Always Silent? Endogenous Central Bank Communication During the Quiet Period

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Intro

- Should the central bank always adhere to the quiet period policy?

  Silence pros:
  - No immediate major shock in financial markets

  Communication pros:
  - Let the markets know the reaction function
  - Offset leaks

- If not, what drives the decision?

Intro

- Financial market model
  - Information asymmetry - the central bank can't disclose everything
  - CB endogenously decides whether to communicate
  - Investors re-evaluate their beliefs depending on the decision
- Solution
  - Monte Carlo + ML iterative algorithm

Intro

- Results snapshot
  - Beneficial to communicate sometimes
  - Key factors: allocation of uncertainty between different sources, CB priorities
  - The observed sharp reaction to the news – an internal property of the model, not always decisive
  - Response asymmetry – hide bad news more often

Stylized facts

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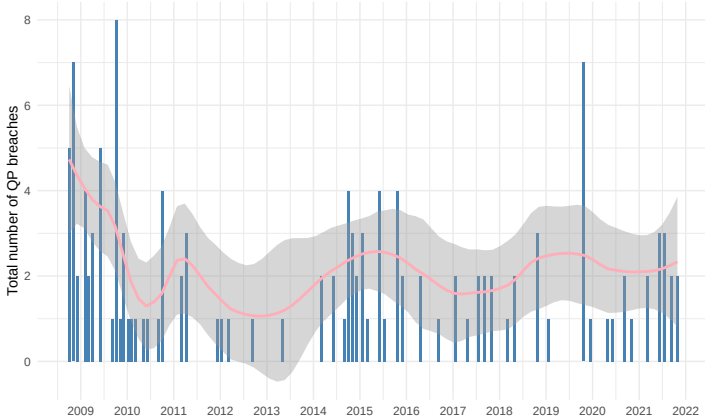

SOURCE: Gnan, Rieder (2022)

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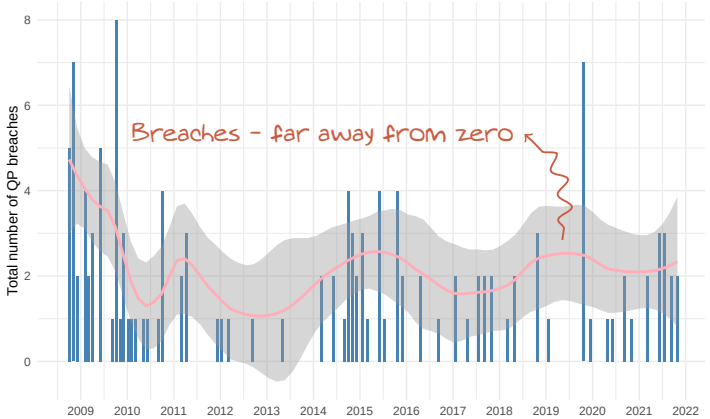

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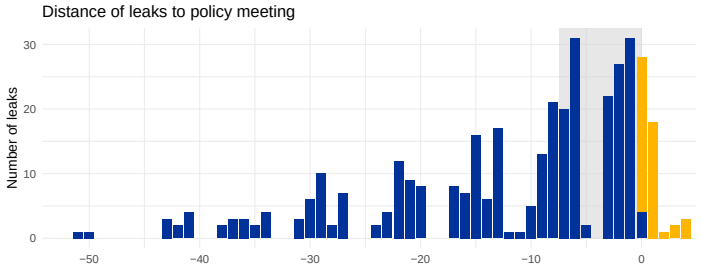

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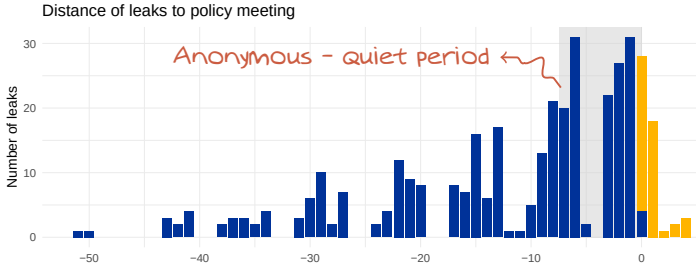

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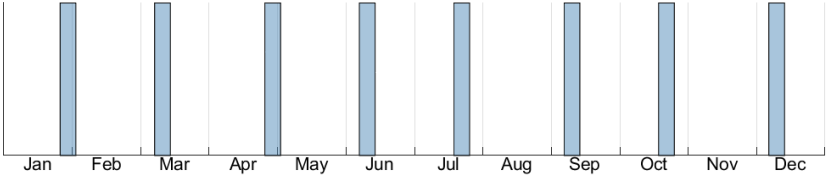
Stylized facts

