Weekday seasonality of stock returns:
The contrary case of China

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Motivation and Introduction

- Why should a more profitable firms (such as, long leg of the Robust-minus-Weak factor of Fama and French (2015) five-factor model) be riskier and offer extra compensation for risk?

- Novy-Marx (2013) acknowledges that both a behavioral interpretation and a rational latent risk premium interpretation are possible. However, economic interpretation of Profitability premium is neither elaborated by him, nor by Fama and French.

- Similarly, why should the less-investing firms' stocks (such as, long leg of the Conservative-minus-Aggressive factor of Fama and French (2015)five-factor model) earn higher returns whereas larger investments represent additional risk, uncertainty in future profits and exposure to macroeconomic factors, which should be rewarded ?

Motivation and Introduction

- Given that the difference between a mispricing and a rational risk-based explanation is not straightforward to examine, Ülkü (2017) employs an indirect test that emerges from the anomalous calendar patterns in risk premia.

- Ülkü (2017) reports a strong positive Monday or early-in-the-week effect in Fama-French's RMW (Robust-minus-Weak) profitability factor premium : in the US, 94 % of RMW premium accrues on Mondays; and 135 % of it on Monday-Tuesdays, leaving the premium estimate for the rest of the week negative. He further finds that the UMO factor (Hirshleifer and Jiang, 2010), a purer proxy for mispricing, displays a similar 'early-in-the-week' pattern.

- Ali and Ülkü (2019) show that the positive early-in-the-week effect in the RMW factor is pervasive worldwide.

- Similarly, Birru (2018) finds that strategy portfolios, for which the speculative leg is short, earn the highest return on Mondays, accounting for over 100 % of anomaly returns.

Motivation and Introduction

- Ülkü (2017) explains positive early-in-the-week effect in returns of the factors that pick mispricing as institutional noise trading: Institutional investors trade on the wrong side during the formation period of value-type anomalies (Edelen, Ince, & Kadlec, 2016), and institutional trading intensity is known to be significantly less on Mondays or early in the week (Lakonishok & Maberly, 1990; Ülkü & Rogers, 2018).

- An important distinction of the Chinese stock market is that it is dominated by individual investors, unlike the US and other developed stock markets dominated by institutional investors.

- Hence, an out-of-sample evidence on weekday seasonality in China offers a natural experiment to gain insight into the drivers of this pattern observed worldwide.

Data and Sources

- Our sample period runs from the beginning of 2001 through the end of 2016. Thus, we exclude early stages of market development.
- Daily Fama-French five factor return series are obtained from the China Stock Market and Accounting Research (CSMAR) database, which follows the standards of CRSP and Compustat databases and covers only A-shares.
- We calculate value-weighted portfolios for which market capitalization weights are based on free float, excluding the nontradable shares (results are the same in both versions).
- As CSMAR does not report long and short legs of the factors, we reconstruct the factors and their legs.
- In constructing other factors (i.e., UMO, Individual-Minus-Institutional and Short-minus-Zeroshort), we similarly include all A-share stocks listed on the Shanghai and Shenzhen stock exchanges.
- Investor shareholding data come from both CSMAR and Wind Financial Terminal (WFT).

Methodology

- A day-of-the-week-dummy model is estimated via an AR(1)-EGARCH(1,1) specification.

$$R_t = \sum_{d=1}^{5} \alpha_d \, D_{d,t} + \rho R_{t-1} + u_t \tag{1}$$

$$u_t = zt\sqrt{h_t} \qquad \ln(ht) = c + u_{t-1} + \gamma|ut_{-1}| + \ln(ht_{-1}) \tag{2}$$

where Rt is daily returns of the factor portfolio; and Dd are five day-of-the-week dummies (d = 1 denotes Monday, 2 Tuesday, …, 5 Friday). Eq.(1) is estimated via maximum likelihood using t-distribution. Given that the standard Monday effect was observed on Tuesdays and then shifted towards Mondays in Asian markets and that the recent results on the RMW and UMO factors refer to an early-in-the-week (rather than pure Monday) effect, we focus on return differentials between Monday and Tuesday combined and the rest of the week. The early-in-the-week (Monday-Tuesday) effect is measured by δ.

