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Once an Outlier, Still an Outlier?

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Abstract

Japan's financial market is very interesting. It is widely documented that, while cross-sectional momentum exists in many countries, it does not exist in Japan. Recently, time series momentum has been dubbed, yet there is little research on its performance in Japan. I conduct the first examination of the phenomenon in Japan for a period that had not been studied before: 1920 to 1984. The results show that time series momentum is significantly profitable and demonstrates an interesting pattern: January profits are positive and larger than non-January ones.

JEL classification: G11, G12, G14

Keywords: Time Series Momentum, Japan, January.

1. Introduction

Momentum has been one of the most puzzling and long-lasting anomalies in the finance literature. Jegadeesh and Titman (1993) observed that, over the intermediate horizon of 3 to 12 months, recent winners continue to outperform recent losers in the next 3 to 12 months. Fama and French (1996) conclude that, although their three-factor model could explain many anomalies, momentum remains a puzzle. Since such work, numerous researchers examine the phenomenon from various angles: its prevalence, sources of profitability, etc. (e.g., Rouwenhorst (1998, 1999), Jegadeesh and Titman (2001), Griffin, Ji, and Martin (2003), Hou, Xue, and Zhang (2015), Ji, Martin, and Yao (2017)). Interestingly, momentum is found to be significant in many markets and Japan is an outlier. Researchers also examine variations of momentum. For instance, instead of the common way of ranking by total returns, Blitz, David, Joop

Huij, and Martin Martens, (2011) rank stocks based on residual returns, resulting in profits twice as large as the traditional method.

In a related and different dimension, Moskowitz, Ooi, and Pedersen (2012) discover that, across major asset classes such as equity, currency, commodity, and bond, a security's own past returns can predict its future performance. To distinguish it from the cross section momentum described earlier, the authors dub this phenomenon "time series momentum."I investigate this strategy in Japan for a period that had not been examined before, from 1920 to 1984. The results show that time series momentum earns significant profits in Japan over various formation periods and the profits are higher in January than in non-January months.

This study contributes to the literature as follows. It demonstrates the prevalence of time series momentum in both temporal and geographic dimensions, thus excludes data mining as one possible explanation for its profitability. Also discovered is its seasonality. Further, together with the well documented finding that there is no cross section momentum in Japan, the results of this paper provide evidence on the relation between cross section and time series momentum - they are indeed independent of each other and are driven by different forces.

The paper is organized in the following manner. I describe data and portfolio construction in Section 2, present empirical findings in Section 3, and summarize in Section 4.

2. Data and Portfolio Construction

Data is from the Global Financial Data Inc. I measure returns using close-to-close monthly price. If the same closing value remains the same for a minimum of four months, only the earliest value is retained and subsequent ones are coded missing. Such cleaned return indexes are used to calculate returns. Further, if any return is higher than ten, it is considered a data error and coded missing.

Data spans from 1920 to 1984. As Moskowitz, Ooi, and Pedersen (2012) report results on time series momentum from 1985 onward for Japan, my data allows for out of sample and independent examination of time series momentum to see if the results are sample specific or robust.

The benefit of the data is evident: common databases for international studies start much later, e.g., Datastream International starts in the 1970s, so does PACAP. In addition, the Global Financial Data Inc. constructs data systematically and the consistency is indispensable in examining an important strategy over a long period of time.

Table 1 contains summary statistics of the data. Data begins in December of 1920 for Japan. Reported are start month in the first column, average monthly returns in percentage in the second column, and volatility measured in standard deviation in the third column. Over the sample period, average monthly returns and volatility are 1.41% and 6.49%, respectively.

Table 1
Summary Statistics

Data comes from the Global Financial Data Inc. Returns are from close to close month-end values of market index from December, 1920 to December, 1984. To clean up possible data errors, if the same closing value appears repeatedly for a minimum of four months, only the earliest value is retained and repeated ones are coded missing. Such generated return indexes are used to calculate returns; if any return is higher than 10, it is considered a data error and coded missing. Reported below are data start month, average monthly returns in percentage, and volatility measured in standard deviation.

