Algorithm Logic & Market Makers Influence on Market Pricing

Over the last 30 years, intraday returns for the S&P 500 have averaged near 0%.[1,2]

This is a fascinating statistic. It's a phenomenon that is referred to as "*overnight drift*" or "*the night effect*", in which long-term gains in the S&P 500 can be solely explained by overnight price action.[1] Various research papers have explored the cause of this phenomenon, but with no resounding conclusions.

Given the fact that the vast majority of volume resides during normal trading hours, shouldn't we expect the opposite to be the case? In other words, shouldn't the upward move in stock prices over the long-term happen when all the volume is actually being traded? Yes, but that is not what we observe today and "*the night effect"* still remains a mystery.

So what is the force that moves prices up or down during the day? Is it not buying and selling pressure from investors? If it is something else, then what is it?

This article sheds some light on how algorithms and market makers influence price action. The topic is highly debated and very complex but understanding market makers' algorithms can help you get a sense for why the market gyrates the way it does.

How many times has a negative economic report been released only to be followed by upward price action in stocks thereafter? Conversely, how many times have we seen a positive earnings report in a stock result in downward movement in the share price? This seems to happen frequently and almost feels like the norm.

This can be very frustrating for anyone, causing some to give up and say, "the market is rigged" or "the market makes no sense". These internal battles are common. Why is the market still going up when everything seems so bad? And why is the market still going down when everything appears to be so cheap?

Decades ago, two developments occurred that have changed the way markets determine price. The first is the use of computers in electronic trading during after-hours sessions, and the second, is the algorithms that were created and used by market participants, especially market makers, to transact on exchanges.

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First, a little history on electronic trading… It began in the 1970's with the creation of the NASDAQ, but the real movement towards electronic markets happened during the 1990's and 2000's. It was during this period that the growth of the internet forced market participants to change the way they execute and facilitate trading. Specifically, investors in the 1990's gained the ability to trade outside of regular market hours. In September of 1993, S&P 500 futures contracts began trading electronically outside of open market hours. Then in September of 1997, e-mini futures were introduced to increase availability to more investors. Fast forward to today, futures traders have the ability to transact virtually 24 hours a day Sunday evening through Friday's close.

If you go to the New York Stock Exchange during the middle of the day, you'll find a fraction of the traders compared to what it was decades ago. Trading floor specialists are no longer grouped in trading pits yelling their orders across the floor. Today's market makers, via the use of high frequency trading algorithms, execute silently in the background. The algorithms they employ need a set of logic to function. They make sure the markets run smoothly, but hidden inside their code, price is more manipulated than it appears.

Two of the leading research pieces on the topic have made some very interesting observations on "*the night effect*" phenomenon that have created speculation about market makers' role and impact to pricing. One of the research papers is by The Federal Reserve Bank of New York and the other was a joint effort among individuals at the universities of Virginia Tech, University of Utah, and Purdue University. Here are some of their observations:

- Intraday returns in the S&P 500 over time have averaged near 0%.[1]
- Overnight returns in the S&P 500 account for the index's long-term returns.[1]
- Since 2008, around ~80 to ~90% of futures volume has been during normal trading hours.[2]
- This pattern started when overnight trading in futures was introduced, specifically the major divergence began in September of 1997 when e-mini futures started trading.[2]
- The majority of positive overnight returns tend to happen between the hours of 1:30am-3:30am eastern standard time, which coincides with pre-market trading on the London Stock Exchange and the opening of regular trading in European markets.[2]
- News releases were deemed to be an implausible explanation.[2]
- Market makers tend to adjust their books in the overnight sessions at the time when overnight volume tends to increase.[2]
- Positive price performance was more pronounced during uncertain times (high levels of the VIX).[2]
- It was also more pronounced when there was considerable selling pressure in the US market going into the close. In other words, negative selling pressure going into the US close correlated with positive price action as European markets opened.[2]
- Algorithmic trading is speculated to be contributing to "*the night effect*" phenomenon.[1]

The data and observations from the studies above infer certain conclusions:

- Intraday price action does not matter.
- Market makers influence price more than investors.
- Negative selling pressure going into the close actually causes positive price performance overnight.
- Buying and selling pressure during trading hours does not influence price direction over the long-term.

Given these conclusions, market makers are an integral part of price movements. So, what is their job and how are they affecting it?

A market maker provides an important function by making sure the exchanges trade efficiently. If they did not exist, you would see erratic movements in price and flash crashes would be commonplace.

A registered market maker is a firm that stands ready to buy or sell at publicly quoted prices. Regulators have oversight into market makers actions and ensure they comply with their stated obligations. They '*make a market*' by showing two-way quotes which are referred to as the "bid and ask". They must publish the quantity and a price they're willing to transact throughout the trading day. Market makers provide a way to trade quickly and with transparency. Orders that took more than 10 seconds to fill back in the early 2000's now take just milliseconds to execute.[3]

The spread between the bid and ask is the market maker's profit. They can buy at the bid and sell at the ask, which is the opposite of how all investors transact. Investors must buy at the ask and sell at the bid. When you transact through your broker, the other side of the transaction is generally a market maker. When you sell a security to a market maker at the bid, they will in turn try to offload that position at a higher asking price. In doing so, they make the spread. But therein lies the risk, what if they're unable to offload that position quickly enough at a higher ask price? They can either execute at a loss or hold and wait for the price to come back. This

is the risk of being a market maker. It's in their best interest to minimize this risk and maximize their profit through speed.

