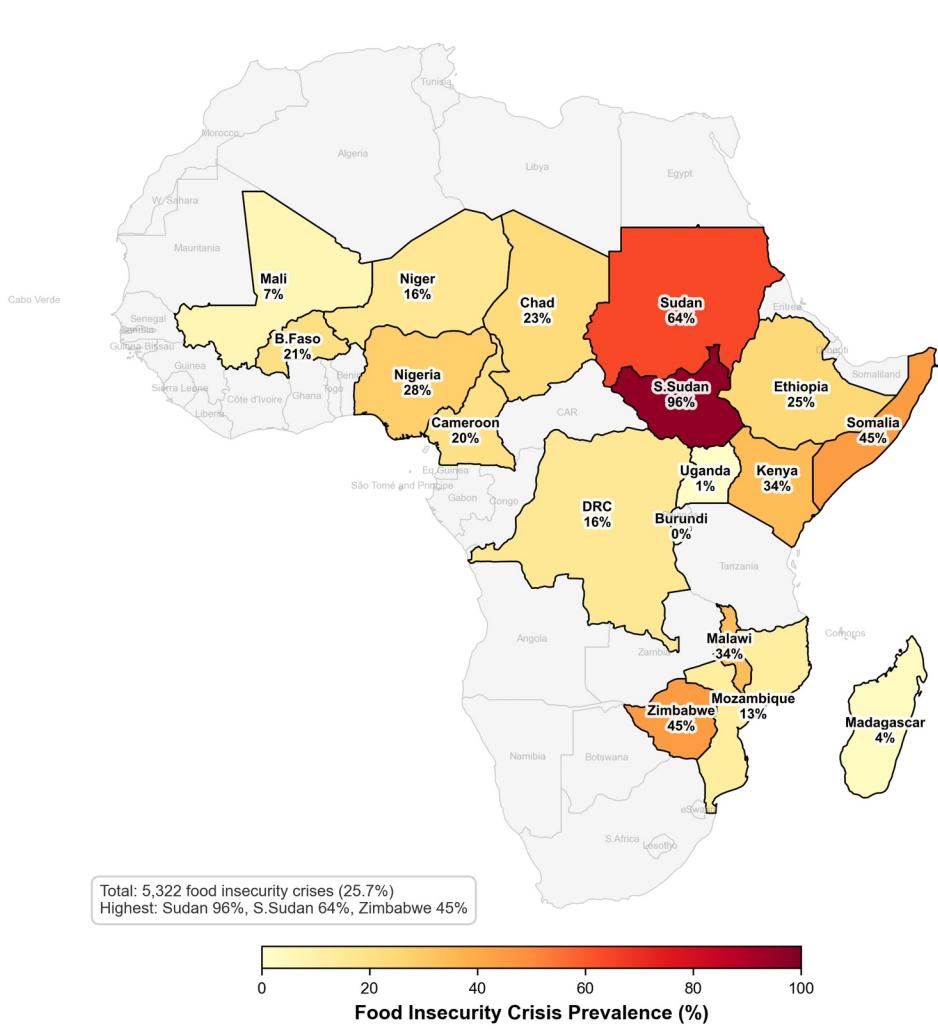


Dynamic News Signals as Early-Warning

Indicators of Food Insecurity

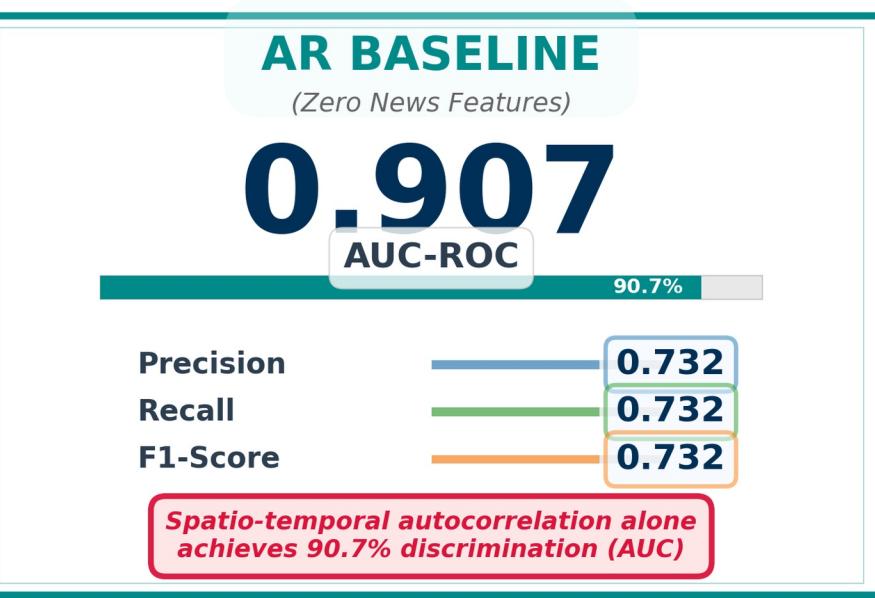
Victor Collins Oppon | MSc Data Science | Middlesex University London | January 2026

