Investigating the correlation between ETFs and their underlying securities
Introduction

There is great interest amongst investors, academics and regulators in the ETFs’ relationship between ETFs and the liquidity of their constituents.

The unique way, in which ETFs allow investors to trade in a basket of stocks and bonds in a single transaction, make ETFs a focal point for liquidity. Multiple studies have shown that ETF liquidity benefits can come both in the form of increased trading volumes and reduced trading costs.

But is there a trade-off involved? Do ETF users lose out in having access to this concentration of buyers and sellers? This issue of ETF Research Academy reviews this key topic.

Key findings:

► ETFs do increase the co-movement of liquidity of their constituent stocks.

► The increase in co-movement is linked to the Creation & Redemption mechanism that lies behind ETFs. The “cost” to ETF investors comes in the form of a loss of liquidity diversification across the constituents (measured as an increase in the co-movement of the constituents’ liquidity).

► The increase in the co-movement of stocks’ liquidity resulting from an increase in ETF ownership appears relatively modest in comparison to mutual funds.

This research initiative is the first to try to quantify the link between the new liquidity created by an ETF and the cost (in terms of the increased commonality of liquidity in the ETF constituents).
A new angle on ETFs’ correlation

An ETF is a “basket” of securities—each ETF share represents a series of ownership stakes in the underlying basket of stocks or bonds held by the ETF.

Given the rapidly increasing size of the ETF market globally, researchers have expressed keen interest in examining the relationship between ETFs and their constituents. Specifically, how, if at all, do ETFs influence the behaviour of the underlying securities held in the baskets?

Over recent years, this question has been posed by academics in different ways: from the perspective of the volatility of the ETF and its constituents; from the perspective of liquidity; and from the perspective of the co-movement in the returns of the ETFs’ underlying securities.

In this issue of Expert Opinion we highlight a new research angle, focusing on the co-movement of the liquidity of ETF constituents. The Expert Opinion summarises the research findings of Vikas Agarwal of Georgia State University, Paul Hanouna and Rabih Moussawi of Villanova University and Christof Stahel of the Division of Economic and Risk Analysis of the US Securities and Exchange Commission.

Why does the co-movement of liquidity matter? From a return perspective, portfolio theory teaches us to seek out stocks that have low correlations with our existing holdings in order to decrease the overall risk of our portfolio. It’s possible to apply the same approach to the liquidity of our holdings.

What is co-movement?

Co-movement is the tendency of two variables (for example, the returns from two securities) to move in tandem. It is typically measured by means of a correlation coefficient (a relative measure of co-movement, falling into a range between -1 and +1).

This is especially true, in view of possible crises. For example when market liquidity deteriorates, investors are likely to seek to be better diversified from a liquidity perspective. Researchers have also shown that greater co-movement in liquidity means that investors should receive higher returns; in other words, investors may demand a risk premium for holding assets that are exposed to an illiquidity factor.

Measures of ETFs’ Relationship with their Constituents in Academic Literature

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1 Ben-David, Franzoni and Moussawi (2014), “Do ETFs increase volatility?”
3 Da and Shive (2012), “When the bellwether dances to noise: Evidence from Exchange-Traded funds”
4 Agarwal, Hanouna, Moussawi, Stahel (2016), “Do ETFs increase the commonality in liquidity of underlying stocks?”
What’s the story?

The researchers start from the premise that ETFs do increase the co-movement of liquidity amongst their constituents. This conjecture is based on a basic design feature of ETFs: by contrast with traditional mutual funds, an ETF features an in-built arbitrage mechanism, designed to ensure that differences between its price and the fair value of its constituents remains small.

The ETF’s “authorised participants” (or “APs”) are incentivised to arbitrage away deviations between the ETF’s price and the fair value of the basket: for example, when the ETF’s price exceeds the fair value of the basket, the AP can sell the ETF short, buy the basket and deliver it to the ETF issuer, receive ETF shares in return, and create a risk-free profit. The same operation can occur in reverse if the ETFs’ price is temporarily at a discount to fair value.

