# Are investors moonstruck? Lunar phases and stock returns

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## Abstract

This paper investigates the relation between lunar phases and stock market returns of 48 countries. The findings indicate that stock returns are lower on the days around a full moon than on the days around a new moon. The magnitude of the return difference is 3% to 5% per annum based on analyses of two global portfolios: one equal-weighted and the other value-weighted. The return difference is not due to changes in stock market volatility or trading volumes. The data show that the lunar effect is not explained away by announcements of macroeconomic indicators, nor is it driven by major global shocks. Moreover, the lunar effect is independent of other calendar-related anomalies such as the January effect, the day-of-week effect, the calendar month effect, and the holiday effect (including lunar holidays).
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"It is the very error of the moon, She comes more near the earth than she was wont. And makes men mad." (Othello, Act V, Scene ii)

## 1. Introduction

The belief that phases of the moon affect mood and behavior dates back to ancient times. The lunar effect on the human body and mind is suggested anecdotally as well as empirically

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in the psychological and biological literature. Do lunar phases also affect the securities markets?

If investors make decisions strictly through rational maximization, then the answer is no. However, research evidence suggests that investors are subject to various psychological and behavioral biases when making investment decisions, such as loss-aversion, overconfidence, and mood fluctuation (e.g., Harlow and Brown, 1990; Odean, 1998, 1999). On a general level, numerous psychological studies suggest that mood can affect human judgment and behavior (e.g., Schwarz and Bless, 1991; Frijda, 1998). The behavioral finance literature documents evidence on the effects of mood on asset prices (e.g., Avery and Chevalier, 1999; Kamstra et al., 2000, 2003; Hirshleifer and Shumway, 2003; Coval and Shumway, 2005). If lunar phases affect mood, by extension, these phases may affect investor behavior and thus asset prices. If so, asset returns during full moon phases may be different from those during new moon phases. More specifically, since psychological studies associate full moon phases with depressed mood, this study hypothesizes that stocks are valued less and thus returns are lower during full moon periods.

This study is motivated by a psychological hypothesis. In modern societies the lunar cycle has little tangible impact on people's economic and social activities. Consequently, it would be difficult to find rational explanations for any correlation between lunar phases and stock returns. The causality would be obvious if there is such an effect. Therefore, investigating the lunar effect on stock returns is a strong test of whether investor behavior affects asset prices. Nevertheless, it is also important to recognize the possibility that the relation between lunar phases and stock returns could be spurious. As many researchers study the patterns of historical stock returns, some will find significant results simply due to chance.[1]

To investigate the relation between lunar phases and stock returns, we first examine the association of lunar phases with the returns of an equal-weighted and a value-weighted global portfolio of 48 country stock indices. The findings indicate that global stock returns are significantly lower during full moon periods than new moon periods. For the equal-weighted global portfolio, the cumulative return difference between the new moon periods and the full moon periods is 40.26 bps per lunar cycle for the 15-day window specification and 27.48 bps per lunar cycle for the 7-day window specification; both are significant at the 5% level. For the value-weighted global portfolio, the corresponding return difference is 30.44 bps for the 15-day window specification and 25.87 bps for the 7-day window specification, which are significant at the 10% and the 5% levels respectively. These numbers translate into annual return differences of 3% to 5%. The differences in the average daily logarithmic returns between the new and the full moon periods are consistent with the above findings.

A sinusoidal model is also estimated to test for the cyclical pattern of the lunar effect. According to this model, the lunar effect reaches its peak at the time of full moon and declines to a trough at the time of new moon, following a cosine curve with a period of 29.53 days (the mean length of a lunar cycle). The results indicate a significant cyclical lunar pattern in stock returns.

To fully utilize the panel data, a pooled regression was estimated with panel-corrected standard errors (PCSE) for all 48 countries and for the following subgroups of countries: the G-7

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[1] For example, Sullivan et al. (1999) argue that data snooping biases occur when a given set of data is used more than once for the purpose of model selection or inference. When such data reuse happens, there is always a possibility that results are due to chance rather than any merits inherit in the method. They quantify the data-snooping bias and adjust for its effect in the context of technical trading rules.