

Subjective Model Uncertainty, Variance Risk Premium,
and Speculative Trading

By
Ming Guo, Hao Zhou

Nancy R. Xu
Boston College

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Objective

- ▶ Develop a model to help understand how subjective ambivalence endogenously generate variance risk premium (VRP) and trading volumes

Motivation

- ▶ The variance risk premium puzzle(s): investors are willing to pay more (almost any time in a business cycle) to hold a hedging position against future variance risk and fluctuation

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- ▶ Paper interpreted it as option overpricing
- ▶ The literature:
 - ⇒ Rational representative agent paradigms [broad rational literature assuming heteroskedastic endowment uncertainty, information uncertainty, time-varying risk aversion can generate time-varying and positive VRP]

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 - ⇒ Introduces **behavioral elements** into pricing VRP in a 3-period model with heterogeneous investors
 - ⇒ Illustrates that the model has the capacity to also understand behavior of trading volumes and asset price simultaneously
 - ⇒ Provides preliminary empirical evidence to support model implications (in particular on the relationship between volume and VRP)

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- ▶ Agents choose their positions among a risk-free bond, a risky security and an option on the security in order to **maximize** expected utility conditional on the path and historical beliefs on period 3

$$\max_{\mathbf{s}^j} E_t^j[U(W_3^j(\mathbf{s}^j))]$$

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- ▶ Period 2: agents observe a public signal and disagree on signals; trade happens.

The Main Finding (in my view): Empirical Justification

Table 4: Variance Risk Premium and Trading Volumes

	TY	RX	JB	SP	GX	NK
Variance risk premium	-0.022** (0.007)	-0.020*** (0.004)	-0.019*** (0.004)	0.015*** (0.004)	0.013*** (0.003)	0.003 (0.003)
Absolute return	0.071*** (0.008)	0.072*** (0.007)	0.103*** (0.009)	0.049*** (0.008)	0.069*** (0.008)	0.056*** (0.010)
<i>Control variables</i>						
Implied volatility Change	0.421** (0.133)	0.420** (0.079)	0.185*** (0.048)	1.015*** (0.093)	1.297*** (0.107)	0.938*** (0.097)
Increase in open interest	-0.007 (0.230)	0.329** (0.151)	-0.372*** (0.086)	2.70* (1.668)	0.159* (0.098)	2.133*** (0.311)
Decrease in open interest	-0.178 (0.167)	0.038 (0.078)	0.104 (0.06)	-0.580*** (0.217)	-0.056 (0.084)	-0.134** (0.073)
Volume: lag 1	0.560*** (0.032)	0.534*** (0.030)	0.522*** (0.024)	0.732*** (0.022)	0.499*** (0.022)	0.612*** (0.021)
Volume: lag 2	0.092*** (0.025)	0.157*** (0.019)	0.111*** (0.017)	-0.004 (0.013)	0.188*** (0.019)	0.052** (0.019)
Days to expiration	-0.003*** (0.0004)	-0.003*** (0.0003)	-0.004*** (0.0003)	-0.002*** (0.0004)	-0.003*** (0.0003)	-0.002*** (0.0002)
Expiration indicator	-0.129** (0.036)	-0.537*** (0.041)	-0.279 (0.047)	-0.115* (0.035)	-0.292*** (0.035)	-0.142*** (0.035)
R^2	0.513	0.568	0.556	0.689	0.565	0.629
$Adj.R^2$	0.510	0.568	0.556	0.687	0.563	0.627

- Empirical justification: S&P500 Trading Volume (Period 2) loads positively on lagged VRP (Period 1)

My view on future improvements

Interesting and novel angle examining an ongoing puzzle!

1. Paper focus, to be revisited
2. Execution, to be revisited

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- ▶ The current draft
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 - ⇒ Promising: we know physical variances and variance risk premiums are moderately correlated in U.S. (and elsewhere the world), and volatility can be interpreted as dispersion in beliefs
 - ⇒ Challenging: confounding (1) subjective model uncertainty = uncertain about my own agent type (ambivalent) \neq (2) uncertain about fundamental future opportunity set the signal carries \approx belief uncertainty

Execution

- ▶ Comparison to rational model:
Lack of economic significance of your explanation
- ▶ International extension, why?
The model is pure domestic; domestic evidence is somewhat weak

Conclusion

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- ▶ To make it more convincing:
 1. Make it more focused
 2. Strengthen the theoretical model calibration and empirical support
 3. Horseshoe with rational models: needs to provide economic significance of the new explanation

Thank You!
nancy.xu@bc.edu