As a result of these arbitrage activities, trading activity in the underlying securities of the basket is linked by their common ownership (via the ETF). In turn, the liquidity demand for each of the constituent securities increases (and decreases) together. Market participants’ ability to trade ETFs continuously and to sell them short reinforces the effect of co-movement. In other words, the ETF’s structural features help create a commonality of liquidity amongst its constituents.

To test the hypothesis that ETFs do increase the co-movement of liquidity amongst their constituents, Vikas Agarwal of Georgia State University, Paul Hanouna and Rabih Moussawi of Villanova University and Christof Stahel of the Division of Economic and Risk Analysis of the US Securities and Exchange Commission examined all ETFs traded on major US stock exchanges between January 1, 2000 and December 31, 2016. They obtained the equity holdings of those ETFs using the quarterly portfolio holdings reports required under US mutual fund legislation. And they computed the quarterly ETF ownership share for each stock.

The researchers then used five different statistical measures to examine how each stock’s liquidity co-moved with the liquidity of other stocks.
Result 1: Higher ETF ownership of stocks is associated with higher co-movement of liquidity

Agarwal, Hanouna, Moussawi and Stahel tested the effect of ETF ownership on stocks’ liquidity by regressing the five statistical measures of liquidity co-movement against a (lagged) variable recording the extent of ETFs’ aggregate ownership of each particular stock.

Their results showed that higher ETF ownership is associated with higher co-movement of liquidity.

The researchers also showed that this result is not true only for certain types of stocks (for example, less liquid small capitalisation stocks), but that it is true across the board. They also examined the relation between liquidity co-movement and ETF ownership over time and under different market conditions, concluding that the relation is persistent over time and is not confined to crisis periods.

Result 2: Some other categories of stock owners have a similar impact on the co-movement of stock liquidity

Allowing for the fact that ETFs are not the only category of stock owners, the researchers also examined other ownership categories, such as traditional open-end mutual funds, index funds and other institutions (collectively, private funds, hedge funds, closed-end funds, etc.), testing for their impact on the co-movement on liquidity using the same statistical tests. The results showed that, in general, the other categories of stock owners have a lower impact on the co-movement of stocks’ liquidity than ETFs.

However, other researchers have established a relationship between stock ownership by traditional, open-end mutual funds and the commonality of liquidity. This relationship could exist, for example, because active fund managers have access to the same information and act in the same way simultaneously. In the next section we compare the impact of ETFs and mutual funds on the commonality of liquidity measure.
Result 3: When ETF arbitrage activity is higher, the co-movement of liquidity amongst constituent stocks is higher

The researchers tested whether increased arbitrage activity in ETFs drove higher liquidity co-movement. They assumed that arbitrage opportunities were higher over the course of a quarter in a given stock when the ETFs that owned the stock experienced high price deviations from fair value (measured by the net asset value of the underlying basket) over that quarter. Additionally, they used the total absolute value of creation and redemption activity, turnover, and short interest in an ETF as measures of its arbitrage intensity.

Overall, the results showed that the more the arbitrage mechanism was used to reduce pricing imbalances between ETFs and their constituent stocks, the higher the measures of the co-movement of liquidity of those constituents.

Result 4: Two tests help establish a causal relationship between ETF ownership and liquidity co-movement

It’s challenging to determine whether there is a causal relation between higher ETF ownership and higher liquidity co-movement. It could be argued that ETFs could just be selecting stocks that already have a greater co-movement in liquidity.

To test this, the researchers ran two experiments to establish the causal relation. The first was to look at index reconstitutions, which involves some stocks moving from one index to another. This, in turn, forces ETFs to change their ownership level in those stocks, which causes the co-movement in stock liquidity to change.

