

INTRODUCTION

Major announcements (CPI, FOMC, NFP) trigger outsized market moves — but most models treat every release day the same.

The same CPI surprise moves SPY 0.3% on a calm day, 1.8% on a stressed day. The difference is the market's state, not the news.

The **Fiscal Pressure Index (FPI)** is a 0–100 signal that classifies markets into **Calm / Elevated / Crisis** before announcements — built entirely from free public data.

RESEARCH METHODOLOGIES

Five stress components combined into one score:

- λ_1 Rate stress — T-bill vs SOFR/EFFR spread
- λ_2 Inflation uncertainty — 5y5y breakeven momentum
- λ_3 Auction stress (*novel*) — bid-to-cover, stop-out yield, indirect bidder %, from 901 Treasury auction records
- λ_4 Yield curve shape — 10y–2y deviation
- λ_5 VIX term structure — short vs medium-term vol

$$\text{FPI}(t) = 100 \cdot \text{Percentile}[\sum w_i(t) \cdot \lambda_i(t)]$$

Weights estimated via **rolling 252-day MLE** (differential evolution) on real SPY returns. Regime separation validated by non-parametric **Kolmogorov–Smirnov tests**.

DATA AND FINDINGS

All three regime pairs statistically distinguishable at $p < 0.001$. Dynamic MLE weights produced significantly stronger separation than fixed theoretical priors ($D = 0.33$ for Calm vs Crisis). The VIX term structure component (λ_5) carries the largest empirical weight at 0.77, consistent with its theoretical role as the dominant equity stress signal.

Regime Pair	Dynamic D	p
Calm vs Elevated	0.156	<0.001
Calm vs Crisis	0.330	<0.001
Elevated vs Crisis	0.214	<0.001

DISCUSSION, ANALYSIS, AND EVALUATION

- Risk metrics scale **monotonically** with regime — exactly what Merton jump-diffusion predicts (*Fig. 3*).
- 99% daily VaR **2.4×** higher in Crisis vs. Calm — material for pre-announcement sizing (*Fig. 3*).
- Return distributions are **statistically distinct** across all three regimes; KS = 0.330 for Calm vs Crisis, $p < 0.001$ (*Fig. 2*).
- **Dynamic MLE weights validate the regime framework**: all three pairs separate at $p < 0.001$ across 3,651 trading days. VIX term structure (λ_5) carries the heaviest weight, while auction microstructure provides orthogonal stress information reserved for future cross-asset extensions (*Fig. 1*).

