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Why does higher variability of trading activity predict lower expected returns?

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ABSTRACT

The paper shows that controlling for the aggregate volatility risk factor eliminates the puzzling negative relation between variability of trading activity and future abnormal returns. I find that variability of other measures of liquidity and liquidity risk is largely unrelated to expected returns. Lastly, I show that the low returns to firms with high variability of trading activity are not explained by liquidity risk or mispricing theories.

1. Introduction

Chordia et al. (2001) show that firms with higher variability of trading activity (measured by either volume or turnover) have lower expected returns. If one thinks of turnover as a measure of liquidity or liquidity risk, this regularity (referred henceforth as the turnover variability effect) is puzzling. If anything, firms with higher variability of liquidity should be more risky, since, all else equal, higher variability of liquidity means that the firm will become illiquid with higher probability.[1]

In this paper, I argue that higher turnover variability picks up higher idiosyncratic risk, and this is the reason why higher turnover variability predicts lower future returns.[2] I also refute the claim of Chordia et al. that liquidity variability appears to be negatively related to expected returns by considering multiple alternative liquidity measures and finding that their variability is unrelated to expected returns.

The main question of this paper is also broader than "what explains the turnover variability effect?". Similar to the initial study of Chordia et al. (2001), I try to find out if liquidity variability is priced. The turnover variability effect, which states that the relation between liquidity variability and expected returns is backwards, is the obstacle one has to remove before answering the bigger question. In this paper, I use a battery of alternative liquidity measures and find that the relation between liquidity variability and expected returns is zero rather than negative. The zero relation, in contrast to the negative one, opens the gate to future studies of liquidity variability pricing, because the zero relation might arise because proxies for liquidity variability are imprecise.

Prior research shows that high idiosyncratic risk firms have negative CAPM alphas because they outperform the CAPM when aggregate volatility increases.[3] The outperformance happens for two reasons. First, aggregate volatility and average idiosyncratic risk in the economy comove (see Duarte et al., 2012; Barinov, 2011, 2013). Holding all else equal, when idiosyncratic risk increases, the value of option-like firms[4] also increases, which means that such firms react less negatively to increases in aggregate volatility. This

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[1] In empirical tests, variability is measured as the coefficient of variation, the ratio of the standard deviation of the variable to the average value of the variable.

[2] All tests in the paper use turnover variability only, but using volume variability instead brings about very similar results (available upon request).

[3] For example, Barinov (2011) successfully uses an aggregate volatility risk factor to explain the idiosyncratic volatility discount of Ang et al. (2006). Barinov (2013) does the same to explain the analyst disagreement effect of Diether et al. (2002).

[4] Equity can be option-like either because the firm has a lot of growth options (equity is a claim on the options) or because the firm has a lot of debt (equity itself is an option on the assets with the strike price equal to the debt value).

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effect is naturally stronger for high idiosyncratic risk firms, which are more likely to witness large increases in idiosyncratic risk.[5]

Second, as Johnson (2004) shows, all else equal, for option-like firms higher idiosyncratic risk implies lower beta. By Ito's lemma, option's beta is equal to the product of the beta of the underlying asset and the elasticity of the option's value with respect to the value of the underlying asset. If the idiosyncratic risk of the underlying asset increases, the second term does not change, but the first term declines. The option value becomes less responsive to the value of the underlying asset if the latter is more volatile and its value becomes "less informative".

As idiosyncratic risk increases together with aggregate volatility, option-like firms with high idiosyncratic risk will witness large increases in idiosyncratic risk and the corresponding decline in their betas. Lower betas will, in turn, moderate the increase in future discount rates that happens in volatile periods and the consequent drop in firm value. Hence, option-like firms with high idiosyncratic risk will again do better than what their CAPM betas imply when aggregate volatility increases.[6]

Campbell (1993) and Chen (2002) show that investors would require a lower risk premium from the stocks, the value of which correlates least negatively with aggregate volatility news, because these stocks provide additional consumption precisely when investors have to cut their current consumption for consumption-smoothing and precautionary savings motives. Ang et al. (2006) confirm empirically that the stocks with the least negative sensitivity to aggregate volatility increases have abnormally low expected returns. This paper builds on this literature and shows that high turnover variability firms have low expected returns because they have high idiosyncratic risk and are thus a hedge against aggregate volatility risk. The paper adds to the list of the anomalies explained by aggregate volatility risk and strengthens the theory about the relation between idiosyncratic risk and aggregate volatility risk by applying the theory to the anomaly it was not originally designed to explain.

A necessary condition for the aggregate volatility risk explanation of the turnover variability effect (or any other idiosyncratic risk effect) is the existence of systematic component in average idiosyncratic risk that would be correlated with aggregate volatility. The existence of such correlation does not imply that firm-specific shocks have a systematic component, which would contradict the definition of the term "firm-specific". Rather, it is the volatility of these shocks that has a systematic component.

