Research Statement

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1 Achievements Summary

In my six years at University of Georgia, I produced nine completed papers. Four of them have been published or accepted for publication (at MS, JFQA, JFM, and JCF). Three received "revise-and-resubmit" (at RFS, JFE, and JBF). These papers have either been resubmitted and are currently considered by the journals, or are being revised for resubmission. Two more papers are submission-ready and are currently being considered by RFS and JFI.

Seven of my papers are solo work, including three published ones (except for the JFM one) and all revise-and-resubmits. Two more are coauthored with other junior faculty members at Terry.

My papers have successfully competed for research awards at several conferences. "Stocks with Extreme Past Returns: Lotteries or Insurance?" received the Best Paper in Investments award at Southern Finance Association (SFA) meetings in 2013. "Turnover: Liquidity or Uncertainty?" (later published in MS) was a runner-up for the Best Paper in Market Microstructure Award at FMA Meetings in 2009. "Institutional Ownership and Aggregate Volatility Risk" was a runner-up for the Best Paper of the Conference at French Finance Association (AFFI) meetings in 2013.

My main line of research is centered around the role of volatility risk and its relation with firm characteristics measuring firm-specific uncertainty and equity option-likeness. My research shows that this relation can explain a long list of important anomalies, such as the value effect, the idiosyncratic volatility discount of Ang et al. (2006), the analyst disagreement effect of Diether et al. (2002), the maximum effect of Bali et al. (2011), the skewness effect of Boyer et al. (2010), etc. My main research idea also produces important
spillovers in corporate finance (explaining the new issues puzzle) and market microstructure (providing an alternative explanation of the negative relation between turnover and expected returns along with evidence that turnover is largely unrelated to liquidity).

A new line of research I started a year ago looks at the relation between firm complexity and stock prices. My coauthors and I find that complex firms (conglomerates) have stronger post-earnings-announcement drift despite being larger, more liquid, attracting more investors’ attention, etc. In a different project, we also find that complexity is negatively related to future returns and this relation is stronger for short-sale constrained firms, suggesting that complex firms are on average overpriced.

I have been active at presenting my work at a number of conferences and refereeing for top finance journals. In total, I have presented my work 45 times in 34 different conferences and 4 research seminars. The highlights of the conference list include AAA 2014, FIRS 2012, 2013, CFEA 2009, Central Bank Workshop on Microstructure 2010, NFA 2008, 2010, 2013.

I also served as a referee roughly 50 times, most importantly 35 times at JFE.

2 Research Agenda

My main line of research evolves around the fact that firms with option-like equity and high firm-specific uncertainty tend to beat the CAPM when expected aggregate volatility increases, i.e. these firms are a hedge against aggregate volatility risk. The intuition is two-fold: first, as aggregate volatility increases during hard times, firm-specific uncertainty increases as well, and the higher firm-specific uncertainty makes real options less sensitive to the value of the underlying asset. The lower sensitivity means lower risk exposure and a smaller increase in expected return during the recessions, which in turn means a smaller loss in value for real options. Second, holding all else fixed, the higher firm-specific uncertainty during recessions increases the value of real options. Assuming that the market beta controls for other impacts of recession and aggregate volatility increase on the value of real options, the two effect above predict that real options perform better than what the CAPM predict during the periods of increasing aggregate volatility. These two effects are naturally stronger for the real options written on volatile assets, which implies that in turn that firms with high levels of firm-specific uncertainty beat the CAPM when aggregate volatility increases, especially if these firms possess valuable real options.
Investors appreciate the ability of the firms with abundant real options and high firm-specific uncertainty to beat the CAPM during the periods of increasing aggregate volatility and reward these firms with lower expected returns for two reasons. First, as Campbell (AER 1993) shows, higher aggregate volatility means lower consumption going forward, and a rational response to an aggregate volatility increase is to cut current consumption and increase savings for consumption-smoothing purposes. Second, as Chen (2002) shows, investors will respond to an increase in aggregate volatility by lowering their consumption and increasing their savings for the precautionary saving motive, since volatility is persistent, and once it goes up, it stays high for a while. Both effects of an increase in aggregate volatility on current consumption imply that an asset that does abnormally well in the periods of increasing aggregate volatility provides additional consumption when it is scarce, and therefore represents a valuable hedge.