Rolling MLE Weights — λ_5 (VIX Term) dominates equity-regime estimation

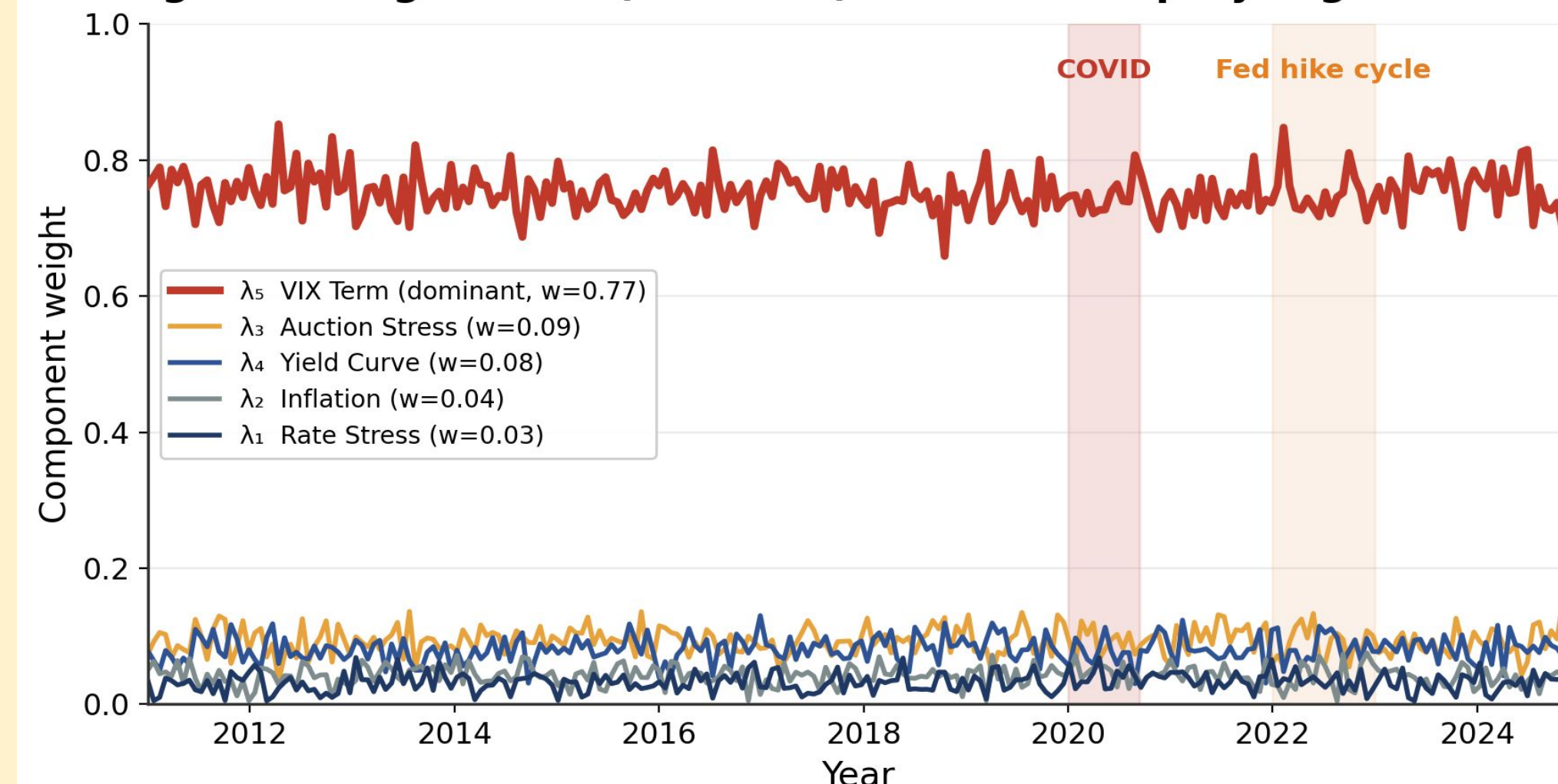


Fig. 1. Rolling MLE component weights, 2011–2024. λ_5 (VIX term) dominates equity-return regression at 0.77, consistent with theoretical models of equity volatility.