Food Insecurity Crisis Prevalence: 18 African Countries (2021-2024)

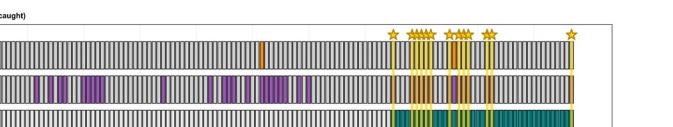
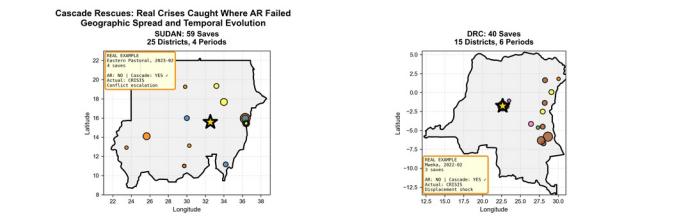
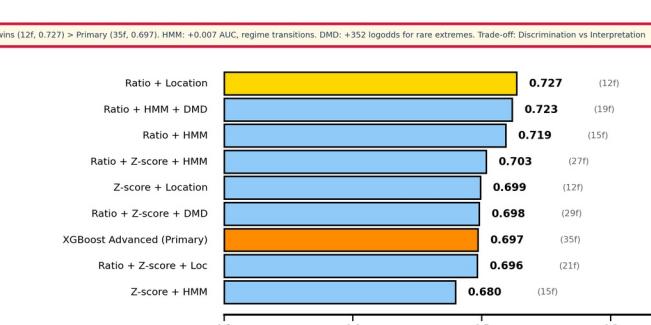


Two-Stage Cascade Framework

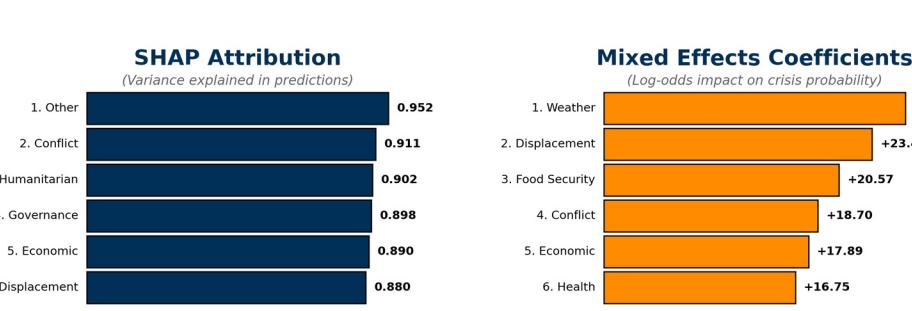
All 20,722 Observations

STAGE 1: AR Baseline
2 features: Lt + LsSTAGE 2: XGBoost
35 features: 9 Ratio + 9 Z-score + 6 HMM + 8 DMD + 3 LocationSelective deployment: AR (simple, fast) handles 86.2%
XGBoost (selective) rescues 17.4% of AR failures

XGBoost Advanced + Ablation Study (9 Configurations)

