

Finding Signals in Economic Uncertainty

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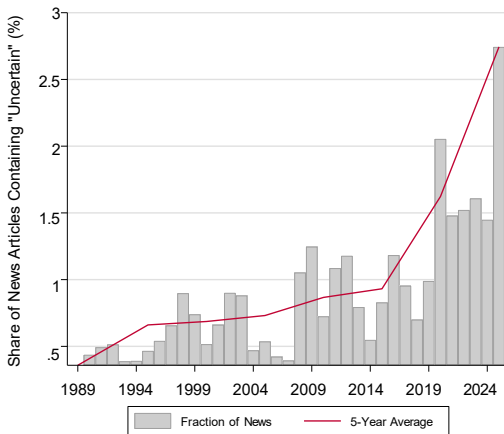
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Uncertainty Dominates Today's Headlines



When Uncertainty Becomes the News



Note: Share of news articles mentioning "uncertain" in The Straits Times, CNA, and The Business Times.

The 1–2–3–4 Framework

- **One Definition:** What economists mean by uncertainty.
- **Two Reasons:** Why it shapes behaviour and cycles.
- **Three Channels:** Real, financial, and expectations.
- **Four Measures:** Survey, market, news, and econometric indicators.

One Definition: Distinguishing Risk from Uncertainty

- Uncertainty is the **unpredictability of future economic outcomes**
— the gap between what is known and what is knowable.
- In economics, **risk** and **uncertainty** differ:
 - Risk: outcomes with known probabilities.
 - Uncertainty: situations where those probabilities are unknown.
- Empirically, uncertainty is captured by the **variance** (second moment) of forecasts or outcomes around their mean.

Two Reasons Why Uncertainty Matters

- **It changes behaviour:** Firms delay investment and households postpone major purchases, the classic *wait-and-see* effect.
- **It amplifies cycles:** Higher uncertainty magnifies small shocks, tightens financial conditions, and slows recovery.
- Together, these effects make uncertainty **countercyclical**: it rises in downturns and fades in recoveries.

Three Transmission Channels

- **Real channel:** Firms and households delay irreversible decisions such as hiring or capital investment.
- **Financial channel:** Volatility rises and risk premiums widen as investors demand higher compensation for unknown risks.
- **Expectations channel:** Forecasts diverge, confidence weakens, and recoveries slow.

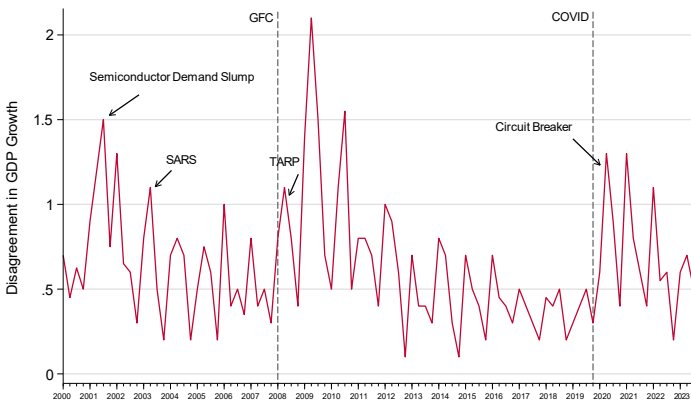
Four Ways to Measure Uncertainty

1. **Survey Based:** Forecast Disagreement
2. **Asset Market:** Financial Market Outcomes
3. **News Based:** Economic Policy Uncertainty
4. **Econometric:** Macroeconomic Uncertainty Models

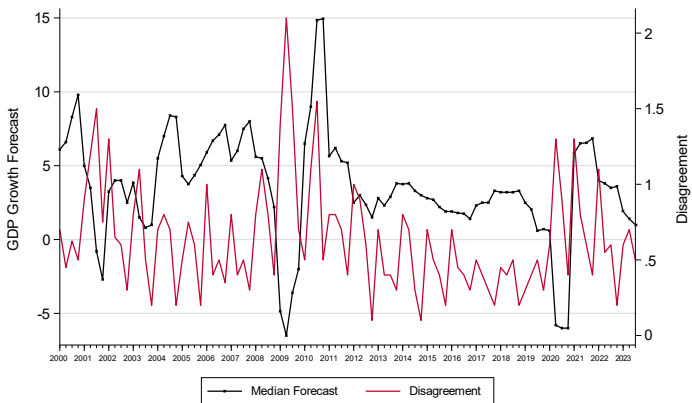
Disagreement Among Professional Forecasters

- The starting point to measure uncertainty is to look at the extent of disagreement among economic agents.
- The MAS Survey of Professional Forecasters provides the forecast of Singapore's key economic indicators by economists and analysts (20-30 forecasters).
- The disagreement among professionals can be measured by interquartile range or standard deviation.

