INVESTOR RESPONSE TO JUMPS IN MUTUAL FUND

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ABSTRACT

While a considerable amount of research examines how investors allocate capital across mutual funds in response to fund performance, relatively little attention has been paid to investor response to fund risk. We posit that when faced with a discontinuity in returns investors receive a clear signal about the riskiness of the fund and respond accordingly. Additionally, jumps occur regularly in fund returns and result in economically significant cash outflows the following month. Funds face outflows even when other funds experience jumps, even if they themselves did not jump.

Body

The mutual fund literature has spent decades questioning the rationality of fund investors. Not only does research strongly suggest active funds underperform , but investors continue to supply capital to these funds in spite of their underperformance (see e.g. [22]). While Berk and Green [7] suggest such performance may be the expected equilibrium given a competitive market for capital among funds, it is not empirically clear investors rationally allocate assets among active funds. Cash flows appear unresponsive to poor performance (see e.g. [31]), weakly responsive to moderate performance (see e.g. [12]), and excessively responsive to high performance and fund characteristics not related to performance.

Additionally, Avramov and Wermers [4] contend investors should consider fund exposure to risk in addition to performance when allocating capital across multiple funds. Whether investors do so remains an empirically open question. The motivation for the consideration of risk stems from modern portfolio theory, which suggests all systematic risks should be factored into asset allocation. While many investors generally interpret this to imply asset covariances, risk is actually agnostic to the source of risk as long as it is systematic. A stochastic jump, a break in an otherwise smooth Brownian motion, reveals discontinuity in an asset's returns. That discontinuity in mutual fund returns, if correlated across multiple funds, is risk borne by fund investors not measured by the fund's standard deviation, covariance, beta, or any factor loadings. If investors alter their allocation to funds following jumps, it suggests they are responding to a signal that those funds are exposed to more risk than previously perceived and provides evidence they are, to some extent, rationally considering risk in their asset allocation.

In this paper we examine whether investors consider risk when allocating capital across active mutual funds by measuring the responsiveness of cash flows to stochastic jumps in daily fund returns. Utilizing a sample of 6,695 actively managed funds across a wide cross section of investment objectives and the jump detection measure of Barndorff-Nielson and Shephard [6], hereafter referred to as BNS, we find that investors respond to jumps in daily returns by removing money from those funds in the following month. This occurs regardless of whether the jump is positive (22 basis point outflow) or negative (31 basis point outflow). Controlling for the objective adjusted return of the fund, a jump can result in as much as a 60 basis point outflow. Given a positive objective adjusted return results in a 74 basis point inflow, the relative outflow following a jump is economically significant, wiping out a large portion of the inflows the fund would have gained from outperforming its peers. This relation is robust to the inclusion of other proxies of fund risk such as return standard deviation, skewness, and kurtosis.

This negative response to jumps may be due to perceived total risk, systematic risk, or neither. Perhaps, for instance, investors perceive jumps as a negative signal of manager ability and respond accordingly. Or investors perceive jumps as non-systematic risk and rebalance their allocation to diversify away that risk. To directly test if this effect is driven by systematic risk, we additionally examine fund cash flows following jumps which occur in other fund's returns. When a large portion of funds either in the same objective or across all funds jumps (what we refer to as a systematic jump) funds without jumps experience outflows (as much as 57 basis points). For objective jumps, this occurs after both positive and negative systematic jumps, suggesting investors perceive such jumps as a signal of systematic risk in the underlying asset or trading strategy. Interestingly, once we control for systematic jumps, we find investors view jumps uncorrelated with systematic jumps (what we refer to as non-systematic jumps) differently. Negative non-systematic jumps result in outflows (as much as 48 basis points) while positive non-systematic jumps result in inflows (as much as 38 basis points).

Stochastic return jumps provide a unique laboratory for examining investor response to changes in risk. It may be difficult for even sophisticated investors to identify structural shifts in a fund's total or systematic risk, as estimation error can make trends, temporary, or even permanent shifts impossible to confidently measure except over very long periods of time. However, discontinuities in returns are relatively easier to identify. If sufficiently large, one may even be able to identify a jump visually on a stock chart. Now, for any specific fund, we do not know whether a jump is an actual change in risk or merely a signal of the underlying risk which already exists in the fund. But regardless, that jump is a relatively unambiguous measure of the fund's risk we can measure precisely and therefore measure a precise response the following month.

This paper makes several contributions to both the mutual fund and stochastic jump literatures. To our knowledge, we are the first to document the existence of stochastic jumps in mutual fund returns. Given funds generally hold portfolios of over 100 securities, investors may assume funds are diversified with smooth returns. However, considering aggregate market returns jump [29] it is reasonable to expect jumps in fund returns. We find that roughly 8 percent of mutual funds experience a return jump each month and investors respond to them by withdrawing cash. Additionally, we find investors respond to jumps that are correlated across an investment objective

or across all funds, suggesting they view these jumps as systematic risk. Interestingly, we find investors reward positive non-systematic jumps, suggesting they view them as a signal of managerial ability.

