



ETFs, arbitrage and contagion: a potential link?

Mon, 06/02/2012 - 13:31

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Arbitrageurs can propagate liquidity shocks between related markets. That's the premise of an intriguing new white paper presented by Professor Francesco Franzoni (pictured) of the Swiss Finance Institute, University of Lugano, at the Lyxor Research 4th Annual Hedge Fund Research Conference in Paris.

Franzoni, along with co-authors Rabih Moussawi of The Wharton School, University of Pennsylvania and Itzhak Ben-David, Fisher College of Business, Ohio State University, chose to focus on exchange traded funds in their paper *ETFs, Arbitrage and Contagion*, because of the incredible boom they've enjoyed over the last decade (there are now over 1,000 in the US alone).

As well as proving that arbitrage occurs between ETFs and the underlying securities, the paper also conjectures that ETFs increase the volatility of the underlying assets and that the price of these assets are affected by shocks to ETFs. To illustrate, the authors use the Flash Crash of May 2010 as a case study for proving the contagion effect.

"The punchline of the paper is that financial innovation can increase systemic risk. It does this via arbitrage relations so that shocks can be more easily propagated from one market to another," explains Franzoni, speaking to Hedgeweek on the phone following the conference.

Arbitrage attempts to exploit mispricings between two related assets and is based on market inefficiency. ETFs prove an interesting case. As a derivative product they track underlying baskets of securities or entire indices and are immensely popular with retail investors. For arbitrageurs, however, they offer an easy way to profit from differences between the price of an ETF and its NAV.

In the paper, the authors point out that if the price of one asset drops arbitrageurs will buy this asset and sell another asset that is priced correctly. The problem here is that if the underlying asset being sold is a stock, by buying the ETF (which might be trading at discount to NAV) the arbitrageur puts downward price pressure on the stock and creates a deviation from efficient pricing. What the authors are essentially saying is that the initial liquidity shock is propagated to the price of the second asset, which falls without a fundamental reason.

They find that ETF mispricing is stronger following periods of high volatility and poor stock market returns. Franzoni explains: "There are more of these arbitrage opportunities when the market was doing poorly in the prior week, when there was an increase in volatility (VIX index) in the prior week or when an index for the financial sector fell. During these times the mispricing becomes larger and for arbitrageurs the profit becomes larger."

Mispricing is more pronounced in small stocks where arbitrage trading activity is expected to have greater price impact due to reduced liquidity.

When examining the contagion effect, the authors used a data set containing over 1 million daily observations taken from 1,146 distinct ETFs between 2 September 1998 and 31 March 2011.

As far as the arbitrage process itself is concerned, the paper points out that since the price of ETF shares is determined by demand and supply in the secondary market it may diverge from the value of the underlying securities (NAV). In a situation where the ETF is trading at a premium (above NAV) authorised participants – which tend to be market

makers or specialists – will look to buy the underlying securities and trade these with the ETF sponsor in return for newly created ETF shares: effectively going long the securities, which are cheaper, and shorting the more expensive ETF. The authorised participant then sells the ETF shares on the secondary market which in turn leads to a decline in the ETF price and an increase in NAV, reducing the premium in the process.

The more mispricing there is, the more intense arbitrage activity is likely to be. Also, the NAV moves in the same direction as the mispricing. This would be upwards in the case of an ETF premium and downwards in the case of an ETF discount – the point being that ETF share creation increases the price of underlying stocks.

The paper found that such activity transmits a shock in the ETF market to the market of the underlying securities and that the average volatility of individual stocks increased after ETF sponsors increased their ownership in those stocks. The authors estimate that the median holding of ETFs in late 2010 caused daily stock volatility to increase by 13 basis points.

Commenting on the paper's results with respect to price impact and volatility, Franzoni says: "When there's a discrepancy between the ETF price and NAV, about 50 per cent of this, on average, is mirrored the following day by movements in the underlying securities. Also, we found that daily volatility increased by about 50 basis points after the introduction of a major ETF on the S&P 500."

This is the basis of evidence that contagion arises from ETF arbitrage and Franzoni admits that he was surprised by the price impact, in particular, because you'd expect the underlying security prices to be tied to their true fundamental value. "However, ETF price movements propagate shocks to the underlying securities which in turn move away from their fundamental value. They're not therefore immune to shocks, there is contagion," explains Franzoni, adding: "We're not looking to answer all questions in this paper but we think financial innovation can cause volatility."

There are, however, a couple of points in the paper that some people don't fully agree with. Speaking to HedgeWeek, Dale Rosenthal, Assistant Professor of Finance, University of Illinois, Chicago, points out that the authors use prices of index stocks to get the index value. There is, though, a small amount of cash (aka fair value) in the index related to dividends and in Rosenthal's opinion, if you don't correct for that the ETF will often look mispriced when in fact it is not.

"Secondly, they look at end-of-day mispricing. Stock and ETF end-of-day prices are set by simultaneous auctions. If the stock auction prices imply a different index value than the ETF auction there is no way to trade on that difference (because the auctions are over). I would worry about these divergences more when people might be able to trade. Perhaps they could look at how often ETFs are mispriced on an intraday basis," says Rosenthal.

As for the Flash Crash of May 2010, the authors conjectured that ETFs tracking the S&P 500 were arbitrated against two types of assets: futures contracts (S&P 500 E-minis) and the basket of underlying stocks (S&P 500 Index). They suggest that the initial liquidity shock to the futures market propagated to the ETF market which in turn caused a decline in the stock index.

The incident in question saw the market fall roughly six per cent, recovering much of that loss within 30 minutes. Nevertheless, the effects were dramatic. What's not clear, however, is how the shock initiated in the futures market passed to the stock market.

Franzoni, Moussawi and Ben-David argue that arbitrage forces might have been at work. "When the futures price started to fall people were arbitraging the futures against the ETF – that is they were selling the ETF and buying the futures. When the ETF price fell, they started to buy the ETF and sell the index, which put downward pressure on the index," says Franzoni. This is plausible and likely was part of the reason, but the overall explanation will no doubt be more nuanced than simply suggesting it was the result of ETF arbitrage activity.

One thing seems certain: ETF arbitrage is a source of contagion to underlying asset classes. In Franzoni's opinion, regulators should more closely monitor financial innovations like ETFs: "People thought these were very plain instruments devoid of risk but we argue that because they're so huge they're bringing more trading and more volatility to the market."