

MARCH 9, 2016

## The “Waterfall Theory” of Liquidity Management Doesn’t Hold Water

By Sean Collins and Chris Plantier

In a series of recent blog posts, economists at the Federal Reserve Bank of New York have discussed new research assessing the potential for bond mutual funds to pose systemic risks. These economists posit that a downturn in the bond market might lead to large-scale redemptions from bond funds (“runs”), which in turn would cause bond funds to sell their holdings into an already declining market (“fire sales”), potentially putting further downward pressure on bond prices (“spillover effects”).

We have posted two *ICI Viewpoints* considering the New York Fed’s approach. In [the first](#) post, we showed that the Fed’s own research indicates that spillovers would be so tiny that they likely would be lost in daily market activity. The Fed economists find this, even though their setup assumes that investors redeem massively from bond funds—far beyond anything we have ever seen. In [our second post](#), we put the role of bond mutual funds in context, pointing out that such funds still constitute a relatively small share of the bond market—and, thus, that the oft-repeated claims of growing “spillover risk” are overstated.

Now we want to examine another key assumption used to claim that bond mutual funds pose systemic risks: the “waterfall theory.” According to this hypothesis, a bond fund will meet redemptions by using up its most-liquid assets first. Under this theory, if the fund experiences further redemptions, it must sell less-liquid or even illiquid bonds into a declining market—exacerbating downward pressure on bond prices.

As it turns out, it’s hard to square the waterfall theory with actual data for bond mutual funds. The data suggest that, in general, in months when these funds experience outflows, their most-liquid assets decline little as a portion of their portfolios—and, as often as not, they actually rise. This is true even for bond funds that invest in less-liquid securities, such as high-yield bond funds.

### What Do the Data Say About the Waterfall Theory?

Presumably, if the waterfall theory were correct, funds should report that their most-liquid assets have fallen relative to total fund assets in months when funds experience large outflows. To test this, we looked at the nine episodes when two types of bond funds—alternative-strategy bond funds and high-yield bond funds—experienced their largest percentage outflows since 2010.

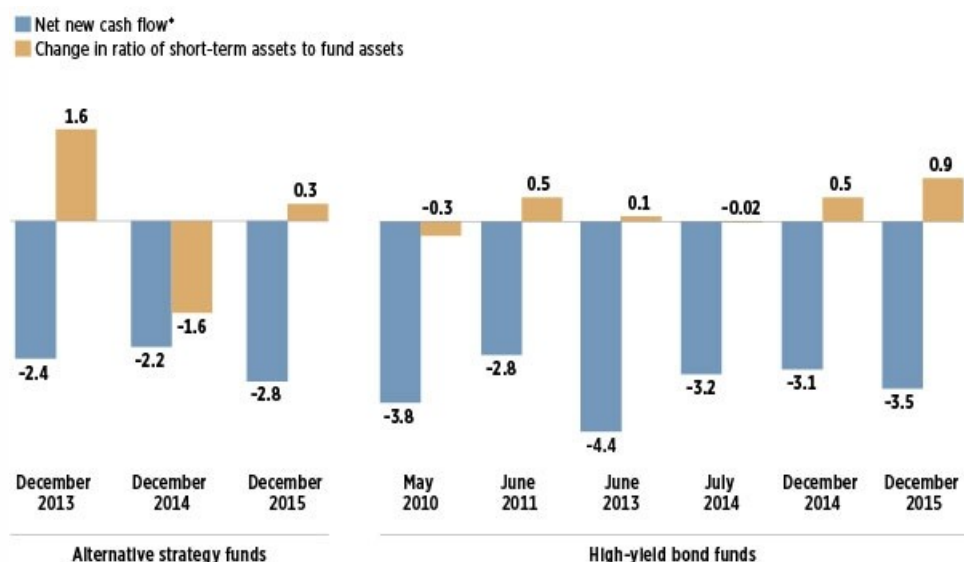
Figure 1 shows the results. For the three months shown for alternative-strategy funds, outflows averaged 2.5 percent of their assets. For high-yield funds, the average outflow for the six months shown was 3.5 percent.

There is no one standard measure of a fund’s liquidity. The waterfall theory suggests that a fund will use its “most-liquid assets” first to meet redemptions. While many securities can be quite liquid (for example, common stocks), “most liquid” suggests focusing on a fund’s short-term assets. Short-term assets are those maturing in less than one year—bank deposits, short-term Treasury securities, repurchase agreements, and commercial paper—and generally are among the most liquid of all assets. Thus, we looked at changes in a fund’s ratio of short-term assets to its total net assets: the fund’s short-term asset ratio.

#### Figure 1

#### Changes in Funds’ Short-Term Asset Ratios Are Uncorrelated with Shareholder Redemptions

*Percent, selected months*



\*Represents net new cash flow as a percentage of previous month-end total net assets.

