

Lunch Effect in the U.S. Stock Market Indices *

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Abstract

The Lunch Effect is a well-known anomaly in the U.S. stock market, characterized by increased stock prices following the lunch break. This article explores the Lunch Effect, examining evidence that supports and contradicts its existence. Proponents of the Lunch Effect suggest that investor behavior, specifically a shift towards algorithmic trading during lunch hours, contributes to the price increase.

Background. The U.S. stock market operates with several daily trading sessions, including pre-market, regular hours, and after-hours. During regular trading hours, algorithms and buy/sell programs execute trades according to pre-programmed parameters.

Methods. The authors analyzed intra-day stock market data from May 6, 2010, to May 2024, obtained from Yahoo Finance and Finram. They adjusted the data for splits, dividends, and opening prices.

Results. The study found that the previously observed overnight effect has diminished significantly. However, the Lunch Effect persists, with markets exhibiting an upward trend from 11 AM to 2 PM, followed by consolidation.

Discussion. The authors posit that the Lunch Effect remains a factor, albeit weaker than before. They attribute this effect to human traders taking lunch breaks and algorithmic trading activity.

Keywords— market timing, own-research, seasonality

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** *SSRN Template* from Josh Nicholson (<https://www.authorea.com/templates/ssrn>) used for this manuscript.

Introduction

In the complex world of financial markets, subtle patterns often reveal themselves through careful observation and analysis. Among these is the intriguing phenomenon we can call the “Lunch Effect,” a pattern observed in U.S. stock indexes where market performance tends to exhibit a distinct positive shift immediately after the lunch break, following a typically negative or flat performance earlier in the trading day right before the lunch. This lunchtime revival is not an isolated occurrence; it shares a curious connection with the “Overnight Effect,” a well-documented tendency for the U.S. stock market to experience the bulk of its appreciation during non-trading hours, with relatively little movement during the trading day itself. Together, these effects underscore the intricate dynamics of market behavior, where timing and investor psychology play crucial roles in shaping intraday and overnight market performance. Understanding these patterns can offer valuable insights into the rhythm of the markets and the underlying factors that drive short-term price movements.

Background

In the U.S. stock market, an ordinary day can be divided into:

- **daily (intraday) session** (consisting of
 - **PM — pre-market** (incredibly rarely also called before-hours trading), from 4 AM to 9:30 AM; during this time, there is usually little activity apart from stocks directly affected by the news, such as biotech having an FDA drug decision (approval or declination). Spreads, even on large caps, are huge, and liquidity is dried up until 8:30 AM when sometimes important macroeconomic releases occur (CPI, PPI, NFP, etc.). Fair to say that some ETFs representing indices and tech stocks affected by news overnight have tighter spreads, but volume is still low;
 - **(US) cash seance** — very often called *regular trading hours (RTH)*; this is the main session of the trading day, 9:30 AM to 4 PM, where most of the action takes place;
 - **AH — after-hours market** (occasionally named post-market); 4 PM to 8 PM. The first 15 minutes are pretty liquid since it is still also able to trade options on indexes, and various dealer flows are happening and taking place; during this period, companies have their earnings releases (ER) and give forward guidance on subsequent quarterly calls, so spreads and liquidity on their tickers are often much better after initial volatility vanishes and first algorithmically-driven jerk moves;
 - * Both PM and AH are often called *extended trading hours (ETH)*.
- **night session** (where no trading is happening, but we might include
 - overnight trading (from 8 PM to 4 AM) on some U.S. broker platforms such as Robinhood or TD Ameritrade (note: no affiliations) and
 - trading of secondary listing of companies on European and/or Asia markets. (During these, a minuscule number of shares are traded and do not compare even for PM/AH US sessions; usually, one dedicated market maker makes highly unfavorable quotes, and there is a severe

lack of liquidity to execute large orders at favorable prices. Individual stocks often do not move and are only quoted by dedicated liquidity providers.)

