Frog in the Pan Momentum

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Abstract

In their paper "Frog in the Pan: Continuous Information and Momentum," Zhi Da, Umit G. Gurun, and Mitch Warachka explore the relationship between continuous information flow and portfolio performance, unveiling that portfolios enriched with ongoing data exhibit enduring returns. Anchored in limited attention theory, the FIP hypothesis posits that investors, constrained by cognitive limitations, tend to overlook gradual information changes in favor of dramatic events. This selective awareness distorts market efficiency, as investors prioritize attention-grabbing signals over nuanced, continuous shifts in asset prices. Through empirical analysis, the authors substantiate this hypothesis, illuminating the impact of continuous information on market dynamics and investment outcomes, offering valuable insights into the complexities of decision-making and market efficiency in financial markets.

Information Discreteness

Information discreteness is the main variable of this paper and is a proxy for the rate at which information is incorporated into asset prices. Zhi, Gurun, and Warachka calculate simple ID by taking the sign of the past twelve month return and multiplying by the difference in the percent of down days to percent of up days.

$$\text{ID} = \text{sgn}(PRET) \times [\%neg - \%pos]$$

Throughout the course of this study, various iterations of this metric were explored, encompassing factors such as the inclusion of zero return days and the consideration of magnitude. However, for the sake of clarity and ease of interpretation, we focus solely on the replication of results using the simple ID metric in this paper.

Table 1: 1927

				Unadjusted		three-factor	
ID	Winner	Loser	ID AVG	Return	t-stat	Alpha	t-stat
Panel A: Sequential double-sorts involving PRET and ID							
Discrete	7.53	9.60	0.03	−2.07	−2.01	−2.01	0.03
2	9.48	8.84	−0.01	0.64	0.58	3.53	4.13
3	10.01	6.89	−0.03	3.12	3.11	5.05	6.52
4	9.98	5.62	−0.06	4.36	4.14	6.71	7.89
Continuous	9.56	3.62	−0.10	5.94	4.63	8.77	8.76
Continuous - Discrete			0.13	8.01	8.54	10.78	10.55
Panel B: Independent double-sorts involving PRET and ID							
Discrete	7.12	7.75	0.03	−0.63	−0.52	−0.19	−0.02
2	9.46	9.88	−0.01	−0.42	−0.40	1.64	2.04
3	9.87	8.86	−0.02	1.01	0.87	3.19	4.00
4	9.85	6.64	−0.05	3.21	2.82	5.76	7.19
Continuous	9.77	4.05	−0.12	5.72	4.82	8.31	9.25
Continuous - Discrete			−0.15	6.35	4.48	8.50	6.86

Table 2: 1980

				Unadjusted		three-factor	
ID	Winner	Loser	ID AVG	Return	t-stat	Alpha	t-stat
Panel A: Sequential double-sorts involving PRET and ID							
Discrete	7.60	5.24	0.03	2.36	1.53	4.85	4.54
2	9.53	4.82	−0.01	4.71	3.57	7.08	7.15
3	10.86	4.33	−0.03	6.53	4.94	9.20	8.02
4	10.57	3.55	−0.06	7.02	5.38	9.40	7.75
Continuous	10.54	1.44	−0.10	9.10	6.35	11.75	8.55
Continuous - Discrete			-0.13	6.74	5.41	6.90	5.85
Panel B: Independent double-sorts involving PRET and ID							
Discrete	6.89	6.22	0.04	0.67	0.41	3.35	3.18
2	9.34	5.09	−0.01	4.25	3.05	6.59	5.17
3	9.87	4.52	−0.03	5.35	4.19	7.74	7.62
4	10.50	4.15	−0.06	6.35	5.00	8.98	8.90
Continuous	10.54	2.31	−0.11	8.23	5.93	10.89	8.14
Continuous - Discrete			-0.15	7.56	5.32	7.54	5.98

Understanding FIP Tables

As seen in the tables 1 an 2, unadjusted returns increase monotonically as information discreteness decreases. For the period 1927 to 2007 returns increased from -0.63% to 5.72%. These results were even stronger during the period 1980 to 2007 with returns from 0.67% to 8.23%. In all of these results, the t-stat was statistically significant 90% of the time. The only times that returns were not statistically significant were in portfolios of high to moderate discreteness. Additionally, two different sorting methods were used to prove the robustness of these results.