The second line of research that my coauthors and I started a year ago deals with firm complexity as a limits-to-arbitrage variable. We think about conglomerates as complex firms and measure their complexity in several ways (number of segments, concentration of sales across segments, etc.) We argue that, despite conglomerates being larger, more liquid, less volatile, etc., investors will still face difficulties in pricing conglomerates. In "Firm Complexity and Post-Earnings-Announcement Drift" (coauthored with Shawn Park and Celim Yildizhan) we find that PEAD is almost twice stronger for conglomerates and increases in complexity measures. This relation is strengthened by controlling for other limits-to-arbitrage variables. We also find that conglomerates have worse analyst coverage, but the effects of analyst coverage are responsible for about 25% of the relation between PEAD and complexity. Several related projects are currently in the works (see "Work in Progress" section below).

3 Completed Projects

This section describes the details of my existing papers. I have two lines of research, one mature (volatility risk) and one rapidly developing (firm complexity). The volatility risk line can be divided into three parts. The first one is the core part on the fundamental relation between firm-specific uncertainty and systematic risk. The second and third parts extend the ideas developed in the first part to market microstructure issues and anomalies.
3.1 Firm-Specific Uncertainty and Volatility Risk

In "Idiosyncratic Volatility, Growth Options, and the Cross-Section of Returns” (3rd round RFS), I develop my main argument that volatile option-like firms provide a hedge against increases in market volatility. I construct a new volatility risk factor, FVIX, and find that FVIX factor can explain two prominent puzzles: the value effect (Fama and French, JFE 1992) and the idiosyncratic volatility discount of Ang et al. (JF 2006). The paper also pioneered the idea that idiosyncratic volatility has a strong systematic component, which is currently being developed by several popular working papers of other researchers (see, e.g., Duarte et al., 2012, Herskovic et al., 2014). The paper has achieved recognition by several researchers and collected 18 citations, including 6 in top journals.

In "Analyst Disagreement and Aggregate Volatility Risk” (JFQA 2013), I use a different measure of firm-specific uncertainty: the disagreement by financial analysts forecasting firms earnings. My FVIX factor turns out to be capable of explaining the analyst disagreement effect of Diether et al. (JF 2002) - the puzzling negative relation between analyst disagreement and future returns. The FVIX factor is also capable of explaining why the analyst disagreement effect is stronger for low credit rating firms (see Avramov et al., JFE 2009) and seems to be concentrated around credit rating downgrades. This is consistent with my central idea that higher disagreement lowers volatility risk of option-like equity, and therefore the more option-like (e.g., distressed) the firm is, the stronger is the aggregate volatility risk hedge created by analyst disagreement.

3.2 Extensions into Market Microstructure

In "Turnover: Liquidity or Uncertainty?” (MS 2014), I show that turnover (trading volume divided by market cap), often viewed as a measure of liquidity, is in fact unrelated to liquidity measures and strongly related to firm-specific uncertainty and investors disagreement. The negative relation between turnover and future returns, long viewed as a compensation for liquidity or liquidity risk, is explained by the same volatility risk factor (FVIX) that explains the analyst disagreement effect and the idiosyncratic volatility discount (see above). I also show that the negative effect of turnover on future returns is stronger for the firms with high market-to-book and high leverage, and this cross-sectional pattern is also explained by the FVIX factor.

In "Why Does Higher Variability of Trading Activity Predict Lower Expected Returns?” (2nd round JBF), I extend my main idea to the variability of trading volume
and variability of turnover, another potential disagreement proxies, often confused with variability of liquidity. I show that controlling for volatility risk resolves the puzzle of the negative relation between volume/turnover variability and future returns in Chordia et al. (JFE 2001). I also show that variability of volume and turnover is tightly related to other disagreement and volatility proxies, but unrelated to variability of liquidity. Variability of other liquidity measures also turns out to be unrelated to expected returns, confirming further that the puzzling negative relation between variability of trading activity and future returns should not be interpreted as the evidence of the puzzling negative risk premium for variability of liquidity.

### 3.3 Extensions into Anomalies Literature

In ”Aggregate Volatility Risk: Explaining the Small Growth Anomaly and the New Issues Puzzle” (JCF 2012), I use the FVIX factor to explain away the small growth anomaly - the low expected returns of small growth firms, which usually have high idiosyncratic volatility and abundant growth options. The small growth portfolio is the portfolio that is notoriously hard to price, and explaining its returns is a significant improvement over the existing asset-pricing models.