- During the night session, institutional investors hedge (with high notional value), and individual investors speculate (with small notional value) on stock market indices (ES, NQ, YM, RTY) futures. These futures run apart from 10-minute technical breaks 24/5 when liquidity is abundant and quotes tight.

For simplification purposes, let us just state that it is not easy to trade a lot of instruments during nightly sessions. Most institutional investors use cash open and cash close and auctions to execute their either buy or sell orders to manage their positions; these are times of day that provide a lot of liquidity by market makers, options dealers, and liquidity providers. During the day, there are VWAP and TWAP algorithms and buy and sell programs that divide orders during the hours of the day and are pre-programmed to execute according to the situation and act on the news without human intervention.

We, small investors and individual traders, want to ride the wave, stand on the shoulder of the beast, and find patterns we can exploit. One of those is playing the [overnight gaps](#) (“fill the gap plays”, fading it up until the previous day’s close price or any other technically arbitrary level [support, whole or half number], “gap ‘n’ go” for a further same move from the initial price) or finding quiet times during the day when there is not much going on in the sense that liquidity dries down and is maintained chiefly by big banks algos, and the exact time of that is around lunchtime of New York time.

Because there is such a significant difference between the time when the market is open and most of the action takes place and the night session, when there are limited opportunities to trade, it’s no surprise that the US stock market performance over those two periods differs—like day and night. So what do the long-term statistics show us?

Multiple academic studies have found that the US equity premium is mostly due to overnight returns. This effect is called an [Overnight Anomaly](#), and it is described in more detail by ([Cooper et al., 2008](#)) in “Return Differences between Trading and Non-Trading Hours: Like Night and Day” and in “Overnight Return, the Invisible Hand Behind The Intraday Return? A Retrospective” by ([Branch and Ma, 2018](#)). *[Look figure next page.]*

The genesis of this anomaly can be traced back to the mid-90s when firms began to release positive earnings surprises outside of market hours. This practice led to an accumulation of market orders, resulting in inflated opening prices that typically recede during the first hour of trading. While liquidity premiums contribute to some extent to the positive overnight returns, they account for only a minor fraction of the disparity between night and day returns.

Not just academics noticed this pattern. A worth-reading contribution is also from the blog content of a systematic individual investor ([David, 2021](#)) named [The Magic of Overnight Stock Market Returns \(I\)](#) who tried to break down returns in sessions from past and current periods:

However, the devil is in the detail. While the long-term statistics show that the overnight anomaly is clearly visible over the extended window (1994-2024), when the window is shortened, it reveals that the overnight anomaly is highly sensitive to the start and end of the selected period. In the window from 2010 to 2021, the overnight anomaly nearly disappeared, with daily performance significantly converging towards nightly performance. Yet, for instance, in the window from 2017-2020, the overnight anomaly

