Arbitrage Trading Strategy in Gold Futures

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ABSTRACT

There appears to be an arbitrage trading strategy in the gold market where you are "long" gold overnight, between the London Fix each day. Holding gold price exposure in this way produced reliable profits between 2000 and 2010. In fact, these reliable profits resemble the returns seen with a theoretical example of an inefficient market where a Bollinger Band trading strategy extracts arbitrage profits from a price series with mean reversion.

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Bell (2013) builds an example of a trading strategy and market model that show what happens if there's a bug in the market and you can exploit it. What do arbitrage returns look like? In simple terms, they are reliably winning trades. In the computational example from Bell (2013), two thirds of the trades are winners and, over time, the average trade is the same positive number. This is an "arbitrage strategy" and the distribution of returns is different from another trading strategy in the paper that doesn't earn arbitrage profits.

This theoretical example of an arbitrage strategy is useful as it gives us an indication of what an inefficient market looks like. If we can find trading strategies in the wild that have similar returns, then does that suggest the relevant market may be inefficient? The conclusion of this theoretical exercise in Bell (2013) is a simple: if the trading strategy is able to produce reliable profit, then the market is inefficient. What does "reliable" mean? To some degree, you know it when you see it.

Bell (2019) describes a case where you do know it when you see it: a trading strategy that produces a massive return over ten years with few losing trades. What trading rule generated those gains? As in Manly (2019), it is going "long" the gold price between the PM fix in London one day and selling at the AM fix the next day. That simple strategy earned arbitrage profits from 2000 through 2010, suggesting the gold market was inefficient.

LITERATURE

Financial economists are quick to use the word "information" but slow to define it. Fama (1970) writes, *"... the theory of efficient markets is concerned with whether prices at any point in time "fully reflect" available information."* One set of information that's always interesting for a financial asset is it's own previous prices. That's where we get every stock price chart and quotation – building blocks of our practical understanding of financial markets.

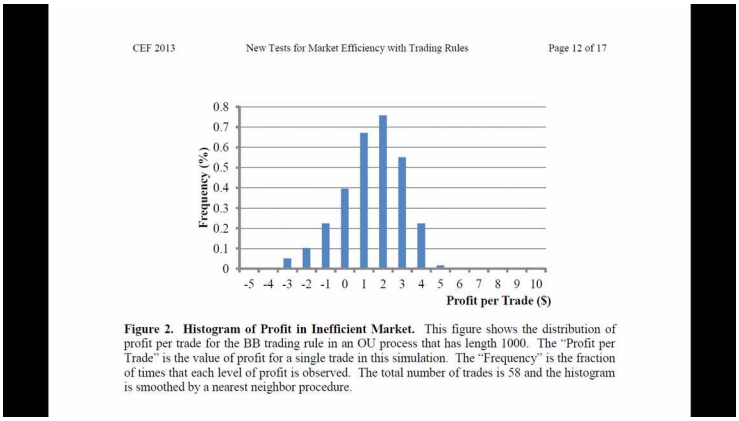
Our understanding of markets continues to race ahead. In a 2011 paper titled *"A Computational View of Market Efficiency"*, Andrew Lo and co-authors present important concepts and suggest that their framework can help *"rationalize the technological arms race of quantitative trading firms."*

Hasanhodzic, Lo, Viola (2011) describe a, *"... simple model of market evolution, where strategies impact the market by their decision to buy or sell. We show that the effect of optimal strategies using memory m can lead to 'market conditions' that were not present initially, such as (1) market spikes and (2) the possibility for a strategy using memory m' > m to make a bigger profit."*

Matching the stylized feature of "market spikes" is an interesting achievement and raises questions around methodology in finance. If a model can generate a pattern that is similar to something seen in nature, then what kinds of comparisons can be made between the model and real life?