The paper continues with a firm-type story to explain the new issues puzzle of Loughran and Ritter (JF 1995, JF 1997) and the cumulative issuance puzzle of Daniel and Titman (JF 2006), two prominent puzzles at the intersection of asset pricing and corporate finance. Firms that have issued stock are known to have low expected returns, and understanding the cause of this regularity can shed light on the costs of issuing stock and on whether the managers tend to misuse the raised capital.

Since stock issuers are mostly small growth firms, the FVIX factor that explains away the small growth anomaly also explains away the new issues puzzle and the cumulative issuance puzzle as well. I conclude that low returns to stock issuers do not imply that issuing equity is extremely costly to the firm or that the managers squander the proceeds from the stock issue.

In ”Stocks with Extreme Past Returns: Lotteries or Insurance?” (3rd round JFE), I successfully use FVIX to explain the negative alphas of lottery-like stocks, such as stocks with high maximum daily returns in the past month (the negative alphas documented by Bali et al., JFE 2011) and stock with most positive expected skewness (the negative alphas documented by Boyer et al., RFS 2010). I show that lottery-like stocks are in fact option-like firms with high idiosyncratic volatility, and the effects of lottery-likeliness are
stronger for growth firms and distressed firms, which are the most option-like. Thus, the paper resolves two important puzzles (the papers by Bali et al. and Boyer et al., though recent, both have over 150 citations) and offers a new look on the emerging literature on lottery-like stocks.

I also study in the same paper the relation between FVIX and alternative volatility risk factors and find that FVIX is similar to the short-run volatility component of Adrian and Rosenberg (JF 2008), but does not overlap with long-run volatility of either Adrian and Rosenberg (JF 2008) or Campbell et al. (2014). FVIX is also unrelated to average idiosyncratic volatility factors of Chen and Petkova (RFS 2012) and Herskovic et al. (2014).

In "Short Interest and Aggregate Volatility Risk" (JFM 2014, coauthored with Julie Wu), we find that heavily shorted stocks tend to have high market-to-book, low credit rating, and high levels of disagreement. That suggests that highly shorted stocks are a good hedge against aggregate volatility risk, which can offer an alternative explanation of why highly shorted stocks have low future returns (the existing explanations are that either short sellers are informed or that heavily shorted stocks are hard to short and therefore overpriced). Consistent with that, we find that the FVIX factor significantly reduces the negative alphas of highly shorted stocks. We also find that only highly shorted stocks with either high disagreement or abundant real options have negative CAPM alphas, and these alphas are largely explained by the FVIX factor.

We also examine the reasons that lead short sellers to short stocks with high uncertainty, option-like equity, and low volatility risk. We find that short sellers target firms with high uncertainty and option-like equity based on (arguably erroneous) belief that these stocks have negative alphas, as the anomalies literature suggests. We find that short sellers are not guided by volatility risk in their shorting choices and load on volatility risk inadvertently while chasing firms with high uncertainty and option-like equity.

In "Institutional Ownership and Aggregate Volatility Risk" (submitted to Review of Finance), I find that institutional investors prefer stocks with intermediate levels of volatility, uncertainty, and growth options, thus resolving the long-standing argument about the relation between institutional ownership and firm-specific risk. The relation turns out to be U-shaped, instead of linear, assumed by previous studies.

Since both the firms with the lowest uncertainty and the highest uncertainty end up in the low institutional ownership subsample, sorting on uncertainty proxies in this subsample creates a greater spread in uncertainty and, therefore, a greater spread in aggregate volatility risk. I show that the FVIX factor can explain why numerous anomalies are
stronger for the stocks with low institutional ownership, as found, for example, by Nagel (JFE 2005), offering an alternative view on the evidence that is usually interpreted as favoring the mispricing explanation of the anomalies.

I also find that the FVIX factor can explain why higher institutional ownership predicts higher future returns, and why this relation is stronger for high uncertainty firms and growth firms, providing an alternative explanation of what is usually thought of as the evidence of stock-picking ability by institutions.

