

# **What Makes the VIX Tick?**

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## **Summary**

This paper seeks to uncover the roots of one-minute changes in VIX, an index of S&P 500 option prices, to understand risk neutral volatility and its risk premium component. Our high-frequency approach reveals new facets of the relationship between stock volatility and more basic trading conditions and economic forces. While it is increasingly common to see VIX used as an explanatory variable in empirical studies, our work reminds researchers, practitioners, and anyone who follows the VIX that this popular indicator has roots in more fundamental forces.

Beyond confirming that leverage or volatility feedback effects appear in high-frequency data, associations between VIX and price, trading, and sentiment indicators suggest a variety of influences. Macroeconomic conditions are important to VIX, as is liquidity provision, as suggested by negative serial correlation between VIX changes and temporary price effects at times of macroeconomic news announcements. A surprising finding is that not all indicators of hedging demand or “fear” are identical: changes in VIX are negatively correlated with changes in the price of gold, although some other gold-related indicators suggest that some investors flee to gold when ex ante stock volatility is high.

The power of proxies for small investor sentiment to explain changes in VIX is very small. Therefore, it is tempting to conclude that investor sentiment, psychology, or “animal spirits” are only minor contributors to minute-by-minute aggregate stock market volatility. However, the explanatory power of proxies for the optimistic and pessimistic positive feedback trading is substantial, which could suggest a significant psychological component to VIX changes.