- Effects of quiet period violations:
  - Ehrmann, Fratzscher (2009), Gnan, Rieder (2022): news causes an excessive shock to the markets, volatility increases
  - Vissing-Jorgensen (2020), Ehrmann, Gnan, and Rieder (2023): attributed communication and consensus-building approach can mitigate the effects of leaks

Stylized facts

ECB quiet periods in 2023



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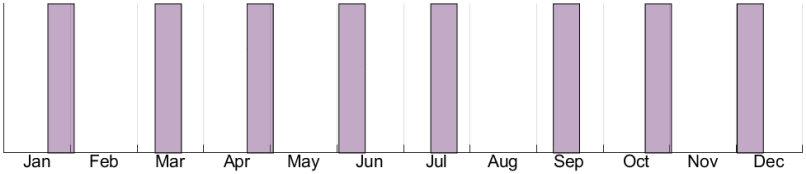

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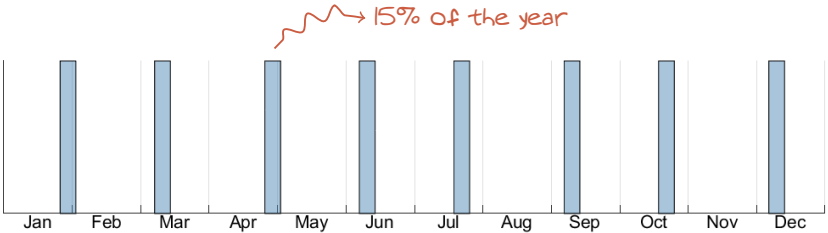

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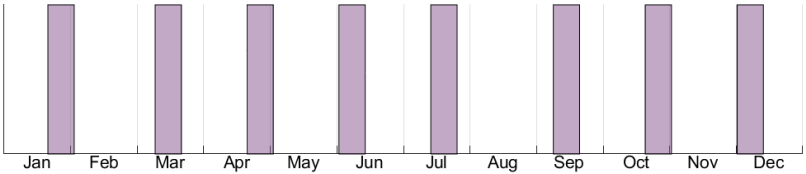

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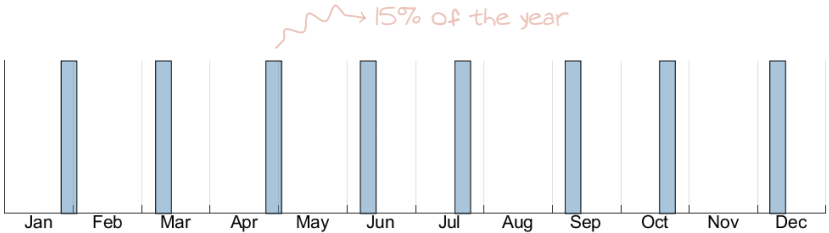

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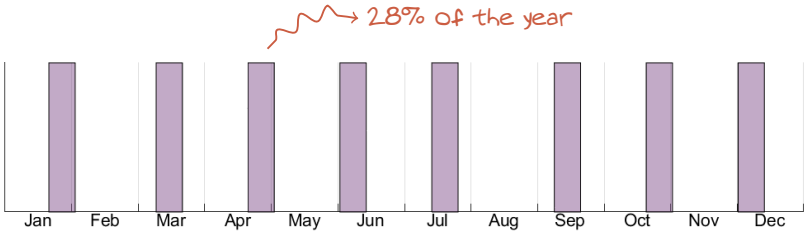


Model

Model

- Financial market model. Ingredients:
  - 4 dates
  - Assets: a share and a bond
  - 3 shocks: news shock, communication, press release
  - CARA investors
  - Central bank endogenously communicates (or not).
- Main mechanism - uncertainty from different sources, resolving over time.

Securities market

- Bond – a terminal payoff of one
- Stock – $D = \bar{D} + \sigma\varepsilon = \bar{D} + \sigma(\varepsilon_1 + \varepsilon_2 + \varepsilon_3)$,

