

Dear Robin,

Thank you for your recent "The curious case of rising stocks in the night-time" column, which I enjoyed reading.

I thought your two-paragraph summary of the explanation I have advanced [1,2,3], given the constraints of such a column, was well done.

I have a few rejoinders -- the first worth a correction, and the rest of which I will categorize as "responses to evidence against the explanation in [1,2,3]" and "responses to attempted alternative explanations."

Correction worthy

Your first graph (which is not well labeled, but which I presume shows overnight and intraday returns to the S&P 500 SPDR ETF) throws dividends into the trash. (See Section III A of [5].) Ways of handling this (ordered from most intellectually honest to least) include (i) remake the plot keeping dividends, the way most people keep dividends (which will produce the top left plot in Figure 2 of [6], which I attach), (ii) explicitly note that you are throwing dividends into the trash and explicitly note what the cumulative overnight return would be if you kept them, (iii) casually mention that you are "ignoring dividends," and (iv) not mention that you are throwing dividends into the trash. The article in *The New York Times* you reference in your column choses (iv), but I am sure that is an inadvertent oversight and you will quickly correct it with (i).

Responses to evidence against the explanation in [1,2,3]

"The costs of trading and insuring against any disastrous tumbles while the portfolio is bloated would almost certainly gobble up any gains from such a strategy." Appropriately hedged (as noted in each of [2,3,4,6]), there is no additional insurance cost. Matt Levine nicely summarized the issue of trading costs in <u>his column you reference</u>: "The point is for your portfolio to be a large enough multiple of your trades, so you make more in mark-to-market gains than you lose in trading costs." (The <u>alphaarchitect article you link to</u> does not discuss the trading costs for a culpable quant firm trading in the way I describe, but rather the trading costs for someone who might try to take the other side.) See also Section II of [1], Section I of [2], and Sections I and II of [3].

"The idea that big hedge funds could systematically manipulate markets on a stunning scale over several decades and across multiple countries without a single regulator, trading firm or money manager noticing defies belief." Unfortunately, "noticing" isn't really the right word here. I think you really mean "without a single trading firm or money manager alerting the public" (no surprise there, and see also Section II of [2]) and "without a single regulator alerting the public or cracking down on the culpable firms" (see e.g. pg 5 of [5] and Section III of [6]). Big difference. I am aware of many similar regulatory failures (Madoff, Wirecard, 2008, LIBOR, etc.) and I am aware of no strikingly suspicious return patterns in financial markets that turned out to be fine (Table III of [5]). Your column provides no historical example of the latter. When I asked you explicitly for such a historical example on a thread last year, you did not provide one. Strikingly suspicious return patterns in financial markets should be viewed as a problem until proven otherwise, not the other way around.

"A New York Federal Reserve study of S&P 500 futures patterns showed that returns actually spike most notably between 2am and 3am in New York." The explanation in [1,2,3] (which addresses the equities market, not the futures market) makes no particular prediction for the S&P 500 E-mini futures contract.

Responses to attempted alternative explanations

"The US stock market is only officially open for a fraction of the hours in a day." Sure, but prices move more intraday than they do overnight, as we have discussed at length and as noted in Figure 4 of [5], Section II of [4], page 1 of [6], the title of [8], and every other academic article on this topic. From the caption of Figure 4 of [5]: "For the S&P 500 index and all other indices and stocks shown in this article over the time period we consider, prices move more intraday than they do overnight . . . despite the many profoundly ignorant – and, at the time of this writing, still uncorrected – public claims to the contrary."

"A quarter of US corporate earnings releases are published right after the market closes, and another 60 per cent before trading starts in the morning." From footnote 27 of [3]: "The attempted explanation we hear most frequently is that 'company news' (particularly quarterly earnings) is often announced overnight and over the past three decades this news has generally been good. Section 4.1 of Ref. [7] dispensed with this attempted explanation [fourteen] years ago: removing the days corresponding to company earnings announcements does not change the overnight/intraday split shown in the [S&P 500 index plot] in the slightest. Separately, no analysis whatsoever is required to see that the release of company news overnight does not explain the consistently negative intraday returns shown in [the 18 plots outside the US and China (attached), which range from -50% (France) to -99.89% (India)]."

"Derivatives." None of the 79 pages in the article you link to claim an explanation for the attached plots.

"Index funds buying in the closing auction." This would produce positive intraday returns, not positive overnight returns.

Quoting from Section III A of [5]: "This [column] nicely displays the typical ways such articles refrain from concluding that [the attached plots] are a problem: understating their scope (e.g., by focusing on the S&P 500 index, the least obviously problematic plot [among those attached]), making unjustifiable analysis choices that understate the magnitude of the problem (e.g., throwing dividends into the trash), and suggesting the plausibility of innocuous explanations that are clearly not plausible."

To summarize, your column presents no evidence disfavoring the explanation in [1,2,3], and your suggestion that some combination of "the stock market's limited open hours," "after hours earnings releases," "derivatives," and "index funds buying in the closing auction" caused the striking consistency of the return patterns in Figure 2 of [6] (attached), negative intraday returns ranging from -50% in France to -99.89% in India, and the extraordinary patterns in individual US stocks shown in Figure 3 of [6] is really very funny.

Please of course follow up if you feel I missed anything, and thanks again for your interest in this topic and your enjoyable column.

Regards, Bruce

- [1] Information, Impact, Ignorance, Illegality, Investing, and Inequality (2016) (SSRN, arXiv)
- [2] How to Increase Global Wealth Inequality for Fun and Profit (2018) (SSRN, arXiv)
- [3] Celebrating Three Decades of Worldwide Stock Market Manipulation (2019) (SSRN, arXiv)
- [4] Strikingly Suspicious Overnight and Intraday Returns (2020) (SSRN, arXiv)

[5] They Chose to Not Tell You (2021) (SSRN, arXiv)

[6] They Still Haven't Told You (2022) (SSRN, arXiv)

[7] Return Differences between Trading and Non-Trading Hours: Like Night and Day (Cooper, Cliff, Gulen) (2008) (<u>SSRN</u>)
[8] Night Trading: Lower Risk But Higher Returns? (Lachance) (2015) (<u>SSRN</u>)

The attached plots are Figure 2 of [6].



world_indices.p df