Duarte et al. (2012) and Barinov (2011, 2013) test this hypothesis and arrive at two findings. First, the first principal component in firm-level idiosyncratic volatilities explains 35% of their variance (Duarte et al., 2012). Second, average idiosyncratic volatility and average analyst disagreement are strongly related to current values, as well as leads and lags, of such indicators as VIX, realized volatility, expected market volatility, and NBER recession dummy (Barinov, 2011, 2013). For example, in recessions average idiosyncratic risk seems to increase by about 30%, and 1% increase in average idiosyncratic risk causes 0.2–0.4% increase in current and future values of market volatility.

The paper proceeds as follows: Section 2 presents the data sources and defines the main variables. Section 3 starts by showing that firms with high turnover variability are exactly of the type that is, according to my hypothesis and prior research, the best hedge against aggregate volatility risk – high idiosyncratic risk firms. Section 3 also documents that the turnover variability effect weakens by at most 25% after controlling for related anomalies (Ang et al., 2006; Diether et al., 2002) and remains statistically and economically significant. Hence, the turnover variability effect is an independent anomaly that merits a separate explanation.

In Section 4, the main result of the paper is obtained by using the two-factor ICAPM with the market factor and the aggregate volatility risk factor (the FVIX factor). The FVIX factor tracks the daily changes in the CBOE VIX index. The VIX index measures the implied volatility of S&P 100 options.[7] Section 4 shows that the negative CAPM alphas of high turnover variability firms are explained by their positive FVIX beta (a positive FVIX beta means relatively good performance when VIX increases) both in portfolio sorts and in the cross-sectional regressions with risk-adjusted returns on the left-hand side, as in Brennan et al. (1998).

According to my theory, higher idiosyncratic risk reduces the risk of option-like firms. The natural prediction is that the effect of idiosyncratic risk on expected returns is stronger for option-like firms. Section 4 confirms that in the double sorts on turnover variability and measures of equity option-likeness, the turnover variability effect is limited to the firms with high market-to-book or bad credit rating. Further analysis shows that these patterns are explained by the FVIX factor and that the link between the turnover variability effect and equity option-likeness is also strong in Fama–MacBeth (1973) regressions.

I also consider alternative explanations of the turnover variability effect. Sections 5.3 and 5.4 look at liquidity/liquidity risk explanations and find that turnover variability is unrelated to liquidity risk or its variability, but strongly related to variability of liquidity. However, further analysis shows that variability of liquidity itself is not priced, reinforcing the earlier conclusion that the reason why variability of turnover is priced is because it picks up idiosyncratic risk and therefore aggregate volatility risk.

Section 5.1 rejects the hypothesis of Pereira and Zhang (2010) that low returns to firms with highly variable trading activity are due to the fact that these firms have higher chance of becoming very liquid. Section 5.1 finds that high turnover variability firms are very illiquid and almost never become more liquid than firms with low variability of turnover.

The strong negative relation between turnover variability and liquidity also sheds light on why firms with high turnover variability have high idiosyncratic risk. Liquidity drives variability of trading activity: illiquid firms are infrequently traded, and their trading volume witnesses frequent jumps due to the pent-up demand. Consistent with that, I discover in Section 5.1 that the frequency of zero returns is 2.5 times higher in the highest turnover variability quintile than in the lowest turnover variability quintile. Liquidity, in turn, is driven by idiosyncratic risk, as much of the microstructure literature suggests. Higher idiosyncratic risk results in higher bid-ask spreads, stronger price impact, and, as a result, higher trading costs (which, in turn, result in infrequent trading and volatile trading activity).

Section 5.5 studies the possibility that the turnover variability effect is mispricing and finds that the turnover variability effect is indeed stronger for firms with higher limits-to-arbitrage. However, this regularity can be explained by the ICAPM with the FVIX factor, which makes the mispricing explanation redundant. I also find that the turnover variability effect is only moderately concentrated at earnings announcements, somewhat inconsistent with the mispricing explanation, and that the stronger turnover

[5] A recent analysis by Grullon et al. (2012) suggest that changes in idiosyncratic volatility have a substantial effect on the value of real options. In untabulated results, I also confirm that volatility of higher idiosyncratic risk firms responds more to shifts in average idiosyncratic volatility.

[6] The formal model that parallels the discussion in the three paragraphs above can be found in the online Theory Appendix at http://people.terry.uga.edu/abarinov/Theory2014.pdf.

[7] VIX was redefined as the implied volatility of S&P 500 options several years ago. The old series is currently called VXO and spans a longer time period. I use the old definition to increase the sample size. All results in the paper are robust to using the new definition of VIX.