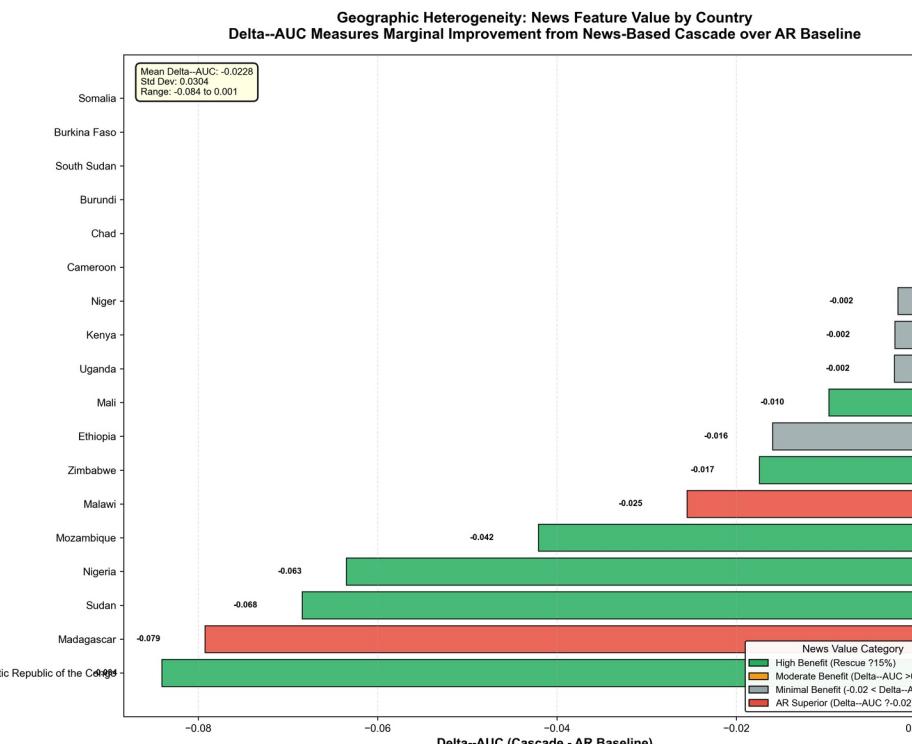
2021: 62 key saves
2022: 23 key saves
2023: 101 key saves
2024: 63 key saves

The Discrimination-Interpretation Paradox: Different Methods Reveal Different Truths



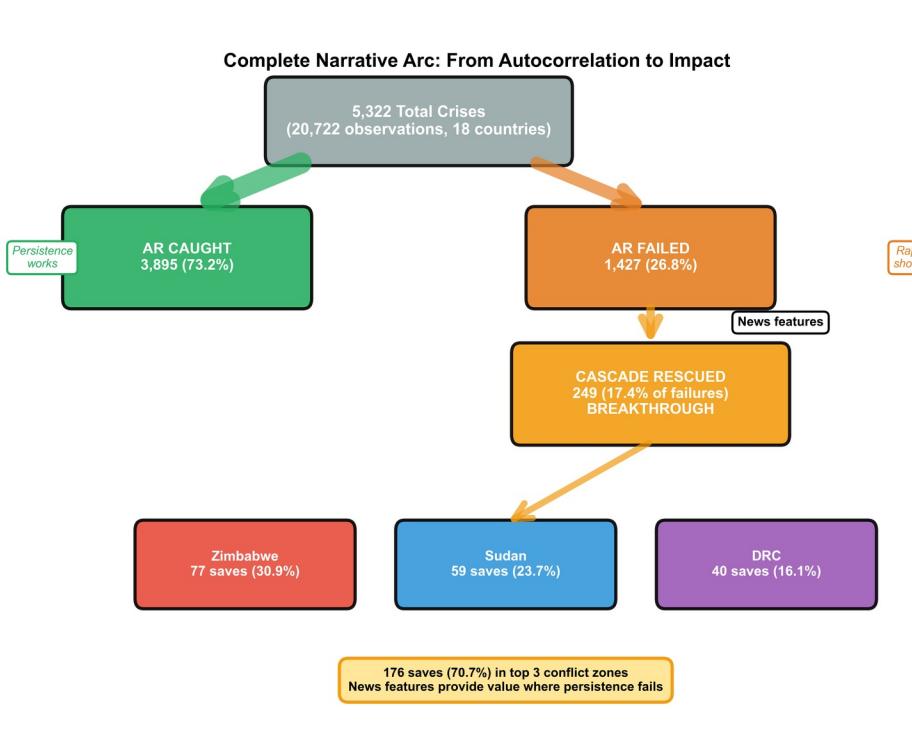
Top 6 themes: 5.4 cumulative z-score SHAP (74.7% total)