$$R_t = +\delta D_t + \rho R_{t-1} + u_t \tag{3}$$

$$u_t = zt\sqrt{h_t} \qquad \ln(h_t) = c + \lambda u_{t-1} + \gamma|u_{t-1}| + \varphi \ln(h_{t-1}) \tag{4}$$

where Dt = D1,t + D2,t is the early-in-the-week dummy which takes the value of 1 on Monday or Tuesday

Key Findings

- Results indicate that the Chinese stock market (index) displays intriguingly the opposite sign of these three weekday patterns. Chinese market returns are significantly higher early in the week, representing a sharp contrast to the well-known negative Monday effect observed worldwide in the past as well as a dramatic shift from the earlier results on Asian markets.

- The Chinese SMB factor similarly exhibits a significant positive early-in-the-week effect, again the opposite of the negative effect observed in the US.

- The Chinese RMW factor exhibits a significant negative early-in-the-week effect, the opposite of the positive effect observed in the US and worldwide. In sum, market returns are higher; small and less-profitable (i.e., more speculative) stocks outperform early in the week in China.

- The UMO factor premium, which is significantly positive in the US, is negative in China. These findings point to institutional investor-induced effects being neutralized in an individual investor-dominated environment, consistent with the conjecture that the RMW and UMO premiums in the US might pick up mispricing due to institutional investors' anti-value trading.

Table Weekday seasonality in Chinese factors

	Mon	Tue	Wed	Thu	Fri	Wed-Fri	δ
Rm-Rf	0.115	0.149	0.063	-0.121	0.067	0.005	0.130
	(2.87)	(3.26)	(1.43)	(-2.80)	(1.54)	(0.19)	(3.30)
SMB	0.070	0.098	0.059	0.019	-0.014	0.003	0.072
	(4.25)	(5.40)	(3.09)	(1.05)	(-0.75)	(0.24)	(4.53)
HML	0.010	-0.013	-0.014	0.018	0.002	0.002	-0.004
	(0.77)	(-0.92)	(-1.04)	(1.30)	(0.15)	(0.21)	(-0.29)
RMW	-0.030	-0.058	-0.031	0.031	0.027	0.015	-0.055
	(-2.19)	(-3.71)	(-2.0)	(2.10)	(1.76)	(1.75)	(-4.20)
CMA	0.007	0.029	0.015	-0.011	-0.015	-0.007	0.024
	(0.61)	(2.51)	(1.28)	(-0.98)	(-1.26)	(-1.09)	(2.27)
UMO	-0.024	-0.004	-0.022	-0.035	-0.015	-0.021	0.009
	(-1.36)	(-0.21)	(-1.18)	(-1.90)	(-0.83)	(-1.96)	(0.53)

Notes: The day-specific coefficients are estimated from Eq.(1) and reported in percentage points. The last two columns are estimated from Eq.(2). Here, δ represents Monday-Tuesday's difference from the rest of the week. The sample period is 2001-2016. t-statistics are in parentheses. (*) under the δ column denotes early-in-the-week effect statistically significant at the 1% level.

Potential Explanations

- Lower Mood at the beginning of the week?

- Birru (2018) and Abu Bakar, Siganos, and Vagenas-Nanos (2014) explain the conventional negative Monday effect by lower mood at the beginning of the workweek.
- The higher market returns and the outperformance of small and speculative stocks early in the week sharply contradict the mood explanation, which makes the results on China even more interesting.

- Do results hold in sub-samples?
- Our results using sub-sample analyses rule out spurious results driven by a specific subperiod.