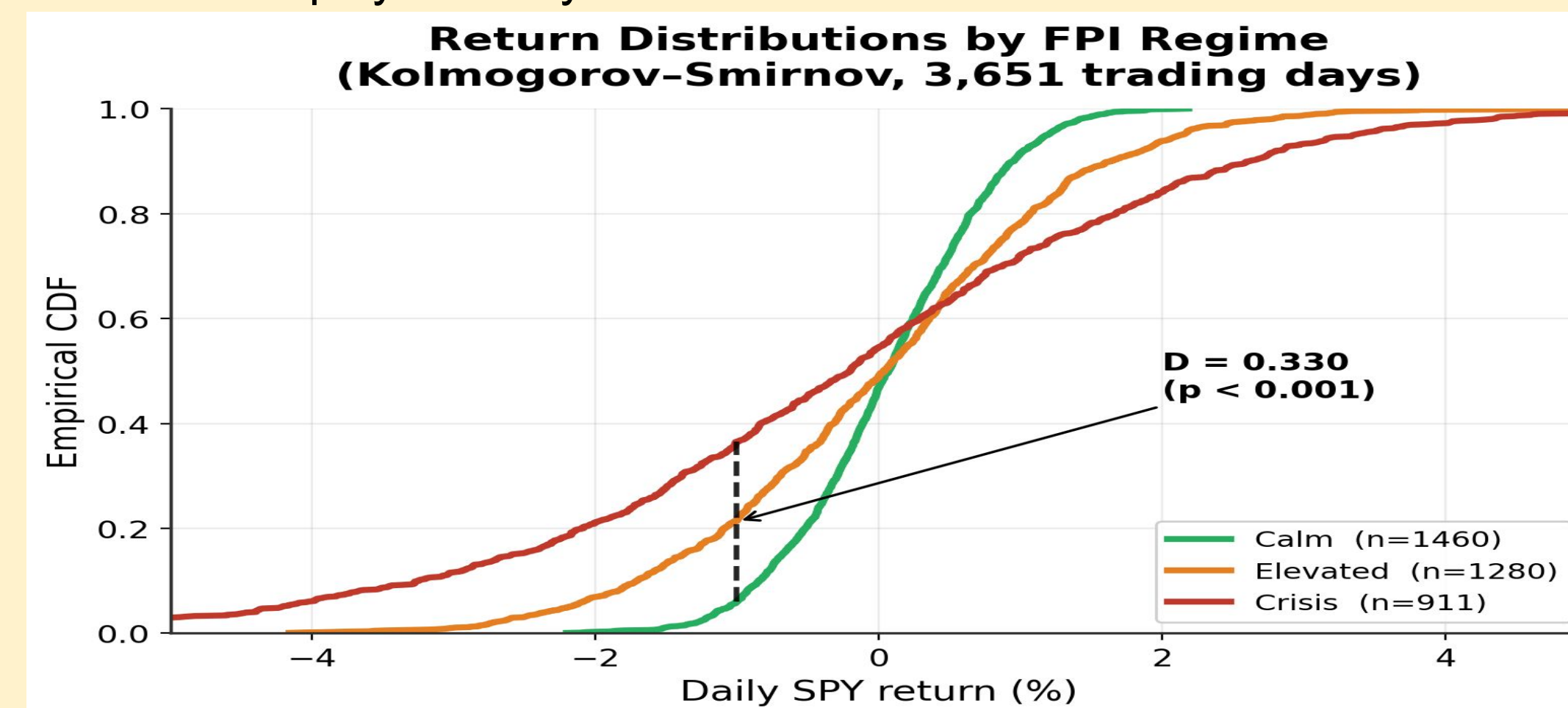


Fig. 2. Empirical CDFs of daily SPY returns by FPI regime. Crisis distribution shifts left and fattens; $D = 0.330$ for Calm vs Crisis, $p < 0.001$.