Top: Weather (>26.38 log-odds)

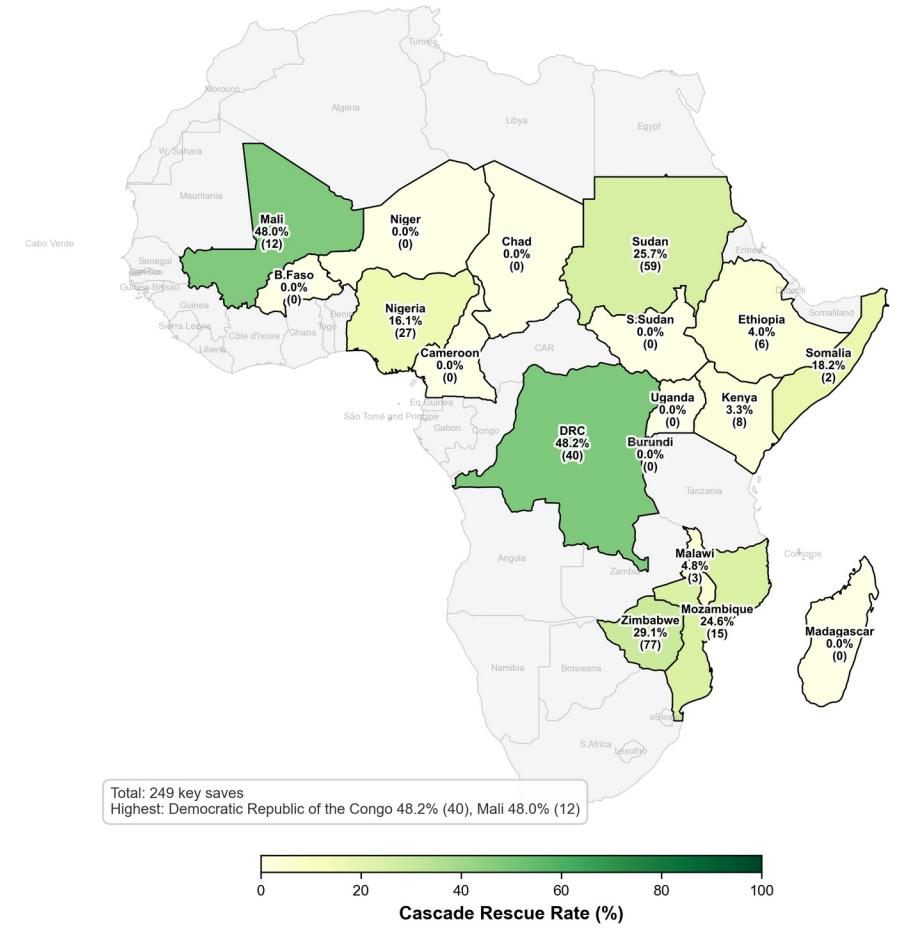


RESEARCH QUESTIONS ANSWERED

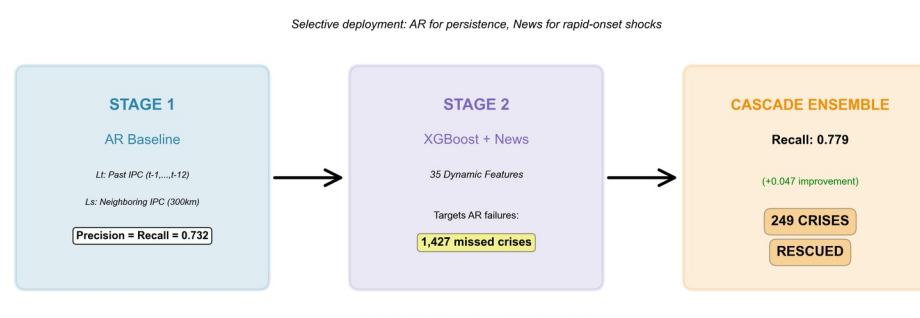
- RQ1: Autocorrelation trap (AUC=0.907, zero news)
- RQ2: Weather +26.71, Z-scores 74.7% SHAP
- RQ3: 249 saves, 17.4% rescue rate
- RQ4: 14.6x variation, 70.7% in 3 countries
- RQ5: HMM/DMD +0.007 AUC, +352 coefficient

