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Conditional portfolio allocation: Does aggregate market liquidity matter?

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ABSTRACT

This paper investigates how aggregate liquidity influences optimal portfolio allocations across various US characteristic portfolios. We consider short-term allocation problems, with single and multiple risky assets, and use the nonparametric approach of Brandt (1999) to directly express optimal portfolio weights as functions of aggregate liquidity shocks. We find, first, that the effect of aggregate liquidity is positive and decreasing with the investment horizon. Second, at daily and weekly horizons, this effect is weaker on allocations in large stocks and gets stronger as we move toward small stocks, regardless of the other stock characteristics, suggesting that liquidity is the main concern of very short-term investors. Third, conditional allocations in risky assets decrease and exhibit shifts toward more liquid assets as aggregate liquidity worsens. Overall, conditioning on aggregate liquidity yields empirical results that are consistent with the so-called flight-to-safety and flight-to-liquidity episodes. Finally, we propose a simple tactical investment strategy and show how aggregate liquidity information can be exploited to enhance the out-of-sample performance of long-term strategies.

1. Introduction

We aim in this paper to examine the relation between aggregate market liquidity and optimal portfolio allocations. Aggregate market liquidity has been proved by many recent works to contain leading information about US future returns as well as real economy and macroeconomic conditions. However, to date, there has been no study that examines its impact on investment decisions. This paper intends to fill this gap in the literature by studying its implications on optimal portfolio allocation across various test portfolios including (a) the market portfolio, (b) 3 size-based portfolios, and (c) 20 double-sorted portfolios on the basis of size and other stock attributes including B/M, momentum, market beta, liquidity, and quality characteristics. In this work, we focus on short investment horizons (daily, weekly, monthly, and quarterly horizons) and consider conditional portfolio choice problems in the presence of a risk-free asset and both single and multiple risky assets. We build on the nonparametric method of Brandt (1999) to compute optimal conditional portfolio allocations as functions of the lagged aggregate liquidity level. The advantage of this method is that it computes optimal portfolio allocations directly from observing the signal and thereby avoids any model misspecification and estimation errors that can arise from any attempt to model return distributions. Additionally, it computes a solution for a CRRA-utility problem, which offers the advantage of considering any possible dependency between higher moments and the conditioning variable.

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We find strong evidence that aggregate liquidity influences optimal portfolio allocations. Our main findings can be summarized as follows. First, in line with the clientele effect (Amihud and Mendelson, 1986), the effect of aggregate liquidity is stronger at daily frequency and decreases with the investment horizon. Second, single risky asset settings show that, regardless of the portfolio B/M, momentum, market beta, and quality characteristics, the investor reacts more aggressively to aggregate liquidity shocks when investing in small stocks than when investing in large stocks. The only exceptions are allocations in large-illiquid stocks that have also strong sensitivity to liquidity shocks. This suggests that liquidity is the main concern of short-term investors. Third, multiple risky asset settings, without short selling, show that, regardless of the portfolio B/M, momentum, market beta, and quality characteristics, conditioning on aggregate liquidity yields mainly portfolio compositions with varying percentages of small stocks, large stocks, and the risk-free asset. In particular, the investor tends to gradually exit the market and shift toward large stocks as aggregate liquidity worsens. Overall, our results are in line with the flight-to-safety and the flight-to-liquidity episodes that have been documented in the literature (Beber et al., 2009; Longstaff, 2004; Vayanos, 2004). In addition, our findings give strong support to the assertion that investors have time-varying risk aversion and preferences for liquidity (Beber et al., 2009; Vayanos, 2004). Fourth, when short selling are allowed, the investor do not seem to exit the market as aggregate liquidity deteriorates. She instead engages in long/short strategies. Our results are robust to (i) different degrees of risk aversion, (ii) different sample periods, and (iii) alternative liquidity measures. Finally, in order to assess the economic value of exploiting information contained in aggregate liquidity, we propose a simple strategy that adapts to aggregate liquidity changes and assess its out-of-sample performance. All results indicate that our strategy is economically profitable and helps increasing return and reducing risk.

