The Long-Run Impact of Monetary Policy

Ai and Fu (2025): Using Asset Prices to Measure the Long-Run Impact

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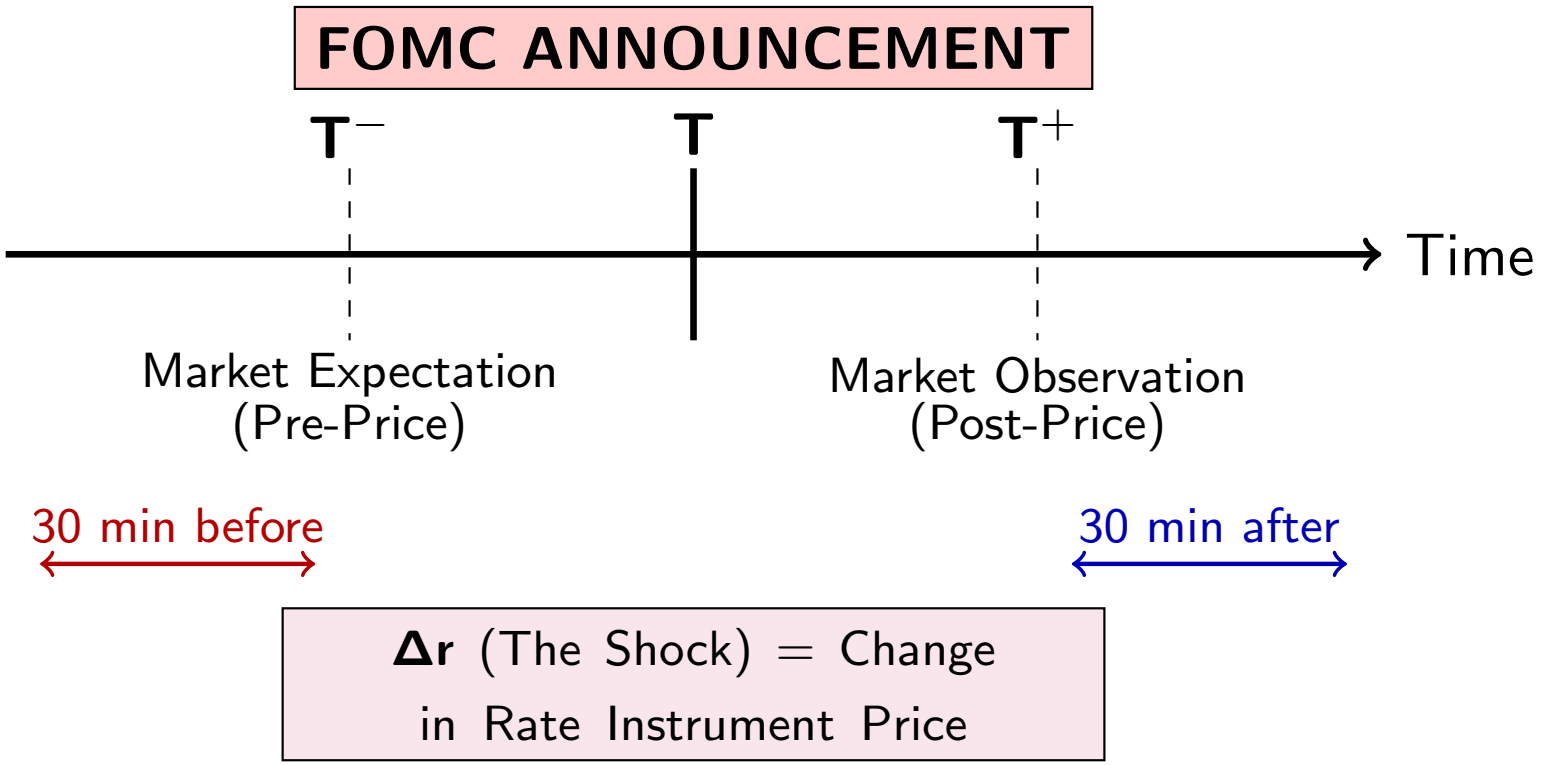
- **What They Measure:** The unexpected change (surprise) in the Fed's announcement instantly causes the market to revise its expectation of the permanent level of output ($\mathbf{Y}_{\mathcal{T}}$) decades from now.
- **Magnitude:** Empirically, a **25** bps surprise causes a permanent upward revision in long-run output of **100** bps (for the Monetary Policy Shock) to **200** bps (for the Central Bank Information Shock).