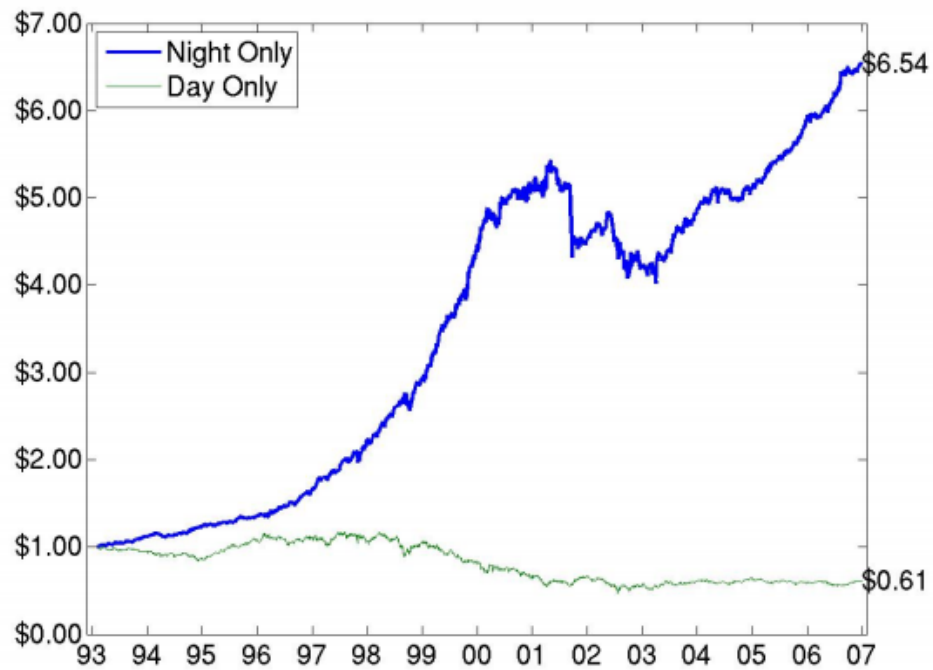


Figure 1

Growth of a \$1 investment in night returns (close to open, heavy blue line) and day returns (open to close, thin green line) from 1993 to 2006 in the S&P 500 Spider (SPY) exchange traded fund.

Branch and Ma (2018)

remains strongly present. This implies that caution is needed due to the sensitivity to macroeconomic and geopolitical periods.

This convergence between the nightly and daily session in the last years brings us to the next emerging phenomenon.

According to sayings and urban legends among traders, there exists a pattern in the intraday price action that happens around the NY noon time, when human traders go for lunch and algos hunt liquidity (NASDAQ and NYSE stocks) for the power (or sour) hour of trading.

There are anecdotal but documented occurrences of short reversal during Lunch hours in NY Cash sessions. Still, they are not documented in academic papers, but some evidence is mentioned in section 1:00–2:30 p.m.: *Lunchtime Lull/Reversal* listed in the book [The Art of Trend Trading: Animal Spirits and Your Path to Profits](#) by Michael Parness (2015).

Data

With the idea of studying the Overnight Anomaly and price action around lunchtime around the Lun in mind, we obtained intraday data and decided to run our own analysis. Our timeframe is from the famous (first) [Flash Crash](#) of May 6, 2010, up to May 2024, and we considered doing this study only on *S&P 500 INDEX (\$PX)* represented by *SPDR S&P 500 ETF Trust (SPY)* data for our backtest.

Data about open and closing prices are from Yahoo Finance. We used the closing prices adjusted for splits and dividends and also adjusted the open prices. Hourly data were downloaded manually from [Finram](#). (Data preprocessing was underdone with an essential stack of data engineering involving UNIX shell commands.) Hourly data were also adjusted for splits and dividends.

All times adhere to [New York, Eastern Time \(ET\) \(UTC-4\)](#). (As a side note, since our readers are not only American, we use the convention of [12-hour clock](#) notation; basically, AM is morning, marking time before noon, and PM is making time after noon.).

