	0.092	0.984	0.047
MC	0.959	0.000	0.261	0.619	0.082	0.916
LC	0.390	0.007	0.015	0.963	−0.008	0.987
Panel B: Coefficients in BD (R, C)						
HC	0.074	0.598	−0.792	0.014	0.689	0.141
MC	0.297	0.023	0.025	0.931	0.037	0.931
LC	0.932	0.000	0.209	0.671	−0.687	0.343
Panel C: Coefficients in Con (C, R)						
HC	0.124	0.419	−0.827	0.019	0.587	0.251
MC	0.891	0.000	0.337	0.503	−0.360	0.627
LC	0.317	0.039	−0.057	0.869	−0.083	0.870

Displayed in Table 3 are the factor coefficients of Three-Factor Model. *b* represents the coefficient of *EMKT*, *s* is the coefficient of *SMB* and *h* is the coefficient of *HML*. The momentum portfolios are *Inter (R, C)*, *BD (R, C)*, and *Con (C, R)*. The levels of excess media coverage contain three levels: high excess media coverage (*HC*), medium excess media coverage (*MC*) and low excess media coverage (*LC*).

The stocks with high excess media coverage are still not affected by market risk in the three-factor model (*p*-values of *b* are 0.677, 0.598 and 0.419, respectively). Consistently, the coefficients of *SMB* for this kind of stocks are all significantly negative (*p*-values = 0.092, 0.014 and 0.019, respectively) among *Inter (R, C)*, *BD (R, C)*, and *Con (C, R)*, which indicates that these stocks exhibit big size [21]. Intuitively, the big companies are more capable of manipulating information dissemination, so they have high excess media coverage. They do well in resisting market risk, and thus tend to not be affected by market risk. However, the coefficients of *HML* are not all significant among *Inter (R, C)*, *BD (R, C)*, and *Con (C, R)*, so the stocks are insensitive to *HML*.

Displayed in Table 4 are the factor coefficients of Four-Factor Model. *b* represents the coefficient of *EMKT*, *s* is the coefficient of *SMB*, *h* is the coefficient of *HML* and *w* is the coefficient of *WML*. The momentum portfolios are *Inter (R, C)*, *BD (R, C)*, and *Con (C, R)*. The levels of excess media coverage contain three levels: high excess media coverage (*HC*), medium excess media coverage (*MC*) and low excess media coverage (*LC*).

Table 4. Factor sensitiveness of four-factor model

	b	*p*-value	*s*	*p*-value	*h*	*p*-value	*w*	*p*-value
Panel A: Coefficients in Inter (R, C)								
HC	−0.06	0.676	−0.560	0.099	1.014	0.064	0.077	0.893
MC	0.960	0.000	0.251	0.637	0.017	0.984	−0.164	0.855
LC	0.394	0.007	−0.020	0.950	−0.215	0.678	−0.528	0.334
Panel B: Coefficients in BD (R, C)								
	b	*p*-value	*s*	*p*-value	*h*	*p*-value	*w*	*p*-value
HC	0.071	0.615	−0.763	0.018	0.860	0.095	0.437	0.418
MC	0.301	0.021	−0.018	0.950	−0.222	0.635	−0.658	0.183
LC	0.937	0.000	0.161	0.744	−0.969	0.225	−0.719	0.391
Panel C: Coefficients in Con (C, R)								
	b	*p*-value	*s*	*p*-value	*h*	*p*-value	*w*	*p*-value
HC	0.123	0.428	−0.810	0.022	0.686	0.224	0.253	0.669
MC	0.892	0.000	0.323	0.525	−0.442	0.589	−0.207	0.809
LC	0.323	0.035	−0.113	0.742	−0.418	0.449	−0.853	0.144

Among *Inter (R, C)*, *BD (R, C)*, and *Con (C, R)*, with high excess media coverage, the stocks are still not affected by market risk (*p*-values of *b* are 0.676, 0.615 and 0.428, respectively). The coefficients of *SMB* for high coverage stocks keep significantly negative (*p*-values = 0.099, 0.018 and 0.022, respectively). However, the coefficients of *HML* and *WML* are not all significant among *Inter (R, C)*, *BD (R, C)*, and *Con (C, R)*. Consequently, the stocks are insensitive to *HML* and *WML*. In addition, the momentum return of the Chinese stock market is not accounted for by the momentum factor, *WML*.

4 Conclusions

We analyze manipulated information dissemination and risk-adjusted momentum returns in China. By the use of excess media coverage as a proxy for manipulated information dissemination, the raw momentum returns of Chinese stock market are negative across all levels of excess media coverage. When we adjust risks by factor models, the momentum returns all turn into significantly positive. These results suggest that the manipulations of information dissemination contribute to stock price instabilities.

However, every coin has two sides. Manipulating information also plays a positive role to certain extent. In particular, the stocks with high excess media coverage exhibit big size and are not affected by market risk. Although the big companies are more capable of manipulating information dissemination, this tendency also helps them to resist market risk well.

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