249 CRIMES RESCUED
8 MONTHS IN ADVANCE

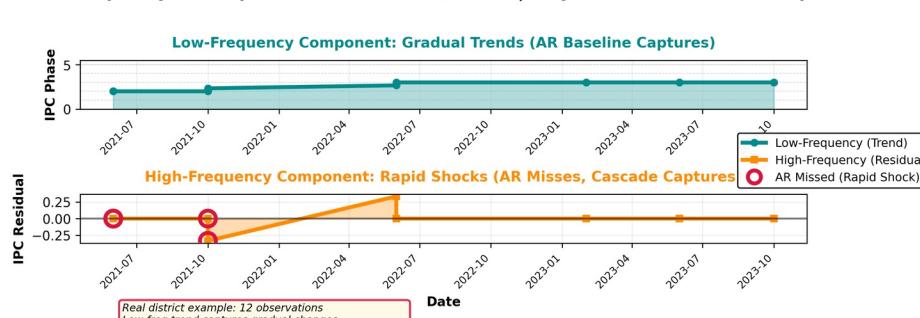
Cascade Rescue Rates: % of AR Failures Saved by Stage 2



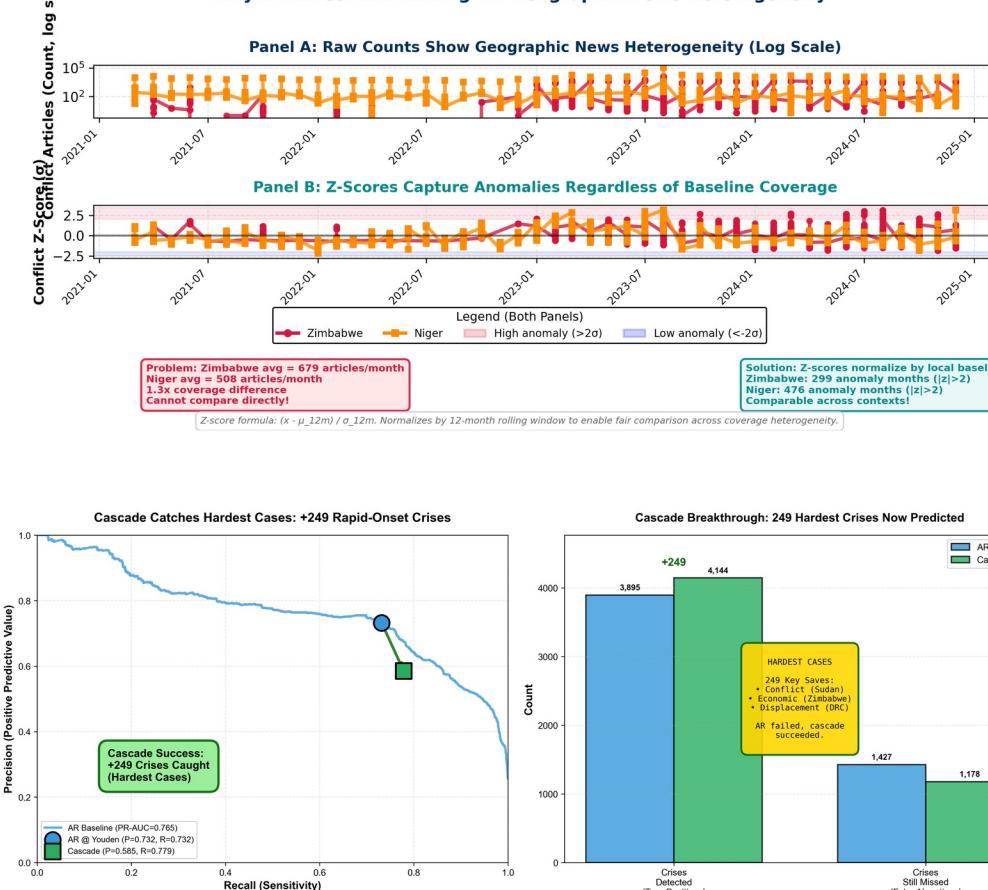
Two-Stage Framework: News Signals for Food Insecurity Early Warning