This paper additionally adds empirical application to the stochastic jump literature. Much of the literature is motivated by the need to better identify systematic risks for more accurately optimized portfolio allocation (see e.g. [8]). In this paper mutual funds act as a laboratory to demonstrate investors can not only identify jumps, but respond to systematic jumps by reallocating capital across funds. Also, given discontinuous returns impact the estimation of risk factor loadings (see e.g. [32]), identifying jumps in mutual funds motivates additional work in empirical measurement of systematic risk in managed portfolios.

Hypothesis Development

Mutual funds generally hold portfolios of 100 or more different securities, suggesting a level of diversification even for funds concentrated inside industries [26], which may smooth returns sufficiently to eliminate discontinuities. However, diversification does not inherently eliminate jumps. Substantial evidence exists for discontinuous returns in even highly liquid equity portfolios (see e.g., [21] [23]) and across entire markets [17] [3] [29]. Additionally, active funds may hold fixed income [13] or option [14] which, due to their market characteristics, are highly likely to have discontinuous returns (see e.g., [20] [18]). A fund's investors may even cause discontinuous returns. In providing liquidity to investors, funds forfeit returns [19]. If the liquidation of assets to cover outflows is large enough, it could cause a jump in returns. This leads us to our first hypothesis:

Hypothesis 1: Mutual funds have discontinuous returns.

The existence of discontinuities in mutual fund returns does not, by itself, prove investors should or do react to them. The fact the jump literature has spent decades carefully developing more sophisticated jump detection techniques (see e.g. [25] [27]) may mean investors are unable to identify jumps when they occur (or can only identify extremely large jumps). And even if they can identify them, they may only be concerned with jumps to the extent they impact the distribution of their portfolio's returns [28]. They could only alter their capital allocation when jumps are large enough to alter a fund's standard deviation or kurtosis. If that is the case then they aren't really responding to jumps, but to the overall risk of the fund.

However, a significant amount of research says investors should care about jumps. Todorov and Bollerslev [33] and Bollerslev, Li, and Todorov [10] show that jumps alter betas while Bollerslev, Law, and Tauchen[8] shows jumps represent systematic risk not captured in beta. If true, investors should factor jumps into their optimal portfolio allocation [17] [1] [11]. Given discontinuous returns are definitionally more risky than continuous returns, investors should remove assets from funds, which experience jumps, even when jumps increase returns. This gives us Hypothesis 2:

Hypothesis 2: Investors remove capital from mutual funds which experience stochastic jumps.

We begin our analysis of flows with a simple regression of flows regressed on our two jump indicator variables (positive jumps and negative jumps), controlling only for the two variables the

literature has previously identified as having the largest impact on flows: the log of total net assets of the fund and the flows into all funds in the same investment objective. These results are reported as Model 1 in Table 2. We note that both jump coefficients (PJump and NJump) are negative and significant. As these are indicator variables, their interpretation is straight forward. Holding all else constant, a fund with a positive jump sees 22 basis points of its assets flow out the following month. The effect is economically larger for negative jumps, which results in a 31 basis point outflow. This is our first evidence in support of Hypothesis 2. Investors respond to jumps by removing cash from the fund.

Model 1's analysis is admittedly simple, so we include four additional specifications in Table 1 to refine our examination of jumps and control for additional fund characteristics. Model 2 introduces a control variable called High Ret, which is an indicator variable equal to 1 if the fund outperformed its investment objective's mean return and 0 otherwise. That also allows us to condition the flow response to jumps on both whether the jump was positive or negative and whether returns were high or low. As expected, high returns result in inflows (78 basis points). Turning to jumps, we don't really have an expectation on variation across the four jump scenarios, other than we still believe they will all be viewed negatively by investors. And this is what we find for three out of four jump scenarios. For instance, a positive jump in the presence of high returns in the largest relative outflows (47 basis points). Examining the partial derivative of the equation with respect to high returns, we see that outperformance with no jump results in inflows of 78 basis points while outperformance with a positive jump results in inflows of only 31 basis points.

Model 3 includes three variables to control for fund fees. Expense fee is defined as the fund's expense ratio minus 12b-1 fees (in essence a proxy for management fee). While all three fees (expense, advertising, and loads) have a negative relation with flows, the relation between jumps and flows remains unchanged.