Market makers have been around a long time, but with the rise of computing power, algorithms do the majority of the work today. You can imagine just how important speed is to their business model, so they utilize computer algorithms to do the heavy lifting. This is important because it's no longer a manual process. It's their coding that controls the game. **There are two things to remember. The first is that market makers must provide bid and ask quotes publicly to the market, which in turn provides liquidity to the exchanges. This creates stability in market prices. The second is that they are for-profit entities. They are in business to make money so we shouldn't be surprised if the algorithms they employ help them profit.**

The way in which market makers' algorithms work and make a profit help us to understand why price moves the way it does.

Price is controlled in an orderly fashion by market makers' algorithms. Traders who watch price action day after day can see these algorithms' fingerprints at work. Algorithms do not simply adjust and fill according to investors' orders that are submitted on the exchanges. If they did, intraday price action would matter more since that's when everyone is trading. Algorithms are coded to minimize risk, not just through speed, but through direction. If price were to move too quickly to the downside with only bids being executed, it appears these algorithms are coded to allow price to retrace back up to offer the ask side of the transaction. This would keep the market balanced, i.e., to offer both buy and sell orders at the same levels of price.

The rest of this article dives deeper into Algorithmic Logic, the manipulation of intraday price action.

If you watch the chart of the S&P 500 over time, you'll notice price tends to gravitate towards three areas:

1) At previous highs and lows
2) At gaps in price where no trading has occurred
3) And at previous levels in price where the market only went one direction

Before algorithmic trading, fear and greed ***pushed*** price up and down. That is, buying and selling pressure moved bid and ask levels, and then market makers manually adjusted to meet the demands. Today, algorithms can transact at lightning speeds with computers adjusting bid and ask levels automatically according to its code. Now algorithms ***pull*** the market into the direction of investor liquidity. To understand this dynamic, the first thing we need to do is separate the idea of "volume" and "liquidity".

Volume is the actual exchange of one asset to the next, i.e., the transaction itself – the frequency of buying and selling. Liquidity on the other hand is the willingness of a buyer or seller to transact. If you think of this in reference to the housing market, the total number of homes bought or sold is the volume, whereas the willingness of a buyer or seller to transact at a particular price is the liquidity. In other words, liquidity is the anticipated volume at various price levels.

Remember that market makers make a profit from the spread between the bid and ask. But they can't make that spread unless an order is submitted. If price isn't moving, the likelihood of you submitting an order is relatively low. So how do market makers incentivize you to transact? **They move price to an area that interests you**. In essence, their algorithms target levels of anticipated volume (liquidity) and incentivize you to transact (volume) in order to make that spread. Liquidity is the target; volume is the byproduct.

So where exactly is this "liquidity" that the algorithms are moving price towards in order to institute more volume? It's embedded in the asset's price history. Think to yourself, at what level am I more likely to trade?

There are two primary focal points in Algorithm Logic. They are liquidity zones and retracement zones.

Liquidity Zones are at previous highs and lows. These are the levels that volume increases because investors and traders are more likely to submit orders there. The algorithms anticipate volume to increase at these price points.

This makes sense if you think about it from an investor's perspective. Volume increases at previous highs because investors typically want to sell at the peak. It also increases at the previous lows because investors tend to get nervous that the security will drop even further and submit sell orders.

It's also logical if you think about it from a trader's perspective. Volume increases at previous highs because traders believe the security is likely breaking out of its range and submit buy orders. It also increases at previous lows because short traders want to push the security down even further. Traders place their limit orders at these very specific points in price.

The other zones are **Retracement Zones**, which are either large, one-way directional moves in price or gaps in price where no trading has occurred. As the algorithm pulls price from "liquidity" to "liquidity", it allows for retracements back into previous ranges. This allows market makers to balance their order books equalizing buy and sell orders. It also helps them protect their profits if too much order flow was one directional. They can get out of losing trades. The algorithms allow for these retracements to provide an efficient market – an ebb and flow of price action offering both buy side and sell side. A subcategory of retracement zones are areas where price wasn't traded at all. These are gaps in price where neither buying nor selling occurred.

Traders who watch the charts every day can see price movement from liquidity zones to retracement zones and from retracement zones back to liquidity zones. It's a back-and-forth process that does not end. The algorithms run continually, giving investors the ability to buy or sell their financial assets. This is the efficiency of today's market.

A conclusion from this discussion is that buying and selling pressure does not influence the market like it once did. Market makers, via the use of algorithms, do provide an important function for us to facilitate the buying and selling of securities at minimal transaction costs, but also manipulate price in ways that are hard to understand.

Could the answer to "*the night effect*" phenomenon just simply be the markets way of rewarding those that buy and hold? Interesting food for thought, but one takeaway is that intraday price moves do not matter. This should give you comfort, as crazy as that sounds. The next time the market doesn't make sense, just remember, computers are the cause and in the long run it all gets sorted out overnight.

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