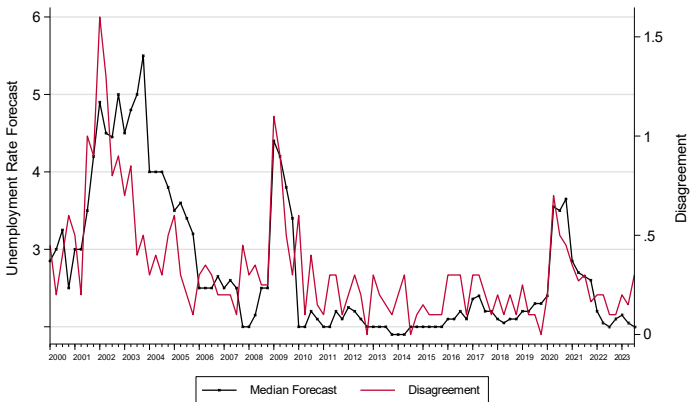
Disagreement Among Forecasters: GDP Growth (End of Year)



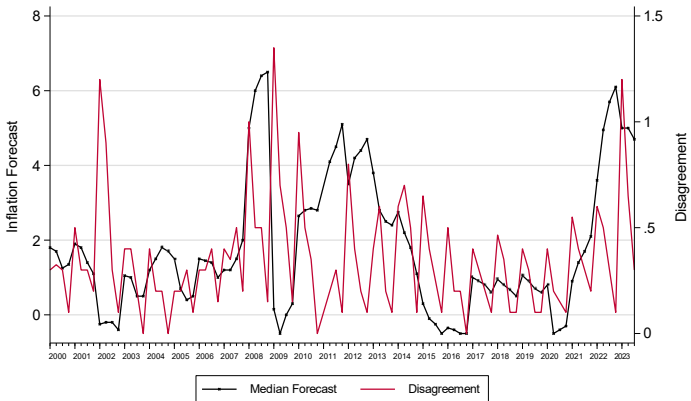
Disagreement Among Forecasters: GDP Growth (End of Year)



Disagreement Among Forecasters: Unemployment Rate (End of Year)



Disagreement Among Forecasters: Inflation (End of Year)



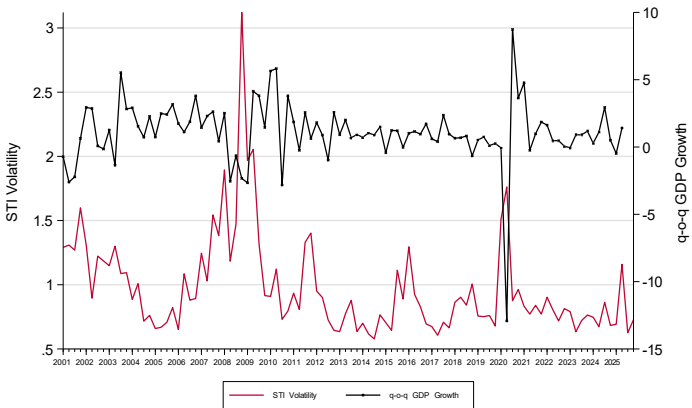
Disagreements are Highly Correlated

Disagreement	GDP Growth	Inflation	Unemployment
GDP Growth	1.000		
Inflation	0.492	1.000	
Unemployment	0.491	0.376	1.000

Market-Based Measures of Uncertainty

- Financial markets offer a real-time lens on uncertainty.
 - When confidence falls, investors demand higher risk premiums.
 - Prices swing more sharply, volatility becomes a direct signal of uncertainty.
- The Straits Times Index (STI) captures how Singapore's market perceives risk and confidence.
- Two common measures:
 - GARCH volatility** — conditional variance from return series.
 - Realized volatility (RV)** — squared daily returns aggregated over time.

STI Volatility and GDP Growth

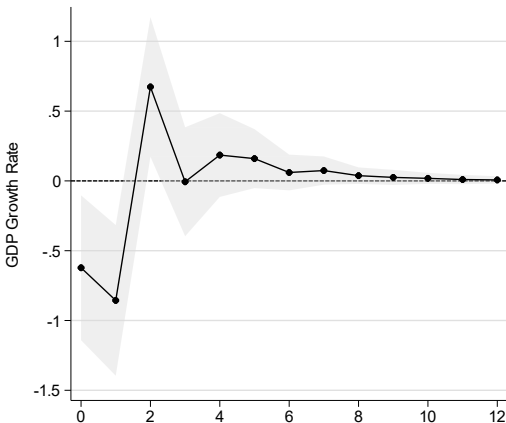


Note: STI realized volatility plotted against Singapore's quarterly GDP growth rate.