Initial Approaches for Forming the Study

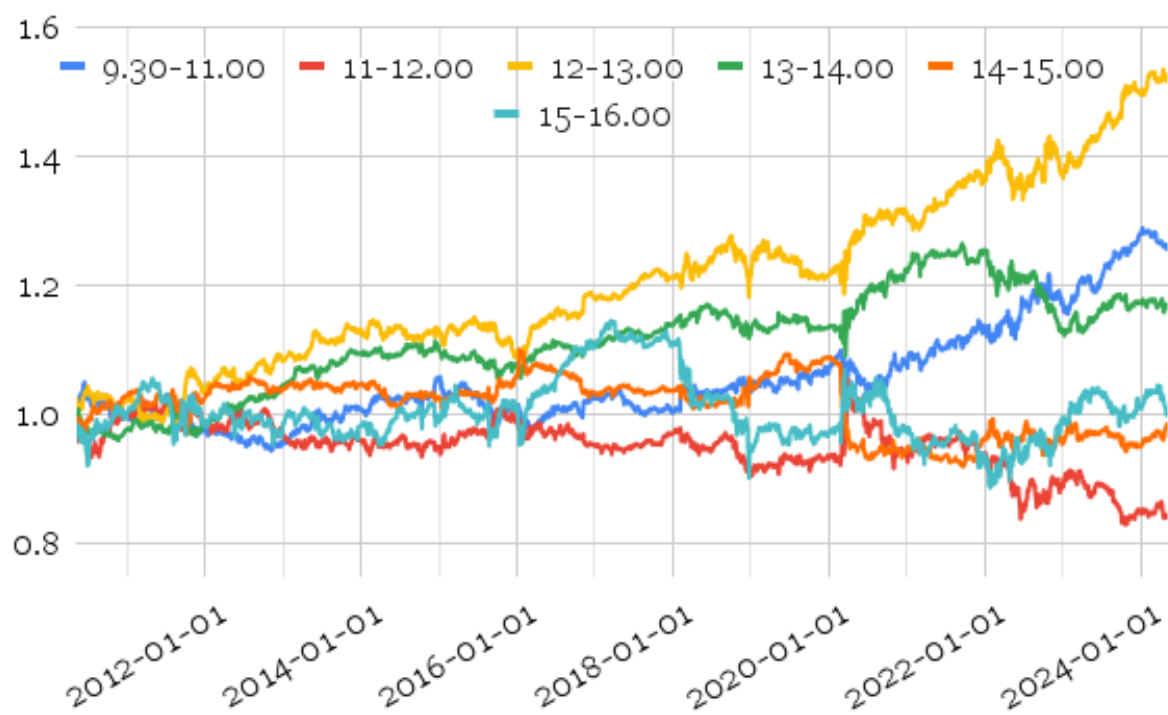
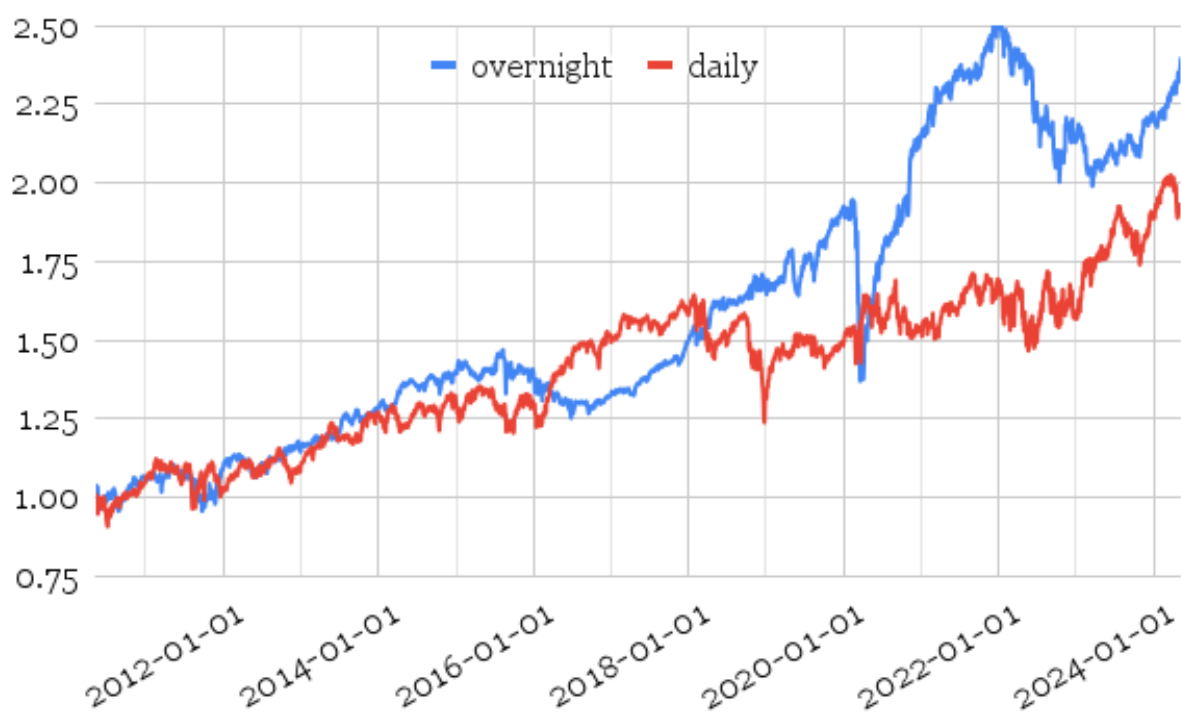
The first thing we did was to download hourly data (data in hour samples) and look at the *Overnight Effect* and whether it still takes place: *[see next page]*