3.4 Firm Complexity

The second line of my research that is currently emerging deals with the impact on firm complexity on asset prices. In Firm Complexity and Post-Earnings-Announcement Drift (coauthored with Shawn Park and Celim Yildizhan), my colleagues and I find that post-earnings-announcement drift, one of the oldest and most prominent puzzles in both finance and accounting literature, is stronger for conglomerates and for more complex conglomerates. In other words, investors fail to incorporate part of the information conveyed during earnings announcements into prices, and this error has a greater magnitude for complex firms. This result is surprising, because conglomerates, and especially large complex conglomerates, are exactly the type of firms (large, liquid, stable) one would expect to be fairly priced. The result is also potentially important for practitioners, since the implied trading strategy deals with conglomerates, which are large, liquid, and low volatility firms. This is in contrast with most anomalies literature that uses other variables related to the strength of an anomaly and usually concludes that in order to make better use of any anomaly, investors should trade in neglected, illiquid, volatile etc. stocks. Since the first draft of the paper appeared in November 2013, the paper was presented at several reputable finance conferences and one top accounting conference and was well received by the audience. The paper has also made several top recent downloads lists on SSRN.

In another on-going project on firm complexity, my coauthors and I find that firm complexity implies lower returns going forward. This relation is the strongest for the firms that are hard to short, suggesting that complexity is positively related to overpricing. This result also sheds light on how the diversification discount, an important phenomenon in corporate finance, arises. It turns out that conglomerates trade at higher multiples because they are gradually losing value, and this loss in value is positively related to their complexity.
4 Abstracts of Publications


We propose a risk-based explanation on why stocks of firms with high relative short interest (RSI) have lower future returns. We argue that these firms have negative alphas because they are a hedge against expected aggregate volatility. Consistent with this argument, we show that these firms have high firm-specific uncertainty and real options, and the ICAPM with the aggregate volatility risk factor can explain the high RSI effect. The key mechanism is that high RSI firms have abundant growth options and, all else equal, growth options become less sensitive to the underlying asset value and more valuable as idiosyncratic volatility goes up. Idiosyncratic volatility usually increases together with aggregate volatility, i.e., in recessions.


I show that turnover is unrelated to several alternative measures of liquidity and liquidity risk and that liquidity risk factors cannot explain why higher turnover predicts lower future returns. I find that the aggregate volatility risk factor explains why higher turnover predicts lower future returns. I also find that the negative relation between turnover and future returns is stronger for firms with high market-to-book or bad credit rating and these regularities are also explained by the aggregate volatility risk factor.


The paper explains why firms with high dispersion of analyst forecasts earn low future returns. These firms beat the CAPM in the periods of increasing aggregate volatility and thereby provide a hedge against aggregate volatility risk. The aggregate volatility risk factor can explain the abnormal return differential between high and low disagreement firms. This return differential is higher for the firms with abundant real options, and this fact can be explained by aggregate volatility risk. Aggregate volatility risk is also capable of explaining why the link between analyst disagreement and future returns is stronger for firms with high short-sale constraints.

The paper shows that new issues earn low expected returns because they are a hedge against increases in expected aggregate volatility. Consistent with that, the ICAPM with the aggregate volatility risk factor can explain the new issues puzzle, as well as the small growth anomaly and the cumulative issuance puzzle. The key mechanism is that, all else equal, growth options become less sensitive to the underlying asset value and more valuable as idiosyncratic volatility goes up. Idiosyncratic volatility usually increases together with aggregate volatility, that is, in recessions.

5 Abstracts of Working Papers

**Idiosyncratic Volatility, Growth Options, and the Cross-Section of Returns, August 2013**

*Revise and Resubmit at Review of Financial Studies, 3rd round*

The paper shows that the value effect and the idiosyncratic volatility discount (Ang et al., 2006) arise because growth firms and high idiosyncratic volatility firms beat the CAPM during the periods of increasing aggregate volatility. Growth options become less sensitive to the underlying asset value as idiosyncratic volatility goes up together with aggregate volatility. Hence, growth options’ betas decrease more and their value decreases less in volatile times, which are typically recessions. All else equal, growth options’ value also increases with volatility. The impact of both effects on the firm’s value is naturally stronger for growth firms and high idiosyncratic volatility firms. The two-factor ICAPM with the market factor and the aggregate volatility risk factor completely explains the value effect and the idiosyncratic discount. The two-factor ICAPM also explains why those puzzles are stronger for the firms with high short sale constraints.