Note: Data exclude high-yield funds designated as floating-rate funds.

Source: Investment Company Institute

The figure shows that in six of the nine months when these funds experienced significant outflows, their short-term asset ratios *rose*—exactly the opposite of what the waterfall theory suggests. For example, in December 2015, the high-yield bond market was roiled by the news that one high-yield bond fund had suspended redemptions after months of significant outflows. That month, high-yield funds as a group saw outflows totaling 3.5 percent of their assets. Rather than falling—as the waterfall theory would predict—the short-term asset ratio of these funds as a group rose by 0.9 percentage points (from 5.9 percent of their assets in November to 6.8 percent in December).

Of the three episodes when the short-term asset ratio fell, in two cases (May 2010 and July 2014), the decline was small, especially compared to the size of the outflows in those months. In only one case (December 2014) did the short-term asset ratio fall roughly in proportion to fund outflows. Overall, this is rather compelling evidence that the waterfall theory has trouble holding water.

## Do Individual Funds Go over the Waterfall?

We have been asked whether the evidence in Figure 1, which is based on aggregate flows to high-yield funds as a group, could be masking fund-by-fund differences that would support the waterfall theory. Perhaps there are a few individual funds out there that experience large redemptions and that do in fact use up their most-liquid assets in the process. If so, couldn't that put remaining shareholders at a disadvantage? We also tested this hypothesis.

Presumably, if the waterfall theory holds across the range of funds, in a given month those funds seeing above-average outflows should see their most-liquid assets—as measured by their short-term asset ratios—declining. This means that we should see positive correlation between flows to individual funds and changes in their short-term asset ratios.

To test this, we calculated the correlation between the flows to individual high-yield funds and the changes in those funds' short-term asset ratios for each of the six months in Figure 1, keeping *only* those funds that experienced outflows (during each of these months, many funds experienced inflows). If the waterfall theory were correct, the correlations should be positive and statistically significant (i.e., they should be strong enough that we can rule out the possibility of seeing a positive correlation simply due to chance). Funds that individually saw the largest outflows in each of these months should also be funds whose short-term asset ratios dropped the most.

The results are shown in Figure 2. The evidence, to put it mildly, does not support the waterfall theory. For five of the months the correlation is statistically insignificant, which means the evidence is not strong enough to conclude that the correlation is anything other than zero. In fact, for four of the months (June 2011, June 2013, July 2014, and December 2015), the correlation is *negative*—the opposite of what the waterfall theory predicts.

For one month (December 2014), the correlation *is* positive and statistically significant. But even then, the correlation is small, explaining just 12.25 percent of the total variation in changes in funds' short-term assets that month. (The total variation explained is equal to the square of the correlation, or  $0.35^2$ .)

**Figure 2***Correlations Between High-Yield Funds' Net New Cash Flow and Changes in Their Short-Term Asset Ratios*

Month	May 2010	June 2011	June 2013	July 2014	Dec 2014	Dec 2015
Correlation*	0.01	-0.03	-0.09	-0.03	0.35	-0.03
Statistically significant?	no	no	no	no	yes	no

\* The correlation for a given month is based on the cross-section of net new cash flows (as a percentage of the previous month's assets) for high-yield funds and the one-month changes in the short-term asset ratios of those same funds. This group keeps, for each separate month, only those funds that experienced negative new net cash flow in that month. Data exclude high-yield funds designated as floating-rate funds, funds with less than \$20 million in assets, and funds with short-term asset ratios greater than 25 percent.

Source: Investment Company Institute

## Why Doesn't the Waterfall Theory Hold Water?

Why, though, does the waterfall theory fail? There are at least two reasons:

- First, when interest rates rise, bond prices fall and the value of a bond fund's assets will typically decline. But the losses will be concentrated in the fund's longer-term bonds, which are more sensitive to changes in interest rates. In contrast, the fund's shorter-term assets, especially cash and cash equivalents, will tend to hold their value. As a result, all else being equal, a fund's short-term asset ratio will rise when bond prices fall. This can help provide a natural buffer against fund outflows.
- Second, fund managers are extremely cognizant of the need to balance the interests of redeeming shareholders with those of remaining shareholders. Among other things, this means that a fund will often meet redemptions by selling a representative portion of the fund's portfolio (sometimes called a "slice"). When a fund does this, it is helping to protect the interests of non-redeeming shareholders.

The persistence of the waterfall theory no doubt relates to its surface appeal—it is easy to describe, and seems intuitive. But regulators, economists, journalists, and other commentators have an obligation to go below the surface, testing theories against the data and discarding those that don't fit. It's time to pull the plug on the waterfall theory.

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