ARBITRAGE TRADING STRATEGY

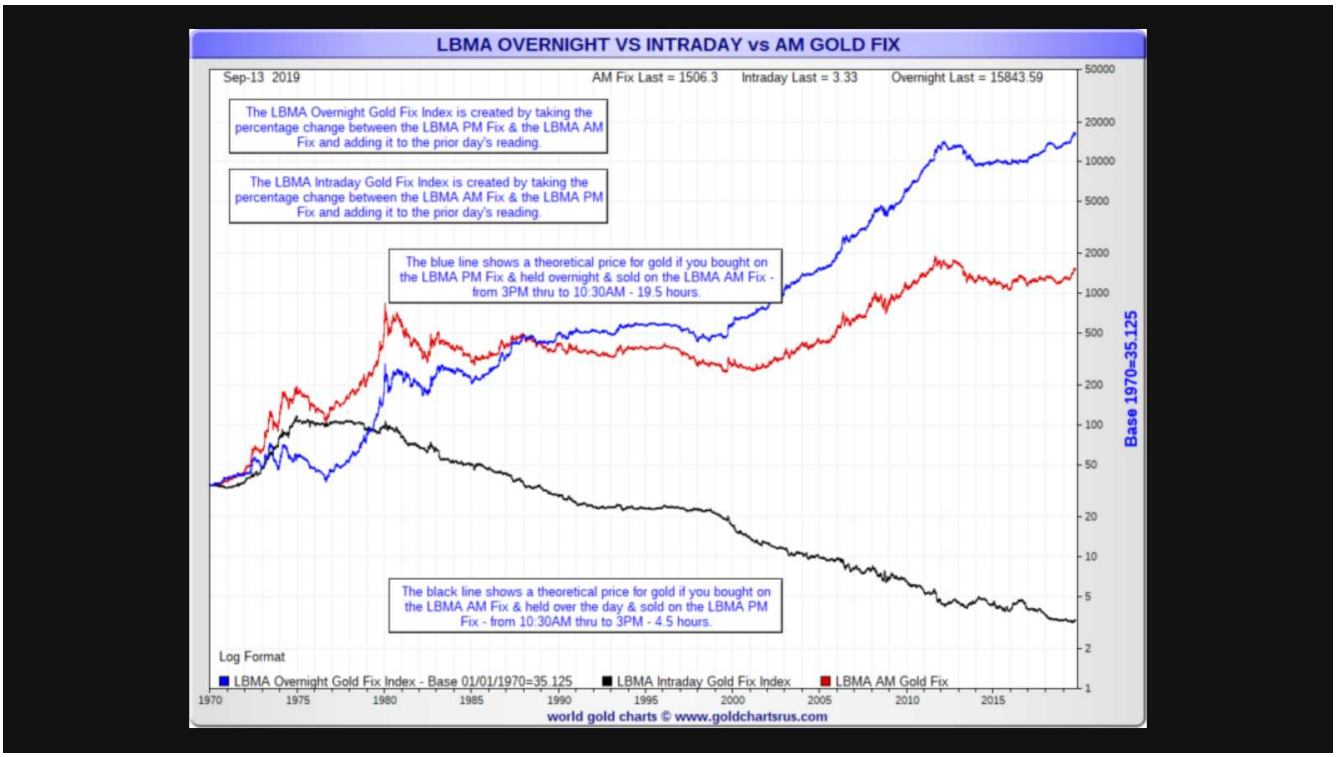
A trading strategy that makes a profit two thirds of the time reliably over time is an example of an "arbitrage trading strategy". The distribution of profits for the arbitrage trading strategy in Bell (2013) has a roughly triangular distribution, ranging from -3 to +5. Roughly 33% of the trades give a loss and the average profit per trade is roughly 2. The average profit is stable over time. If you ran that strategy over time, you'd earn a steady profit with few losses. When the average profit per trade is a steady, positive number, the gains grow and grow.



Distribution of returns for arbitrage trading strategy as in Bell (2013)

Depending on your position sizing rules, they may even compound. These kinds of strategies can provide returns of a hundred-to-one over time. Hundred baggers!

Manly (2019) provides an example of a trading strategy that went a hundred-to-one recently. Manly describes a simple trading strategy for the gold price, *"Starting in 1970 when the price of gold was $35 per ounce, if every day you bought at the price of the afternoon Gold Fixing and sold 19.5 hours later at the price of the next day's morning Gold Fixing price, your $35 would now be worth $15,843."* That's over four hundred to one!



Profits to gold trading strategies, Manly (2019).

That return is a surprising headline, but it's not the whole story. If the trading strategy has some big profit today and it loses it tomorrow, then what? This reliability is always an important consideration, which ties in to the definition of risk as the potential for impairment of capital base rather than as volatility.

Manly (2019) provides a chart of the performance of trading strategy over time. For the period of time circa 2000-2010, the "overnight gold price" strategy earns steady profits. The kind of profits you'd see with an arbitrage trading strategy, as in Bell (2013). Few losses, but consistent gains.

In fact, the trading strategy goes twenty-to-one from 2000 to 2010 (Manly, 2019). In this 10 year window, there were reliable profits to holding gold overnight between the London Fixes each day. Oddly enough, there were reliable losses if you held gold during the day, from the London AM fix to the PM one.

This discussion does not consider information on what was happening within each trade. It only considers the closing balance on each trade, sequentially. There is also no consideration for transaction costs. There may be some hidden risks, but it is clear that arbitrage profits were available for this trading strategy with steady gains over a 10 year period.

To more deeply consider if the gains are statistically significant, refer to non-parametric statistical methods in Bell (2013). Note, it would be possible to run these tests on these gold-trading-strategies over time to see if there have been periods of time where the "overnight gold trade" did not produce arbitrage profits and the market was less inefficient.

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