2. The Causal Impact of Monetary Shocks: The High-Frequency Strategy

To isolate the true shock, the literature uses a narrow 60-minute window around the FOMC announcement (T):



- **The Policy Surprise (Δr):** Measured as the change in the price of high-frequency instruments between the T^- and T^+ windows.

3. The Core Challenge: Decomposing Long-Run Returns

The Dependent Variable ($\ln R$): The log return on any asset is mathematically decomposed into news about future cash flows and news about the discount rate.

$$\ln \mathbf{R} = \underbrace{\mathbf{\Delta E_\infty}}_{\text{1. Long-Run Output News}} - \underbrace{\mathbf{\Delta r}}_{\text{2. Discount Rate News}} + \underbrace{\text{Risk Premium}}_{\text{3. Announcement Premium}}$$

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- **Risk Premium:** Short-term risk compensation.

4. The Filtering Strategy: Obtaining the Clean Signal ($\mathcal{T}$)

The paper uses a two-step approach to remove the contaminating factors from the raw asset return difference:

1. **Filter 1: Canceling Discount Rate News (Δr)**
   - **Action:** They calculate the difference between long-term equity returns ($\mathbf{R^E}$) and long-term bond returns ($\mathbf{R^B}$).
   - **Why it works:** Both assets are exposed to the same change in the risk-free rate (Δr). Taking the difference ($\ln \mathbf{R^E} - \ln \mathbf{R^B}$) effectively **cancels out** this common factor, leaving only the cash flow (output) news and the residual risk premium.
   - **Purity Check:** Using **non-dividend stocks** for $\mathbf{R^E}$ ensures the remaining cash flow news is primarily long-run (minimizes short-term news).

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   - **Purity Check:** Using **non-dividend stocks** for $\mathbf{R^E}$ ensures the remaining cash flow news is primarily long-run (minimizes short-term news).
2. **Filter 2: Estimating the Announcement Premium (Risk Premium)**
   - **Action:** The raw difference from Step 1 is regressed on pre-announcement information $\mathbf{X}_t$ (implied volatility, prior returns, etc.):

$$(\ln \mathbf{R^E} - \ln \mathbf{R^B})_\mathbf{t} = \alpha + \mathbf{X}_t\gamma + \underbrace{\mathcal{T}_\mathbf{t}}_{\text{Residual}}$$

5. The Necessity of Shock Decomposition

The Problem: The raw policy surprise ($\mathbf{\Delta r}$) is a composite measure that combines two opposing economic forces:

1. **Policy Action (MPS):** A pure tightening shock (e.g., higher rates) that should cause a negative long-run output revision (due to reduced investment, hysteresis, etc.).

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1. **Policy Action (MPS):** A pure tightening shock (e.g., higher rates) that should cause a negative long-run output revision (due to reduced investment, hysteresis, etc.).
2. **Information Signal (CBI):** A signal that the Fed is reacting to better long-run economic conditions, which should cause a positive long-run output revision.

The Necessity: If the authors were to use the composite shock ($\mathbf{\Delta r}$) in their final regression, the measured coefficient on the long-run output signal ($\mathcal{T}$) would be heavily understated (close to zero) because the positive and negative effects would cancel each other out.
The Solution: They must use the Jarociński & Karadi (J&K) method to separate these two orthogonal components before running the final causal regression.

6. Policy Shock Identification: Jarociński & Karadi (2020)

The Mechanism: The J&K method is a structural identification strategy that separates the single rate surprise ($\mathbf{\Delta r}$) into two orthogonal shocks based on the instantaneous reaction of **stock prices** ($\mathbf{\Delta R^E}$).