Start	Return	Volatility
192012	1.41	6.49

I construct time series momentum strategies as follows. At the beginning of the one month holding period of January 1930 for Japan, I measure its market's performance over the past six months, June 1929 to November 1929, by compounding market returns during that period. The one-month gap between the end of the ranking period and the start of the holding period is to avoid microstructure influences, as argued in the momentum literature. If the compound return is positive, take a long position on the market in January 1930. Otherwise, sell short. Such positions are held for one month, January 1930, and are liquidated at the end of the month. Momentum profit is measured as the return from January 1930. This process is done for every month available in the sample period. In addition, different ranking periods of three, nine, and twelve months are also examined to be thorough and for comparison purpose.

3. Empirical Results

3.1. Profitability of time series momentum

Table 2 contains the results from implementing the time series momentum strategy. It can be seen that, across various formation periods of three to twelve

months, the strategy earns unanimously positive returns. For the typical six-month ranking, time series momentum profit is 0.48% per month with a significant *t*-statistic of 2.01 for Japan. Both are economically and statistically significant.

Table 2

Profitability of Time Series Momentum

Time series momentum strategy is implemented for the six-month ranking period as follows. At the beginning of each month *t*, compound market returns over the previous six months: *t*-7, …, t-2. If the compounded return is positive, buy the market index; otherwise, sell. The position is held for one month, *t,* and liquidated at the end of the month. Time series momentum profit is measured as the return in month *t*. Similar strategies are formed for three-, nine-, and twelve-month ranking periods. The table below shows average monthly returns in percentage and associate *t*-statistics in parenthesis.

Ranking Months	Begin	TSMOM	t(TSMOM)
Three	192105	0.49	(2.04)
Six	192108	0.48	(2.01)
Nine	192111	0.75	(3.12)
Twelve	192202	0.90	(3.75)

A closer look shows that time series momentum profits demonstrate a u-shape pattern with the number of ranking months. For instance, for Japan, the profits decrease slightly from 0.49%, to 0.48% for three- and six-month ranking, then increase monotonically from 0.48%to 0.75%, and further to 0.90% for six-, nine-, and twelve-month ranking, respectively. All are economically and statistically significant. The existence of time series momentum profitability in the sample period adds to previous research and proves that time series momentum is not specific to the particular sample of Moskowitz, Ooi, and Pedersen (2012).

The fact that time series momentum exists in Japan is highly interesting. Because the literature of cross section momentum documents the lack of momentum in Japan, e.g., Chan, Hammed, and Tong (2000), the existence of time series momentum in the same country suggests that time series and cross section momentum seem to be distinct from each other and are driving by different forces.

3.2. Seasonality of time series momentum

Table 3 shows the results for momentum seasonality. The third and fourth columns show the returns and associated *t*-statistics of momentum profits in January.

Across all ranking periods, January returns are unanimously positive, ranging from 0.53% to 1.64%. They are larger than the overall returns presented earlier, though not statistically significant. Such interesting findings are in notable contrast with those from cross section momentum where negative momentum returns in January are widely documented (see Jegadeesh and Titman (1993, 2001), Griffin, Ji, and Martin (2003), etc.). The differences could be due to the fundamental reasons for the January anomaly investigated by various researchers, such as Starks, Yong, and Zheng (2006), Tinic and West (1984), etc. and is left for future research.

Table 3

Seasonality of Time Series Momentum

Time series momentum strategy is implemented for the six-month ranking period. At the beginning of each month *t*, compound market returns over the previous six months: *t*-7, …, t-2. If the compounded return is positive, buy the market index; otherwise, sell. The position is held for one month, *t,* and liquidated at the end of the month. Time series momentum profit is measured as the return in month *t*. Similar strategies are formed for three-, nine-, and twelve-month ranking periods. The table below shows average monthly returns in January; year-round returns are included for comparison.

Ranking Months	Begin	January		Overall	
		TSMOM	t	TSMOM	t
Three	192105	0.53	(0.35)	0.49	(2.04)
Six	192108	1.36	(0.91)	0.48	(2.01)
Nine	192111	0.77	(0.51)	0.75	(3.12)
Twelve	192202	1.64	(1.09)	0.90	(3.75)

4. Conclusion

I investigate time series momentum using a dataset that is systematically constructed and had not been examined in time series momentum. The results show that time series momentum exists in Japan from 1920 to 1984. In direct contrast with the negative January profits for cross section momentum, profits are positive in January for time series momentum. In addition, such profits are even higher than the average from February to December. These results contribute to the existing literature on time series momentum with out-of-sample evidence for its profitability, its seasonal variations in January and non-January months. The findings also suggest that time

series and cross section momentum are independent of each other and are driven by different sources.

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