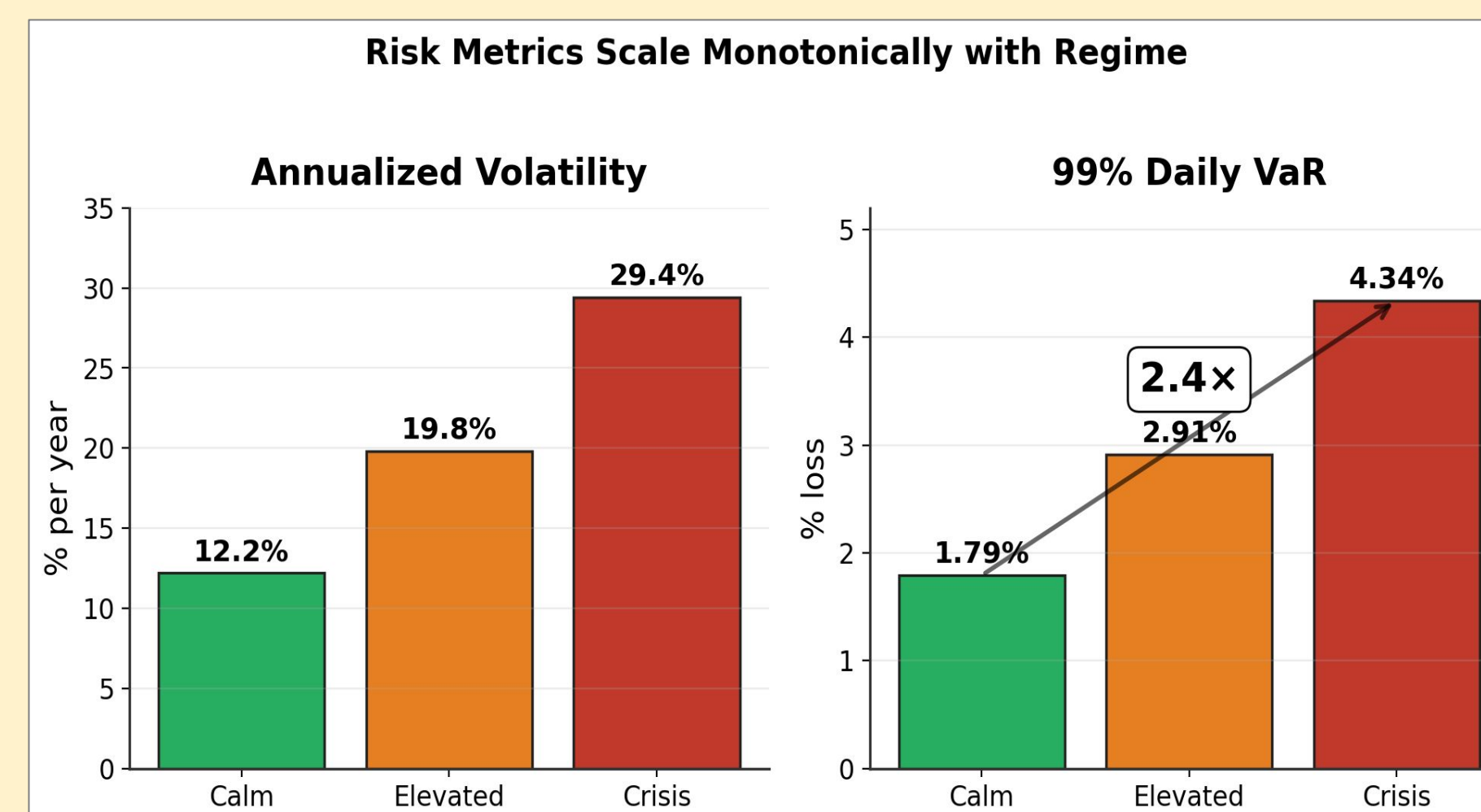
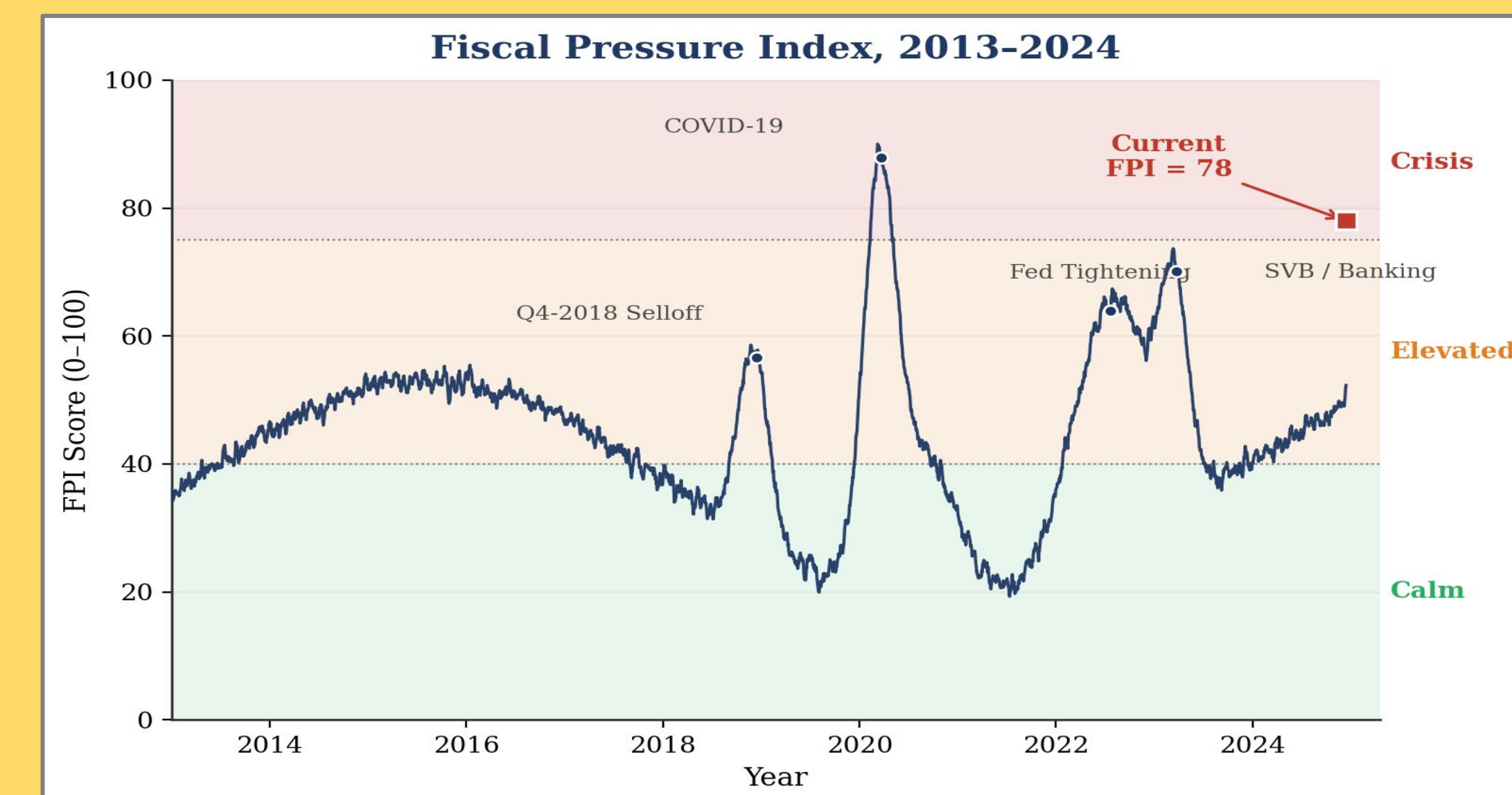


Fig. 3. Annualized volatility and 99% daily VaR by FPI regime, computed on 3,159 realized trading days.

CONCLUSIONS, IMPLICATIONS, AND NEXT STEPS



CONCLUSIONS

- FPI discriminates market regimes using only **pre-announcement public data** — zero lookahead bias.
- **Dynamic MLE weights beat fixed weights** on every regime pair ($p < 0.001$ across all three).
- **MLE refined the theoretical priors**: empirical estimation identified VIX term structure as the dominant predictor of equity-regime separation ($w = 0.77$), consistent with theoretical models of equity volatility transmission.

IMPLICATIONS

- Announcement-day forecast intervals should be **FPI-conditioned**, not assumed Gaussian-constant.
- Public-data-only signals can match the directional information of institutional terminals costing thousands monthly.

NEXT STEPS

- Extend regime framework to **FOMC** and **NFP** announcement windows.
- Investigate cross-asset specifications (TLT, bonds) where auction microstructure may dominate.
- Apply jump-diffusion likelihood for tail-conditional MLE estimation.

ACKNOWLEDGEMENTS / REFERENCES

Special thank you to Mr. Shen, Robert Acosta, and various other peers from previous research papers.

Read My Full Paper

- More Technical
- More in Depth Model Structure