From our investigation, we concluded (pretty much the same as the blog post and academic research mentioned above) that overnight effects still exist to some extent. However, nightly and daily sessions converged. The difference in return is not as strong as it was before; nightly sessions still outperform, but the spread is not statistically significant anymore.

And what about the Lunch Effect?

The second thing we did was to divide daily sessions into individual parts by hours, and we wanted how market performs in the morning, around lunchtime, and in the afternoon. We were initially especially interested in short-time reversal opportunities to expose in day trading timeframes. But did it materialize? Let the data decide.

From the plotted graph figure *[see next page]*, we see that from cash open (9:30) up until 11 AM, we see modest gains and there is a little bit of pullback, negative drift from 11 AM to 12 PM. Subsequently,



in the next hour, the market goes up on average, from 13 PM to 14 PM, too. Then, it is often churning and moving sideways, not having a distinctly trending move up until close, including the last hour of the trading day during the primary session, often dubbed as the *Power Hour*.

One should be aware that this is a price action from 2010, from the time when the convergence between the daily and nightly sessions started. But this finding does not guarantee that the market will be the same in the next 10 years if there are some policy changes (broader overnight trading, prolonging, or even having 24/5 markets, etc.).

Simple Trading Strategy Implementation & Application

So, what may be the simple Lunch Effect strategy?

The investment universe would contain only SPDR S&P 500 ETF Trust (**SPY**) (as a side note, the found findings shall be applicable within the same timeframes by other trading vehicles such as near-term [front] futures on the index itself [S&P 500 E-mini Futures, Continuous contract; CME_MINI-ES1!] or CFDs).

Based on our simplified model, we would propose the following rules:

1. From 11 am, (sell) short;
2. Cover (buy back shorted [borrowed] shares at 12 pm and go straight long (buy)
3. Sell (liquidate) (whole) long position at 2 pm.