The remainder of the paper is organized as follows. Section 2 discusses relevant literature; Section 3 explains the investor's problem and describes Brandt's nonparametric technique; Section 4 presents data and preliminary analysis. We discuss, in Section 5, the empirical results on the effect of aggregate liquidity on optimal allocations and present robustness checks in Section 6. In Section 7, we propose a simple investment strategy based on aggregate liquidity signals and evaluate its out-of-sample performance. Section 8 concludes the paper.

2. Relevant literature

Our paper is closely related to the literature on portfolio allocation problems under return predictability. Since substantial empirical works found that US equity returns are partially predictable from some predictive variables such as dividend yield, term spread, and a variety of macroeconomic instruments, a number of studies have investigated the implications of those findings on optimal portfolio allocation policies. For example, Kandel and Stambaugh (1996), Balduzzi and Lynch (1999), Barberis (2000), and Campbell and Viceira (1999) use the dividend yield, and Brandt (1999) and Aît-Sahalia and Brandt (2001) use the lagged return, dividend yield, default spread, and term spread. In general, they conclude that optimal portfolio allocations are quite sensitive to variations in their conditioning variables and therefore investors may incur significant costs if they ignore time variation in those instruments. Along the same lines of the previous studies, we focus in this work on aggregate market liquidity as a predictive variable and examine its implications on portfolio allocation.

The concept of market liquidity, as a stock characteristic, is broadly defined as the ability of an asset to be transformed into cash without loss of value. Amihud and Mendelson (1986) were the first authors to confirm the existence of a negative relation between liquidity and asset returns. The effect of the asset's liquidity on optimal portfolio allocation has been addressed only in more recent studies. Longstaff (2001), for example, examines a portfolio choice problem where the investor has access to an illiquid risky asset that could not be traded immediately. Ghysels and Pereira (2008) study the effect of liquidity, as a stock characteristic, on optimal portfolio allocations in small and large stocks. Our work differs from these studies in that we consider liquidity as an aggregate state variable rather than a stock characteristic. Our aim, hence, is to investigate the effect of this aggregate liquidity on optimal portfolio allocation. Our motivation for this stems from three lines of research. First, there is a growing evidence that aggregate market liquidity is an important state variable affecting future returns. The notable works in this field are those of Amihud (2002), Pastor and Stambaugh (2003), Acharya and Pedersen (2005), Liu (2006), and Watanabe and Watanabe (2008) among others. All these authors documented that aggregate liquidity is a priced state variable. For example, Amihud (2002) found that when aggregate liquidity falls, stock prices fall, leading to an increase in future expected returns. Amihud and Mendelson (2008) argues that "when market liquidity falls, investors anticipate that liquidity costs will remain high for a while because of the persistence of illiquidity, and higher expected liquidity costs should cause expected returns to rise and stock prices to fall." In addition, Pastor and Stambaugh (2003) and Sadka (2006) found that stocks exhibiting a greater sensitivity to aggregate market liquidity earn higher returns. They argue that asset prices include a compensation for the systematic liquidity risk. Second, besides the predictive power of innovations in aggregate liquidity to forecast expected returns, other supporting evidence comes from the role that market liquidity plays in financial markets. For example, Brunnermeier and Pedersen (2009) provide a theoretical framework that links market liquidity, funding liquidity, and asset prices. The model explains how shocks in the funding of liquidity providers, especially during periods of financial stress, can affect assets' market liquidity, leading asset prices to decline. This decline in prices, in turn, affects the ability of liquidity providers to raise funding, creating a downward liquidity spiral across asset classes and markets. Third, we also find support in recent macroeconomic research, such as the work of Næs et al. (2011). The authors highlight the importance of stock market liquidity as a state variable containing leading information about current and future real economy conditions. Using Granger tests, these authors found that, for both US and Norway markets, causality goes from stock market liquidity to real economy.

All these studies show that aggregate liquidity contains useful information about future investment opportunities. However, despite this predictability ability, its impact on investment decisions has not been adressed in previous studies. This paper