The second test involved looking at the events of 24 August 2015, when trading was halted on US stock exchanges in a large number of ETFs and the arbitrage links between ETFs and their constituent securities could not operate.

The test showed that when trading in an ETF is halted for stocks with higher ETF ownership, the co-movement in liquidity decreases, supporting the researchers’ claim that ETF arbitrage drives commonality in liquidity across stocks.
How much does the commonality of liquidity measure an increase in ETF ownership?

The empirical research conducted by Agarwal, Hanouna, Moussawi and Stahel helps establish a causal relationship between the ownership of stocks by ETFs and an increase in the co-movement of liquidity for those stocks.

But how should ETF users interpret these results—in particular, by how much does an increase in ETF ownership raise the commonality measure? And do other pooled vehicles—for example, traditional mutual funds—have a similar effect on their constituents?

The researchers first measure the growing impact of ETFs in the US equity market, showing that over the period from 2000 to 2016 ETFs’ aggregate ownership share of three popular US equity indices—the S&P 500, the Russell 1000 and the Russell 2000—has risen from around 1% to between 7-12%. Adding bonds to an ETF lowered their returns.

ETF ownership share of underlying index

How much does an increase in ETFs ownership share increase the commonality of liquidity of the constituents?

The researchers calculate that, for each one standard deviation increase in ETF ownership, the commonality of liquidity measure increases by by 0.0679, or by 37.7% of the average commonality measure. To put these figures into context, the average annual increase of ETFs’ ownership share in the stocks in the S&P 500 index between 2000 and 2016 was 0.4% (representing an increase from 1.26% to 7.62% over the period), and the standard deviation of the change in ETF ownership was 3.07%.

How does the impact of ETFs on the commonality of liquidity compare with that of mutual funds? In a study published in 2015, Koch, Ruenzi and Starks showed that higher mutual fund ownership also affected on the diversification of liquidity across the stocks owned. They calculated that a one standard deviation increase in mutual fund ownership of US stocks was associated with a 25% increase in the average commonality of liquidity measure.

In other words, on the basis of the calculations performed by these two groups of researchers, ETFs have a modestly, but not dramatically higher impact on the co-movement of liquidity than traditional mutual funds.

What should you do next?

The research helps to confirm a well known hypothesis that ETFs concentrate liquidity in a particular basket of stocks and bonds. The resulting liquidity is a factor in reducing trading costs, however the trade off is that investors have less liquidity diversification across the stocks owned within an ETF.

Investors should therefore look to diversify their stock holdings to garner more liquidity as levels of ETF ownership in particular stocks may be a variable to monitor. In addition ETF investors should take in to consideration funds tracking alternative and therefore less-owned indices.

Lastly based on the research market participants should look more closely at levels of arbitrage activity in the creation and redemption process in order to assess the potential for the ETF to impact liquidity demand.
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About the ETF Research Academy

The ETF Research Academy was launched in 2014 as a joint initiative between Lyxor Asset Management and the Université Paris-Dauphine House of Finance.

In contrast to the abundant research on asset management in general, the Academy’s objective is to help develop a research framework for topics that are specific to ETFs and indexing.

What’s the central theme this year?
This year, the ETF Research Academy turned its focus towards the role of ETFs in portfolio management. The five research papers sponsored by the Academy explored different elements of the value chain underlying ETFs:

► The choice of benchmark and the design of smart indices
► The role of ETFs in facilitating low-cost access to different asset classes;
► The challenges involved in the distribution of ETFs via the financial adviser community.

Previous topics
Last year, the Academy sponsored five research papers with a common theme of ETF liquidity. The researchers examined topics such as the link between ETF liquidity and that of the underlying basket (Calamia, Deville, Riva), ETFs and corporate bond liquidity (Sultan), the role of ETFs in intraday price discovery (Wermers), how ETF trading affects local markets (Boehmer) and the role of the primary market in determining ETF liquidity, based on a new theoretical model (Malamud).