Table Robustness Checks

Panel A. Stability across subperiods								
	Rm-Rf			SMB			RMW	
	Wed-Fri	δ		Wed-Fri	δ		Wed-Fri	δ
2001/01–2006/04	-0.082	0.12		-0.029	0.06		0.058	-0.08
	(-2.05)	(1.89)		(-2.23)	(3.12)		(4.35)	(-3.99)
2006/05–2011/08	0.144	0.151		0.071	0.055		-0.025	0.004
	(2.48)	(1.67)		(2.73)	(1.45)		(-1.45)	(0.13)
2011/09–2016/12	0.007	0.146		0.056	0.128		-0.007	-0.081
	(0.19)	(2.48)		(2.53)	(3.85)		(-0.05)	(-3.48)
Panel B. Non-overlapping components of factors								
					Wed-Fri		δ	
Rm-Rf residual					-0.015		0.05	
					(-0.057)		(1.23)	
SMB residual					0.038		0.019	
					(4.66)		(1.51)	
RMW residual					0.024		-0.013	
					(3.94)		(-1.36)	

Note: Results are from Eq. (2). δ represents the difference between Monday-Tuesday and the rest of the week. t-statistics are in parentheses. Note: Results are from Eq. (2) for the full sample, run using residuals from a no-intercept regression of each factor on the remaining four factors. For example, SMB residual is et in $SMB_t = (Rm\text{-}Rf)_t + HML_t + RMW_t + CMA_t + e_t$.

Potential Explanations

- Do such (opposite) patterns in anomalies are closely linked?
- We find that the common part largely accounts for the pattern in all three factors, suggesting that a common driver might be responsible for all of them.
- Thus, we search for this common driver and test: what structural characteristics of the Chinese stock market might give rise to opposite weekday patterns?
- The Chinese stock market has at least two main characteristics that contrast with the US stock market: individual investor domination and government interference.

- Government Interference or short sales restrictions?
- In several steps--including bubble-formation and bubble-burst periods and Short and Zero-short portfolios--we reach evidence that rules out government interference and short sale restrictions.

Individual investors are expected to undertake sentiment-induced buying during bubble formation periods and reverse their behavior during bursts.

On the other hand, government interventions in the Chinese stock market intensified during the 2015-16 burst, to save the stock market and economic sentiment from a crash.

Table Weekday pattern in factors during the formation versus burst period

	Formation			Burst	
	Wed-Fri	δ		Wed-Fri	δ
Rm-Rf	0.548	0.401		-0.070	-0.170
	(3.69)	(1.84)		(-0.38)	(-0.47)
SMB	0.211	0.024		0.373	-0.135
	(1.48)	(0.12)		(2.86)	(-0.66)
RMW	-0.096	-0.104		0.042	0.163
	(-1.35)	(-1.03)		(0.53)	(1.31)

Notes: The bubble formation and burst periods are defined as 23.October.2014–12.June.2015 and 13.June.2015–5.February.2016, respectively. Estimates are obtained using Eq.(2). δ represents Monday-Tuesday's difference from the rest of the week. t-statistics are in parentheses.

Table Early-in-the-week effect in shorted stocks

	Wed-Fri	δ
Short	0.019	0.215
	(0.40)	(3.05)
Zer-Short	0.120	0.228
	(2.48)	(3.11)
Shoert-minus-zero-short	-0.090	-0.013
	(5.42)	(-0.53)
Notes: Note: Results are from Eq. (2). Each quarter, stocks are allocated to one of the three portfolios based on the average ratio of the number of shorted stocks to the number of all outstanding tradable shares: Shorts (if the ratio is above 0.00001), Neutral (if the ratio is below 0.00001), and Zero-Short (if the ratio equals 0). δ represents the difference between Monday-Tuesday and the rest of the week. t-statistics are in parentheses.		

Potential Explanations

- Do individual Investors drive this effect?

- Given that Chinese stock market is dominated by individuals, most stocks in the Chinese stock market should experience a positive early-in-the-week effect, where small and more-speculative (less-profitable) stocks, i.e., the Small and Weak legs, known to be individual investor habitat, should experience 'stronger' positive early-in-the-week effects.

- If, alternatively, a decrease in institutional buying activity at the beginning of the week is the driver of the pattern, we should observe negative Monday-Tuesday effects in the Big and Robust legs.