The Logic of Separation (Sign Restriction):

Shock	**Short-Rate ($\mathbf{\Delta r}$)**	**Stock Price ($\mathbf{\Delta R^E}$)**
MPS (Policy Action)	Positive ($\uparrow$)	Negative ($\downarrow$)
CBI (Information Signal)	Positive ($\uparrow$)	Positive ($\uparrow$)

The opposing stock market sign is the key restriction that allows the authors to mathematically isolate the two components of the total rate surprise: Pure Contractionary Action (MPS) vs. Signal of Strong Future Growth (CBI).

7. The Final Step: Causal Regression and Findings

The final step is the causal regression, where the clean output signal ($\mathcal{T}$) is regressed on the two identified shocks:

$$\mathcal{T}_t = \beta_1 \times \mathbf{MPS}_t + \beta_2 \times \mathbf{CBI}_t + \epsilon_t$$

Shock Type	Economic Role	Long-Run Output Revision
MPS	Policy Action	**100 bps (1.0%)**
CBI	Information Signal	**200 bps (2.0%)**

- **Conclusion:** The market judges the **25** bps information signal (CBI) to be twice as potent as the **25** bps policy action (MPS) in permanently shifting the economy's output path.

7. The Contamination Critique: Is the MPS Truly "Pure"?

The Problem: The J&K method's two-shock system (rates & stocks) cleanly separates shocks into two buckets based on sign restrictions. But reality is rarely binary.

Potential Sources of Contamination:

- The sign restrictions assume that the **only** information in Fed announcements is either (1) pure policy action or (2) news about real economic conditions.

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Potential Sources of Contamination:

- The sign restrictions assume that the **only** information in Fed announcements is either (1) pure policy action or (2) news about real economic conditions.
- But Fed communications may also reveal information about:
  - The Fed's *reaction function* (how aggressively they respond to news)
  - Market misperceptions of systematic policy
  - Other signals that don't fit neatly into two boxes

Implication: If additional information channels exist, the measured MPS and CBI shocks may each contain "leakage" from other sources, potentially biasing the estimated long-run output effects.

8. Recent Extension: The 3-Shock Model (Jarociński & Karadi, 2025)

The Update: Jarociński & Karadi (2025, CEPR DP 19923) extend their original framework to a **3-shock system**:

The Three Shocks:

- **1. Monetary Policy Shock (MP):** Pure policy action
- **2. Central Bank Information Shock (CBI):** Fed's private information about the economy
- **3. Fed Response to News Shock (FRN):** Market learning about how aggressively the Fed responds to *public* news

Key Findings:

- CBI shocks remain robust even after controlling for FRN
- MP shocks purged of both CBI and FRN effects generate **stronger contractionary responses** — consistent with the view that the original 2-shock system had some attenuation bias
- Extends event set beyond FOMC announcements to Fed chair speeches, minutes, etc.

9. Extension II: Causal Check with External Instrument

The authors can strengthen the causality and purity of the shocks identified using external data.

Augment with a Narrative Surprise Index

- **Suggestion:** Use a **Narrative Surprise Index** based on the actual text/keywords of the FOMC statement as an external instrument.
- **Why it helps:** This technique provides an independent, non-price-based measure of policy intent (i.e., textual analysis).
- **Benefit:** This provides an independent check on the **Monetary Policy Shock (MPS)**, reducing reliance on the purely mathematical J&K sign-restriction method. It helps confirm the shock is truly exogenous and robustly supports the **100** bps finding.

10. Extension III: Mitigate Risk Premium Noise

The choice of the proxy asset may exaggerate the permanent growth effects.

The Problem: High-Beta Contamination

- The proxy portfolio (non-dividend-paying stocks) is highly populated by high-growth, high-beta stocks.
- **Contamination:** The large measured return revisions might not reflect a permanent shift in aggregate output, but rather a temporary change in the **Equity Risk Premium (Risk Appetite)** applied to these volatile assets.
- **Bias:** This leads to an **overstatement** of the permanent output effect.

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The Solution: Use a Factor-Mimicking Portfolio (FMP)

- **Suggestion:** Replace the non-dividend portfolio with a **Factor-Mimicking Portfolio (FMP)** for long-run output news.
- **Construction:** The FMP is explicitly built to maximize sensitivity to long-run cash flow while **minimizing exposure to extraneous risk factors (low beta)**.

11. Conclusion

Thank You