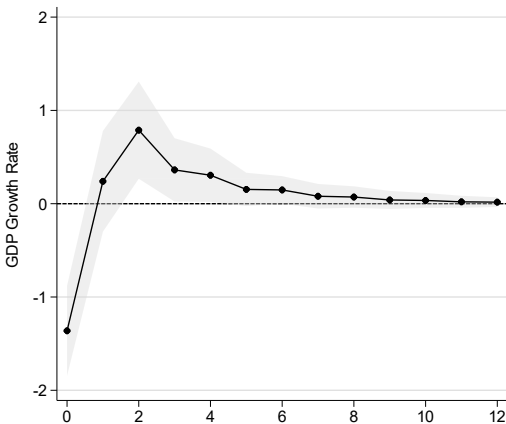
Why Uncertainty Matters: First vs Second Moments

- **First-moment shocks** affect the **level** of output (e.g., productivity or demand shocks).
- **Second-moment shocks** affect the **variance** of outcomes — they raise uncertainty.
- Higher uncertainty weakens confidence and delays decision-making, slowing activity even without fundamental shocks.
- We can trace this mechanism using a Vector Autoregression (VAR) model linking uncertainty to GDP growth.

Impact of Stock Market Volatility on GDP



Impact of Forecast Disagreement on GDP



Textual Analysis of Uncertainty

- Beyond surveys (what forecasters say) and markets (what investors do), we can study **what people read**.
- When uncertainty rises, it appears in language: words like *risk*, *volatility*, *uncertain outlook*.
- Text analysis tracks uncertainty almost in real time, how it is **perceived and communicated**.

Text-Based Approaches

- **Keyword counts:** frequency of uncertainty terms.
- **Machine learning:** detect themes such as *trade policy uncertainty*.
- **Sentiment indices:** tone — optimism vs fear.
- Turns **narratives into data**, often leading macro indicators.

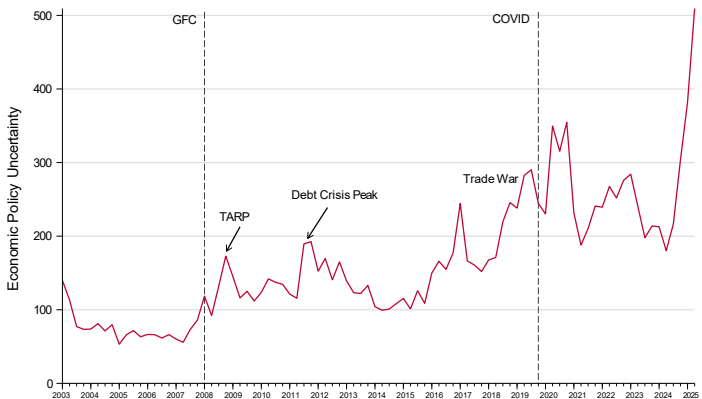
Economic Policy Uncertainty (EPU)

- Developed by **Baker, Bloom, and Davis (2016)**, the EPU index counts newspaper articles containing the words *economic*, *policy*, and *uncertainty*.
- Serves as a proxy for how much policy-related uncertainty dominates public discourse.
- Index is **comparable across countries**, allowing global analysis of uncertainty trends.

Singapore's Trade-Weighted EPU

- Singapore's EPU is constructed as a **trade-weighted average** of its major partners' EPU indices.
- Reflects how **global policy shocks** spill over to Singapore through trade, investment, and sentiment channels.
- Links **international narratives** to Singapore's domestic macroeconomic uncertainty.

Singapore EPU and Key Events



Building Local and Sectoral Measures of Uncertainty

- We can extend this approach to build **Singapore-specific text indices**.
- Track local references to policies like *ABSD*, *COE*, and *CPF* to capture sentiment shifts.
- Beyond the aggregate, construct **sector-focused measures** for:
 - **Trade policy** — uncertainty around tariffs and supply chains.
 - **Monetary policy** — uncertainty over rate paths and forward guidance.
 - **Financial regulation** — uncertainty tied to new rules or supervision.

Measuring Uncertainty in a Data-Rich Environment

- In today's data-rich economy, variables like GDP, inflation, and employment can be forecast using statistical models.
- When uncertainty rises, **forecast errors widen**, so realized outcomes deviate more from predicted values.
- The volatility of these errors reveals how unpredictable the economy is.
- Using a **stochastic volatility model**, we can estimate how this unpredictability evolves over time.
- This approach follows **Jurado, Ludvigson, and Ng (2015)**, who formalize uncertainty as the **expected volatility of forecast errors**.