- Evidence from the legs of the SMB and RMW factors supports the former conjecture: The Small (Weak) leg of the SMB (RMW) factor experiences a positive Monday-Tuesday effect, which is stronger than the Big (Robust) leg.

Robustness of our Conjecture

- We corroborate this line of reasoning by showing that institutional investor ownership decreases (or equivalently, individual investor domination increases) monotonically as we move from the big size-quartile to small, and from the robust profitability-quartile to weak. Thus, the pattern is driven by the stronger positive early-in-the-week returns of those legs where individual investors prevail.

- Finally, and most importantly, utilizing a dataset of institutional shareholding in each and every stock, we rank stocks by the percentage of institutional ownership and construct an Individual-minus-Institutional factor portfolio. If the common pattern in three factors is related to individual investors' trading, this portfolio should exhibit a strong positive early-in-the-week effect.

- Results support our prediction: the Individual-minus-Institutional portfolio exhibits a significant positive early-in-the-week effect, stronger in magnitude compared with the Market, SMB, and RMW factors. In other words, early-in-the-week returns are highest in those stocks where individual investors dominate the most and diminish as institutional ownership increases.

Table Weekday seasonality in the legs of Factors and an investor-habitat factor

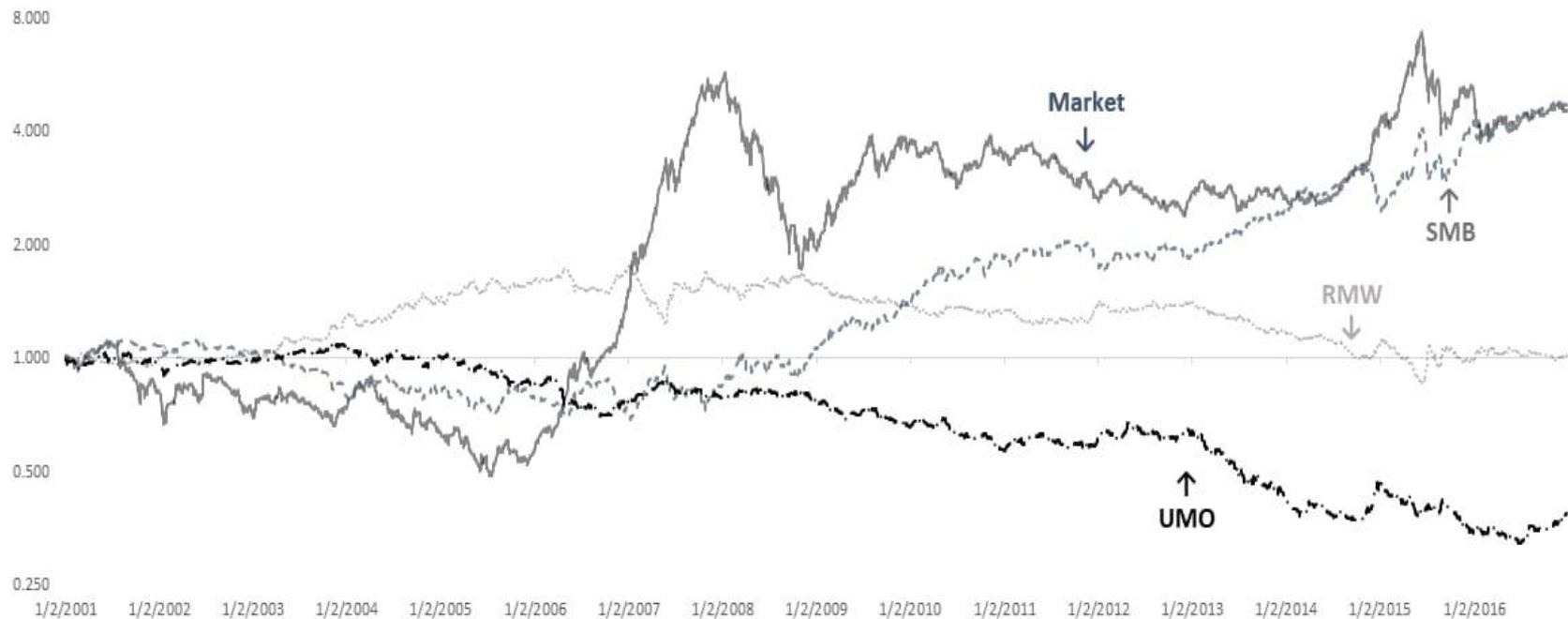| Panel A. Legs of the SMB and RMW factors				
Portfolio	Wed-Fri		δ	Institutional investors' share
Small	0.034		0.274	6.68%
	(0.96)		(4.95)	
Big	0.012		0.186	9.43%
	(0.39)		(3.96)	
Robust	0.039		0.071	9.89%
	(1.45)		(1.75)	
Weak	0.059		0.213	6.83%
	(1.99)		(4.67)	
Panel B. Individual- versus institutional portfolios				
	Wed-Fri		δ	Institutional investors' share
Individual	-0.015		0.05	1.70%
	(-0.57)		(1.23)	
Institutional	0.038		0.019	14.46%
	(4.66)		(1.51)	
Ind-Minus-Inst	0.024		-0.013	
	(3.94)		(-1.36)	
Panel C. SSE-50 and SSE-Composite indexes				
Portfolio	Wed-Fri		δ	Institutional investors' share
SSE-Composite	-0.015		0.108	63.75%
	(-0.60)		(2.86)	
SSE-50	0.013		0.016	29.72%
	(0.44)		(0.36)	
Notes: Results are from Eq.(2). δ represents the difference between Monday-Tuesday and the rest of the week. t-statistics are in parentheses.				