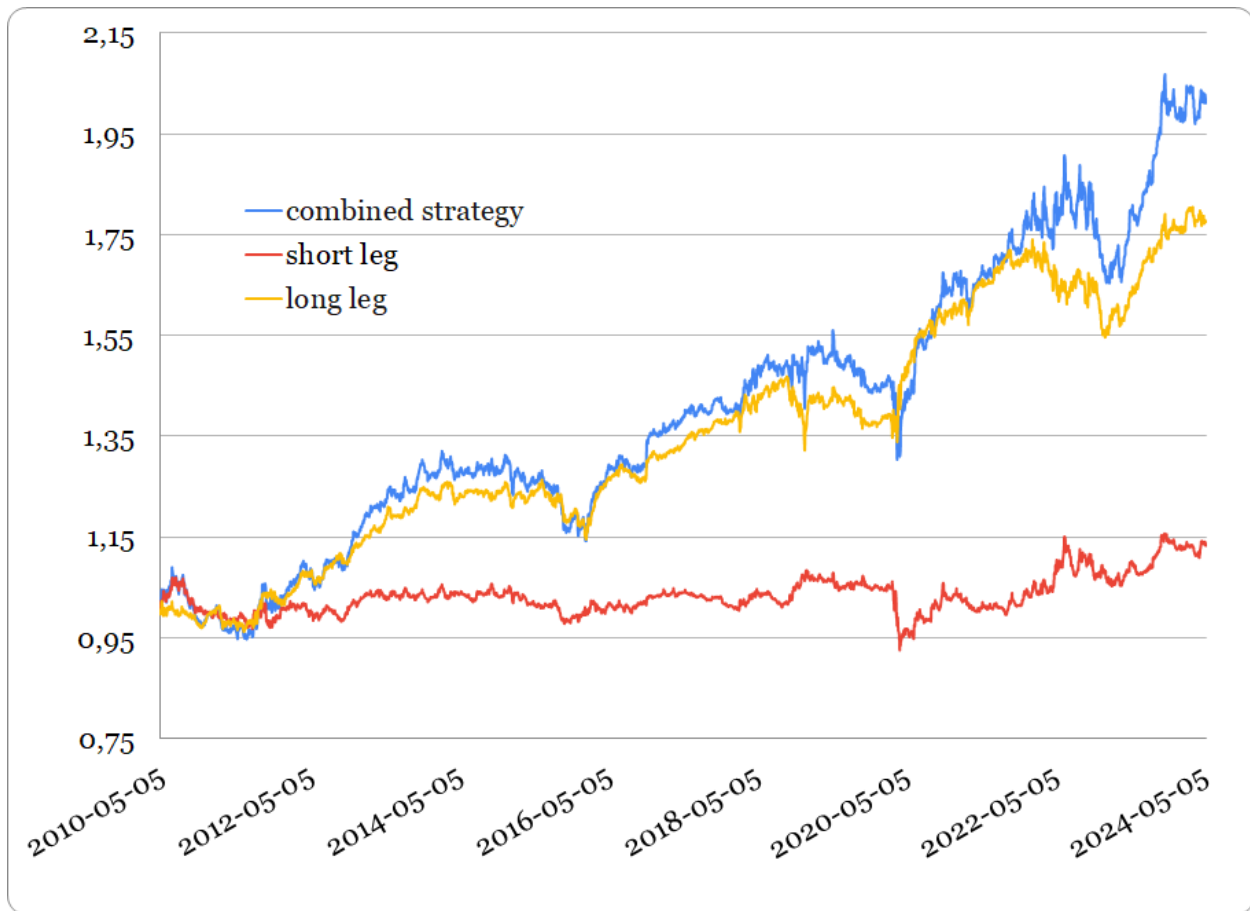
Alternatively, if you are a discretionary trader: Look for shorting opportunities from 11 a.m. until 12 p.m.; afterward, look for opportunities to enter into long positions.

And how does this simple intraday strategy fare?

This is the equity curve (taking performance over time into account): *[see next page]*

And pretty much the standard format of our reporting for performance and risk metrics: *[see next page]*

Having reversed trades (short, then long) during lunch increases performance, albeit at the expense of the return-to-risk metrics. So, speculating on the after-lunch uptrend can be preferable for traders who prefer to just go long.



	CAR	Volatility	Sharpe	Max DD	CAR / max DD
<i>model 1. + 2.</i>	5,17%	8,03%	0,64	-16,41%	0,32
<i>1. short leg</i>	0,93%	5,49%	0,17	-14,63%	0,06
<i>2. long leg</i>	4,21%	5,83%	0,72	-11,17%	0,38

Conclusions

The main idea of this article was to disseminate lunch hour price action trading patterns, and ultimately, we somewhat succeeded in finding some relationships that can be exploited in the easily performed trading strategy we present. We hope to have provided some new remarks on how the session's performances are developing. But there are still nuances that need to be covered. Tweaking the strategy's parameters has potential, and it gives us a good perspective on revisiting it in the future.

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