Constructing the Measure

1. Information-Rich Forecasting

- Build an interlinked system with many macro series so forecast errors truly represent **unforecastable components**.

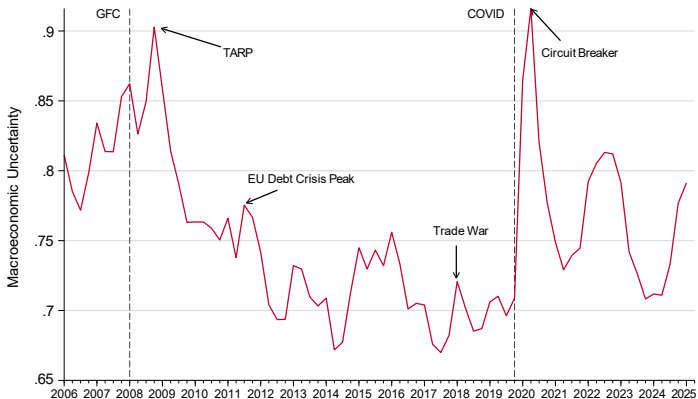
2. Common Variation

- Macroeconomic uncertainty arises from **common variation** in unpredictability across series — not isolated noise.

3. From Byproducts to Final Product

- Uncertainty from each series is a **byproduct**; their simple average forms the **final product** — aggregate macro uncertainty.

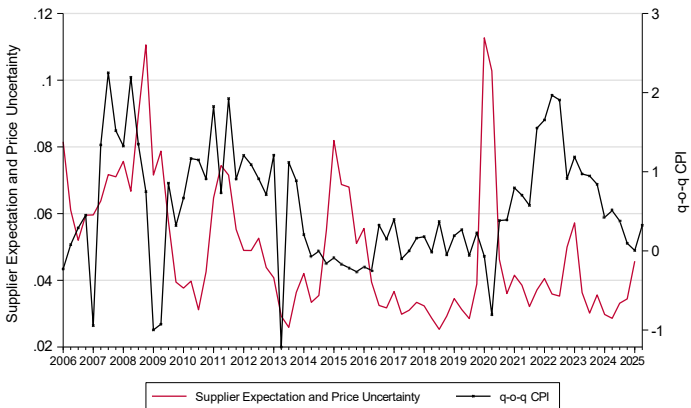
Macroeconomic Uncertainty in Singapore



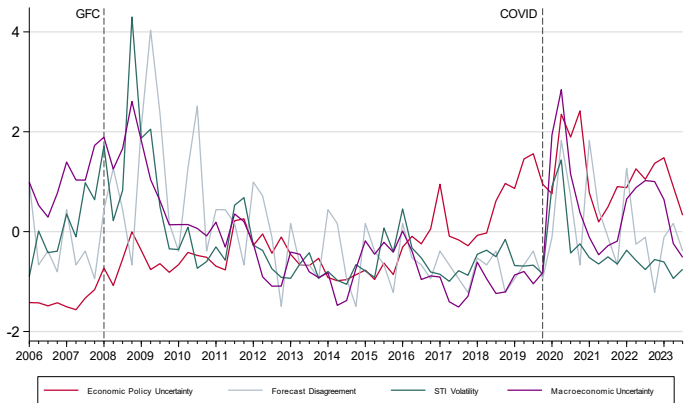
Tracing the Sources of Uncertainty

- Since aggregate macro uncertainty is the **average** across all series, we can trace back to see which variables contribute most.
- To summarize this efficiently, we examine uncertainty within the model's **common predictive factors** — a few latent variables capturing shared macro trends.
- Each factor's interpretation can be inferred from its **correlation with observable variables**, such as output, inflation, or credit.

Supplier Expectations and Price Uncertainty vs CPI Changes



Putting the Uncertainty Indicators Together



Pulling the Threads Together

- Uncertainty is not random noise — it conveys information.
- It reflects how agents form expectations and adjust to shocks.
- It rises when confidence deteriorates and declines as information improves.
- In Singapore, uncertainty spikes during crises but normalizes rapidly.

Uncertainty serves as a high-frequency indicator of confidence and adaptability.

From Signal to Policy

- **Measurement:** Real-time uncertainty indices provide **early warning signals** of shifts in confidence and sentiment.
- **Communication:** Clear and consistent policy guidance **anchors expectations** and supports faster stabilization.
- **Expectations:** Economic outcomes depend not only on fundamentals, but on how information is **interpreted and internalized**.

Managing uncertainty means managing expectations.

Uncertainty is not a by-product — it is an **endogenous variable** that policy can shape through **credibility, clarity, and communication**.