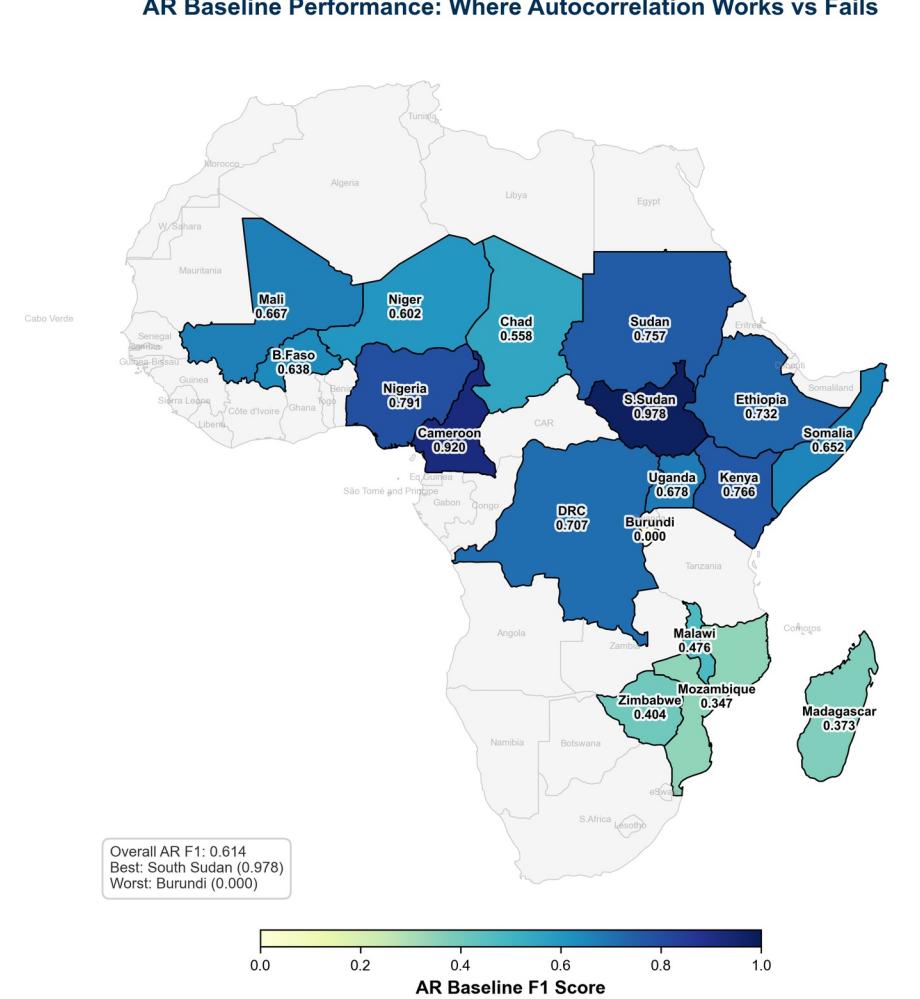
Frequency Decomposition: Reiji Aroma, Sudan | WHY AR Baseline Fails on Rapid Shocks



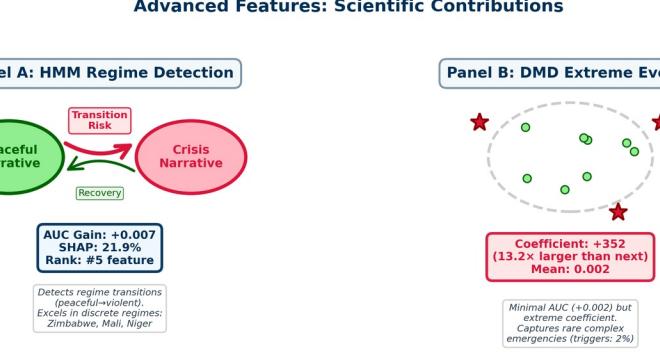
Why Z-Scores? Accounting for Geographic News Heterogeneity



AR Baseline Performance: Where Autocorrelation Works vs Fails



Advanced Features: Scientific Contributions



• 249 CRIMES RESCUED 8 MONTHS IN ADVANCE - Where AR baseline failed, news signals saved lives

• GEOGRAPHIC HETEROGENEITY (14.6x variation) - Deploy selectively where news coverage is dense

• AUTOCORRELATION TRAP (AUC=0.907 with ZERO news) - Persistence dominates, news adds value on rapid shocks