**Stocks with Extreme Past Returns: Lotteries or Insurance? (June 2014)**

*Revise and Resubmit at Journal of Financial Economics, 3rd round*

The paper shows that lottery-like stocks are hedges against unexpected increases in market volatility. The loading on the aggregate volatility risk factor explains low returns
to stocks with high maximum returns in the past (Bali, Cakici, and Whitelaw, 2011) and high expected skewness (Boyer, Mitton, and Vorkink, 2010). Aggregate volatility risk also explains the new evidence that the maximum effect and the skewness effect are stronger for the firms with high short-sale constraints, high market-to-book, and low credit rating.

**Why Does Higher Variability of Trading Activity Predict Lower Expected Returns? (September 2014)**

*Revise and Resubmit at Journal of Banking and Finance, 3rd round*

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 also 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 the firms with high variability of trading activity are not explained by liquidity risk and mispricing stories.

**Firm Complexity and Post-Earnings-Announcement Drift, (with Shawn Park and Celim Yildizhan), (January 2014)**

*Submitted to Review of Financial Studies*

The paper shows that the post earnings announcement drift (PEAD) is stronger for conglomerates, despite conglomerates being larger, more liquid, and more actively researched by investors. We attribute this finding to slower information processing about complex firms and show that PEAD is positively related to measures of firm complexity. We also show that PEAD is stronger for new conglomerates than it is for existing conglomerates. Finally, we find that conglomerates are followed by a fewer number of analysts compared to single-segment firms of similar size and that these analysts are more likely to be non-specialists and make larger forecast errors.

**Institutional Ownership and Aggregate Volatility Risk, April 2014**

*Submitted to Journal of Financial Intermediation*

The paper shows that the difference in aggregate volatility risk can explain why several anomalies are stronger among the stocks with low institutional ownership (IO). Institutions tend to stay away from the stocks with extremely low and extremely high levels of firm-
specific uncertainty because of their desire to hedge against aggregate volatility risk or exploit their competitive advantage in obtaining and processing information, coupled with the dislike of idiosyncratic risk. Thus, the spread in uncertainty measures is wider for low IO stocks, and the same is true about the differential in aggregate volatility risk.

6 Work in Progress

Firm Liquidity and Issuing Activity

The paper shows that issuing activity does not result in additional liquidity. I find that even in the subsamples in which issuing is supposed to create more liquidity (severely underpriced IPOs, IPOs backed by venture capital, new issues with high-prestige underwriters) new issues are indeed more liquid, but so are their peers, and thus issuing does not create liquidity. The paper thus refutes the existing liquidity-based explanations of the new issues puzzle. The paper also shows that the low-minus-high turnover factor seems to explain the new issues puzzle and related anomalies only because it picks up volatility risk.

The Idiosyncratic Volatility Discount and Conservative Accounting

One of the attributes of high-quality accounting is conservatism. I find that sorting firms on asymmetric timeliness of earnings, one of the most popular measures of accounting conservatism, produces the conservatism premium of around 15-20 bp per month. The conservatism premium appears unrelated to the size effect, the accrual anomaly, and the idiosyncratic volatility discount. I plan to test three hypotheses: ”conservatism premium is related to risk, because conservative accounting makes firms riskier”, ”conservatism premium is related to risk, because riskier firms choose conservative accounting”, and ”conservatism premium is mispricing, caused by the fact that investors do not appreciate how good conservative accounting is for the firm’s cash flows”.

Diversification Discount and Aggregate Volatility Risk (with Sheri Tice)

Firms with high idiosyncratic volatility and abundant real options tend to beat the CAPM when expected aggregate volatility increases and therefore tend to have lower expected returns. We hypothesize that diversification destroys the idiosyncratic volatility and thereby destroys value by increasing risk. The diversification discount should be stronger for the firms with high market-to-book or high leverage. The link between diversification discount and market-to-book or leverage should be stronger for related diversification.
Higher diversification discount for growth firms and highly levered firms should also imply higher level of aggregate volatility risk and higher expected returns going forward.

**The Idiosyncratic Volatility Discount and the Size Effect**

Small firms usually have high idiosyncratic volatility. The size effect says they should earn high returns. The idiosyncratic volatility discount says just the opposite. This is why the size effect seems weak. When I sort stocks on residual size, orthogonalized to idiosyncratic volatility, I find the size effect alive and well in all periods. Sorting on residual size also eliminates the small growth anomaly and the negative size effect for growth firms. Residual size sorts produce a better pricing factor I call RSMB. RSMB is less correlated with HML and FVIX. Replacing SMB with RSMB makes the HML betas of new issues large and negative instead of zero.