Table 1: Replication 1927-2007

			Unadjusted		Three-Factor	
ID	Winner	Loser	Return	T-Stat	Alpha	T-Stat
Panel A: Sequential double-sorts involving PRET and ID						
Discrete	−0.85	1.10	−1.95	−8.19	−2.00	−8.75
2	0.21	0.55	−0.34	−2.62	−0.50	−3.91
3	0.85	0.74	0.11	0.78	0.00	−0.08
4	1.43	0.86	0.57	3.32	0.40	2.69
Continuous	2.15	0.78	1.37	6.12	1.30	5.95
Continuous - Discrete			3.32	11.45	2.90	10.64
Panel B: Independent double-sorts involving PRET and ID						
Discrete	0.61	1.93	−1.32	−11.21	−1.60	−14.51
2	1.31	1.40	−0.09	−0.81	−0.20	−2.19
3	1.84	1.11	0.72	6.46	0.60	5.96
4	2.22	1.13	1.09	9.54	1.00	9.83
Continuous	2.47	1.31	1.16	8.49	1.20	9.86
Continuous - Discrete			2.47	15.48	2.40	18.45

Replication Table 1 Explanation

Our replication of the paper from 1927 to 2007 proves consistent with returns ranging from -1.32% to 1.16%. While the paper displays 6 month returns, our replication displays 1 month returns. This explains the difference in magnitude between the original results and our paper. Regardless, the pattern of monotonicity is the same for both tables.

Table 2: Replication 1980-2007

			Unadjusted		Three-Factor	
ID	Winner	Loser	Return	T-Stat	Alpha	T-Stat
Panel A: Sequential double-sorts involving PRET and ID						
Discrete	0.43	1.98	−1.55	3.59	−3.00	−6.52
2	0.38	1.31	−0.93	1.87	−1.20	−6.07
3	0.79	1.03	−0.24	−1.37	−0.30	−1.30
4	1.21	0.80	0.41	−5.71	0.60	1.89
Continuous	1.63	0.51	1.12	−6.59	1.00	2.82
Continuous - Discrete			2.67	7.40	3.50	5.86
Panel B: Independent double-sorts involving PRET and ID						
Discrete	0.35	2.18	−1.83	−9.65	−2.30	−18.65
2	1.45	1.70	−0.26	−1.70	−0.70	−4.65
3	2.19	1.30	0.89	5.38	0.50	2.96
4	2.69	1.38	1.30	7.29	1.00	5.36
Continuous	2.57	1.53	1.04	5.57	0.70	3.95
Continuous - Discrete			2.87	10.38	2.60	12.58

Replication Table 2 Explanation

Mirroring the results of the paper, our replication for the time period 1980 to 2007 reflects the same increase in performance in the second table. In this sample returns range from -1.83% to 2.87% with an incredibly significant t-stat.

Table 3: 2007-Present

			Unadjusted		Three-Factor	
ID	Winner	Loser	Return	T-Stat	Alpha	T-Stat
Panel A: Sequential double-sorts involving PRET and ID						
Discrete	0.43	1.98	−1.55	−6.59	−1.70	−7.74
2	0.38	1.31	−0.93	−5.71	−1.00	−6.09
3	0.79	1.03	−0.24	−1.37	−0.30	−1.53
4	1.21	0.80	0.41	1.87	0.40	1.77
Continuous	1.64	0.51	1.13	3.59	1.10	3.70
Continuous - Discrete			2.68	7.40	2.80	8.44
Panel B: Independent double-sorts involving PRET and ID						
Discrete	0.32	2.12	−1.80	−9.77	−1.90	−11.25
2	0.73	1.46	−0.73	−4.68	−0.80	−5.03
3	1.02	1.05	−0.02	−0.14	0.00	−0.11
4	1.45	0.97	0.48	2.24	0.50	2.46
Continuous	1.55	0.60	0.94	3.13	1.00	3.56
Continuous - Discrete			2.74	8.44	2.90	10.24

Replication Table 3 Explanation

In order to further prove the robustness of the FIP hypothesis we performed an out of sample test from the period 2007 to present. The returns for this sample ranged from -1.80% to 0.94%. While they are lower than the previous samples results, the alpha of the spread portfolio for this sample was 2.9% as compared to 2.6% in the previous sample, showing that this sample has the same or better results as the original samples.