As the thesis of this paper is predicated on jumps representing risk, Model 4 includes controls for the higher moments of the fund's return distribution. Standard deviation, skewness, and kurtosis are all measured from daily returns during month t-1. Our biggest concern here is perhaps kurtosis, as there is a mechanical relationship between the tails of the return distribution and the probability of jumps occurring. While we find investors do not like standard deviation (a 1 percentage point increase in daily standard deviation reduces flows by 14 basis points), the coefficient on kurtosis is not significant and, more importantly, does not impact the relation between jumps and flows. One interesting finding is that the coefficient on skewness is positive and significant. This is consistent with a long line of work suggesting investors (both rationally and irrationally) have a preference for skewness (see e.g. [5] [15] [34]). Overall, Table 1 is consistent, strong evidence in favor of Hypothesis 2. Investors do not like jumps and remove statistically and economically significant amounts of cash from funds in the month following a jump.

Given the magnitude of the jump/flow relation appears to be conditional on objective adjusted performance, we want to determine if it is conditional on fund characteristics. Most notably characteristics related to risk expectations. If a jump is a signal of riskiness in the fund, then investors should respond more strongly to that signal if they perceive the fund as low risk. In Table 3 we divide our sample monthly three ways: (1) high and low expenses, (2) high and low tracking error, or (3) high and low return standard deviation, where high is above median and low is below median in month t. Low expense funds tend to be less active than higher expense funds, while low

tracking error and low return standard deviation funds definitionally have less risk than their higher counterparts.

We find the negative relation between jumps and flows exists almost exclusively in low risk funds. Low expense funds with high returns see outflows following jumps, low tracking error funds see outflows following negative jumps, independent of fund performance, and low standard deviation funds see outflows regardless of whether the jump is positive or negative and regardless of whether returns are high or low. Only one jump coefficient loads significant for any high risk funds: high expense funds with high returns and a negative jump see outflows. Otherwise they see no flow relation with jumps.

Conclusion

In this paper we examine whether mutual fund investors adjust their asset allocation to discontinuities in returns (stochastic jumps). We find that mutual funds experience jumps in returns. On average, 8.45 percent of funds experience a jump monthly and these jumps are economically large (several times larger in absolute terms than median daily returns). Investors do not like jumps, removing cash from funds following either positive or negative jumps. This effect is economically large, and can wipe out nearly all expected inflows when a fund outperforms its investment objective.

Coefficients from pooled OLS of monthly net asset flow (in time t+1) on fund performance characteristics. The sample period is 2001 through 2011. Log(TNA) is the log of the fund's total net assets in time t. Obj Flow is the dollar holdings value weighted net asset flow into the fund's investment objective in time t+1. Jumps are divided into positive (PJump) and negative (NJump). High Ret (Low Ret) is high (low) return defined as an indicator variable equal to 1 if the fund outperformed (underperform) its investment objective's mean return and 0 otherwise. Jumps are identified using BNS jump measure. See the Appendix for detailed calculation. Expense fee is measured in excess of the 12b-1 fee. Stdev, Skew, and Kurt are the moments of daily fund returns during the month. t-statistics are estimated using standard errors clustered by time (months) and investment objective.

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	(1)		(2)		(3)		(4)	
	Coef	t-stat	Coef	t-stat	Coef	t-stat	Coef	t-stat
Intercept	0.0256	22.56	0.0214	18.96	00171	13.71	0.0195	14.64
Log(TNAt-1)	-0.0030	-22.54	-0.0030	-22.42	-0.0016	-14.04	-0.0017	-14.39
Obj Flowt	0.2564	2.03	0.2573	2.03	0.2058	1.94	0.2026	1.95
PJumpt	-0.0022	-2.80						
NJumpt	-0.0031	-3.00						
High Rett-1			0.0078	19.58	0.0075	21.89	0.0074	21.87
PJumpt-1*High Rett-1			-0.0047	-5.23	-0.0046	-5.84	-0.0060	-7.95
NJumpt-1*High Rett-1			-0.0037	-2.64	-0.0053	-4.16	-0.0053	-4.15
PJumpt-1*Low Rett-1			0.0002	0.17	-0.0006	-0.74	-0.0021	-2.53
NJumpt-1*Low Rett-1			-0.0024	-2.17	-0.0037	-3.95	-0.0035	-3.77
Expense Feet-1					-0.3486	-7.88	-0.4095	-8.93
12b-1 Feet-1					-0.3513	-4.57	-0.4034	-5.24
Max Loadt-1					-0.0979	-11.44	-0.0943	-11.00
Stdev(Rett-1)							-0.1412	-4.10
Skew(Rett-1)							0.0006	1.76
Kurt(Rett-1)							-0.0001	-0.75
Objectives Fixed Effects	No		No		No		No	
N	427,181		426,819		384,819		384,538	
Adj. R2	0.0095		0.0122		0.0119		0.0125	

References available upon request from the author(s)