Figure 1 Evolution of Cumulative Returns by Factor

Notes. Figure 1 shows the historical evolution of the value of Renminbi 1 invested at the beginning of our sample period in Market, SMB, RMW, and UMO factors, respectively.

Table Day-specific means and standard deviations of market returns

	Monday		Tuesday		Wednesday		Thursday		Friday	
	Mean	St.Dev.	Mean	St.Dev.	Mean	St.Dev.	Mean	St.Dev.	Mean	St.Dev.
China	0.115%	0.021	0.149%	0.017	0.063%	0.017	-0.121%	0.017	0.067%	0.016
US	0.020%	0.013	0.036%	0.012	0.061%	0.012	0.049%	0.013	0.025%	0.011
World ex-US	0.009%	0.012	0.040%	0.010	0.044%	0.010	0.073%	0.011	0.036%	0.010

Conclusion

- In contrast to the well-known pattern of negative/low Monday returns, Chinese stocks earn positive/higher returns early in the week, which are more pronounced in small-cap and less-profitable (speculative) stocks. This results in opposite-signed early-in-the-week effects in the Market, SMB, and RMW factors relative to the US and other developed markets. This difference is consistent with the lack of institutional investor domination. For the significance in the opposite direction, existing literature does not offer an explanation. Our further analysis suggests that the pattern in three factors is consistent with a scenario where the net demand of individual investors shifts towards buying early in the week and particularly so for smaller and more speculative stocks.

- The sharp contrast in the weekday seasonality of Chinese factors with developed markets offers a unique opportunity to rethink the explanations for weekday seasonality proposed so far. The fact that the well-known Monday effect can change sign, apparently depending on dominant investor type, highlights a potential role of investor types in inducing weekday patterns in stock returns.

Conclusion

- It also poses a refuter for the trending hypothesis that attributes the conventional negative Monday effect to lower mood on Mondays, as the positive Monday effect, most pronounced in the habitat of individual investors who are considered to be most susceptible to mood effects, requires Chinese individuals to have exceptionally higher mood at the beginning of the week. We are not aware of such an exceptional mood pattern in China.

- The fact that the factor premiums vary together with the weekday seasonality in factor returns has an important bearing on asset pricing: it implies that some factor premiums might capture behavioral effects rather than purely representing rational risk factors.

- An additional implication of our findings involves earlier attempts to conjecture a link between the negative Monday effect and the relatively higher return volatility on Mondays.

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