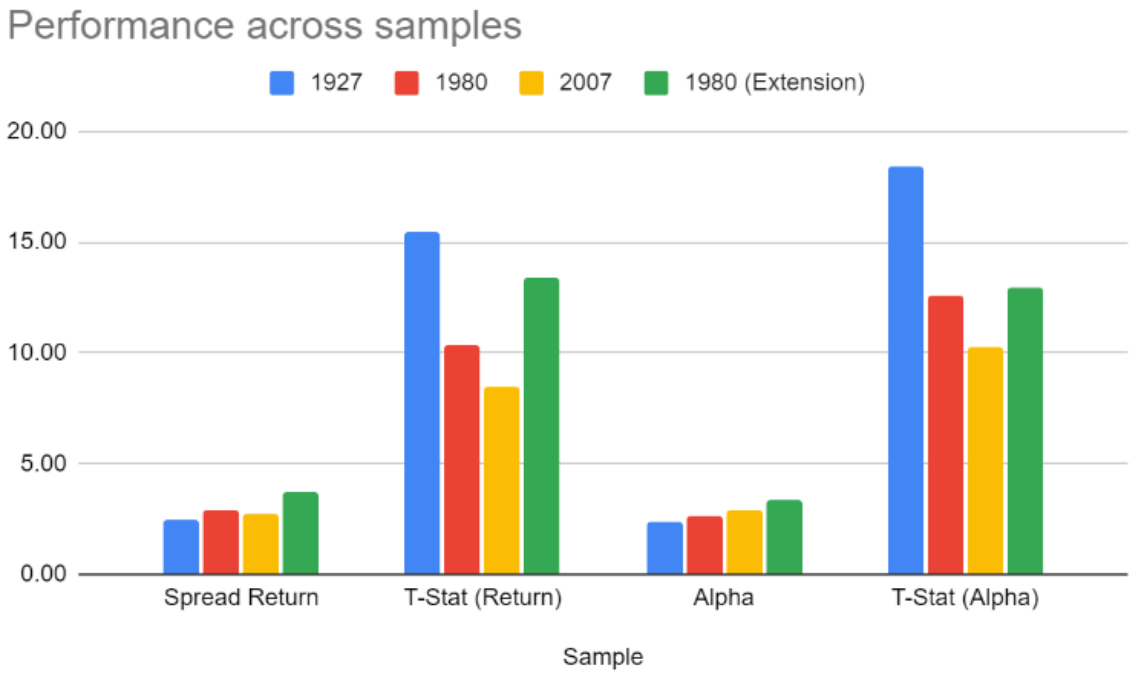
Extension

Momentum portfolios tend to take on excess risk since assets that have strong returns are often assets with high volatility. In order to understand if the returns generated by our ID portfolios are just taking on more risk, we adjust momentum for the same period of volatility.

Table 4: Replication 1980-2007 (Extension)

			Unadjusted		Three-Factor	
ID	Winner	Loser	Return	T-Stat	Alpha	T-Stat
Panel A: Independent double-sorts involving PRET and ID						
Discrete	0.52	2.49	−1.97	−12.69	−2.40	−18.37
2	1.52	1.50	0.02	0.20	−0.40	−3.79
3	1.87	1.30	0.57	4.61	0.20	1.30
4	2.27	1.33	0.94	6.58	0.60	4.02
Continuous	3.23	1.44	1.79	6.73	1.50	5.60
Continuous - Discrete			3.76	13.36	3.40	12.99

As we expected, adjusting the momentum variables for rolling standard deviations leads to improved results on all metrics. This sample has a spread portfolio return of 3.76% with an alpha of 3.4% beating all previous samples.



Conclusion

In conclusion, we agree with Zhi, Gurun, and Warachka in proving that portfolios with continuous information exhibit strong persistent returns. We believe that these results prove that the frog in the pan hypothesis is valid, since portfolios achieve increasing returns as information continuity increases across all samples. Additionally, the significant t-stats of each sample's spread portfolio are further evidence of the validity of our results. Investors have often asked what momentum really is (mispricing, risk, etc. . .). We believe that momentum is produced when investors underreact to new information leading to a delay in the improvement of stock prices.