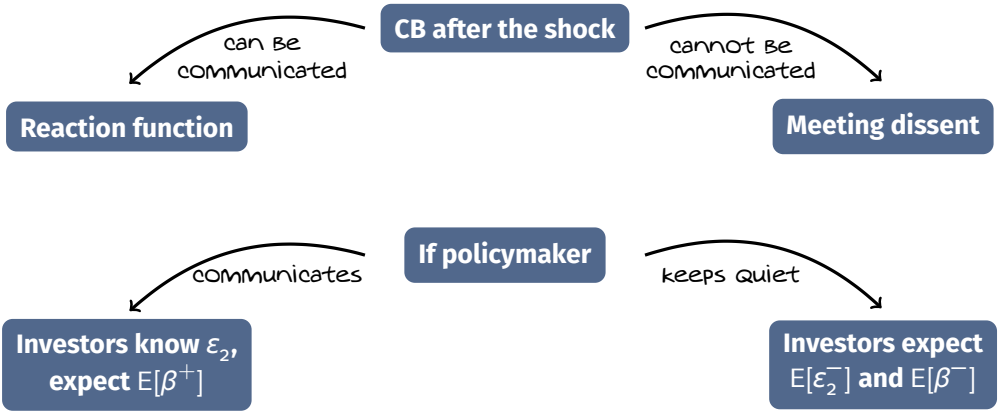
  where shocks $\varepsilon_1 \sim \mathrm{N}(0, \delta_1)$, $\varepsilon_2 \sim \mathrm{N}\left(\rho\sqrt{\frac{\delta_2}{\delta_1}}\varepsilon_1,\ \delta_2(1-\rho^2)\right)$, $\varepsilon_1 \sim \mathrm{N}(0, \beta\delta_3)$,

  dissent uncertainty $\beta \in [0;\ 2]$, shocks correlation $\rho \in [-1;\ 0)$.

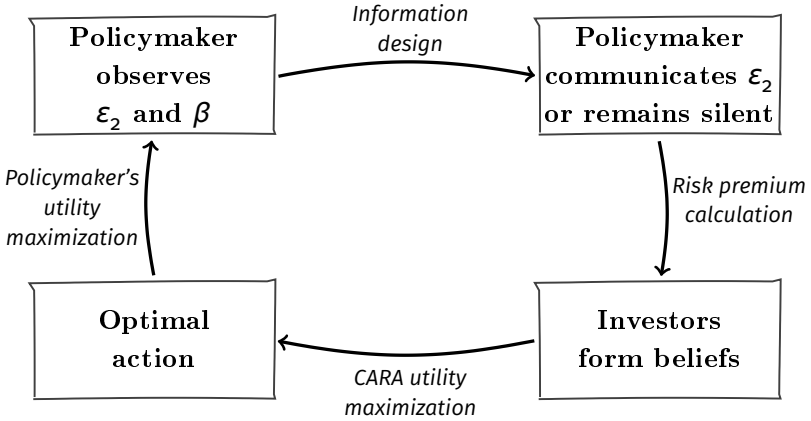
Time line

- T=0: Underlying model parameters are known prior to the shocks
- T=1: News shock is known to the central bank and investors
- T=2: CB knows the reaction function and the level of dissent for the upcoming meeting and decides whether to communicate the former to the markets
- T=3: all shocks are known (reaction function and press release)

Central bank design



Mechanism illustration



Central bank utility function

$$U = -\left(o_1 \left(\widehat{\text{Var}_2}[R_3] - \text{Var}_2[R_3] \right)^2 + o_2 \left(\text{E}_2[R_2] \right)^2 + \left(\text{E}_2[R_3] \right)^2 \right)$$

- Quadratic in 3 components:
  - quiet period communication shock
  - press release shock
  - distance in implied volatility from the full information mode

- Relative weights:
  - o_1 on volatility
  - o_2 on quiet period communication shock.

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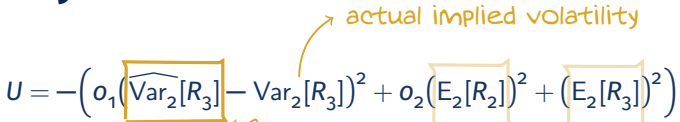

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Equilibrium

- Solve the model backward, finding the risk premium and the stock price at $T = 3$, then $T = 2$, and $T = 1$.
- Compute expected returns and variances for both cases and can calculate $U^{w/o}$ and U^{w}.
- CB maintains the blackout period policy if $U^{w/o} \geq U^{w}$ and violates it if $U^{w/o} \leq U^{w}$.

Equilibrium

The equilibrium condition looks cumbersome and depends on the probability of communication and the moments of shocks and dissent uncertainty parameter:

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The equilibrium condition looks cumbersome and depends on the probability of communication and the moments of shocks and dissent uncertainty parameter:

$$U^{w} - U^{w/o} = o_1\left(\sigma^2\beta\delta_3 - \sigma^2\,\mathrm{E}_2[\beta^+]\delta_3\right)^2 + o_2\left(\sigma\varepsilon_2 - \alpha\sigma^2\,\mathrm{E}_2[\beta^+]\delta_3 - \sigma Pr^+\,\mathrm{E}_1[\varepsilon_2^+] - \sigma(1-Pr^+)\mathrm{E}_2[\varepsilon_2^-] + rp_1\right)^2 +$$
$$+\left(\alpha\sigma^2\,\mathrm{E}_2[\beta^+]\delta_3\right)^2 - o_1\left(\sigma^2\beta\delta_3 - \sigma^2\,\mathrm{Var}_2[\varepsilon_2^-] - \sigma^2\,\mathrm{E}_2[\beta^-]\delta_3\right)^2 - o_2\left(-\alpha\sigma^2(\mathrm{Var}_2[\varepsilon_2^-] + \mathrm{E}_2[\beta^-]\delta_3) -\right.$$
$$\left.-\sigma Pr^+\,\mathrm{E}_1[\varepsilon_2^+] + \sigma Pr^+\,\mathrm{E}_2[\varepsilon_2^-] + rp_1\right)^2 - \left(\sigma\varepsilon_2 - \sigma\,\mathrm{E}_2[\varepsilon_2^-] + \alpha\sigma^2(\mathrm{Var}_2[\varepsilon_2^-] + \mathrm{E}_2[\beta^-]\delta_3)\right)^2.$$

, where the risk premium at T=1:

$$rp_1 = \alpha\sigma^2\left(Pr^+\,\mathrm{E}_1[\beta^+]\delta_3 + (1-Pr^+)(\mathrm{Var}_2[\varepsilon_2^-] + \mathrm{E}_2[\beta^-]\delta_3)\right) + \alpha\sigma^2 Pr^+(1-Pr^+)(\mathrm{E}_1[\varepsilon_2^+] - \mathrm{E}_2[\varepsilon_2^-])^2 +$$
$$+\frac{1}{2}\alpha^3\sigma^4 Pr^+(1-Pr^+)(\mathrm{E}_1[\beta^+]\delta_3 - \mathrm{Var}_2[\varepsilon_2^-] - \mathrm{E}_2[\beta^-]\delta_3)^2 - \frac{3}{2}\alpha^2\sigma^3\left(Pr^+\delta_3\,\mathrm{E}_1[\varepsilon_2^+]\,\mathrm{E}_1[\beta^+] + (1-Pr^+)\,\mathrm{E}_2[\varepsilon_2^-]\,\mathrm{Var}_2[\varepsilon_2^-] +\right.$$
$$\left.+(1-Pr^+)\delta_3\,\mathrm{E}_2[\varepsilon_2^-]\,\mathrm{E}_2[\beta^-]\right) + \frac{3}{2}\alpha^2\sigma^3\left(Pr^+\,\mathrm{E}_1[\varepsilon_2^+] + (1-Pr^+)\,\mathrm{E}_2[\varepsilon_2^-]\right)\left(Pr^+\,\mathrm{E}_1[\beta^+]\delta_3 + (1-Pr^+)(\mathrm{Var}_2[\varepsilon_2^-] + \mathrm{E}_2[\beta^-]\delta_3)\right).$$

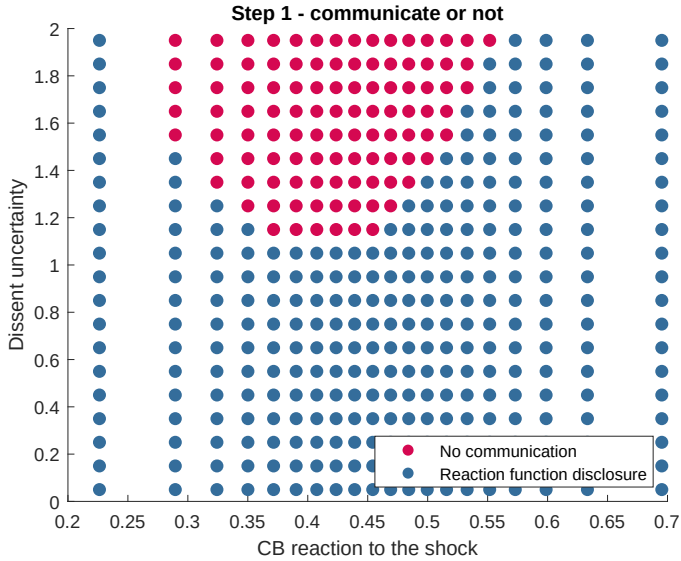
Solution

Solution

- ML algorithm to find a mapping $(Parameters) \rightarrow \{communicate; keep\ silent\}$ for all possible values of the CB reaction function shock ε_2 and disagreement within the Board β, given a single set of other parameter values.

- Monte Carlo
  - ML algorithm – one observation (one set of parameters and all possible ε_2 and β)
  - Generate 20,000 observations, use statistical analysis to find drivers and patterns of CB decision.

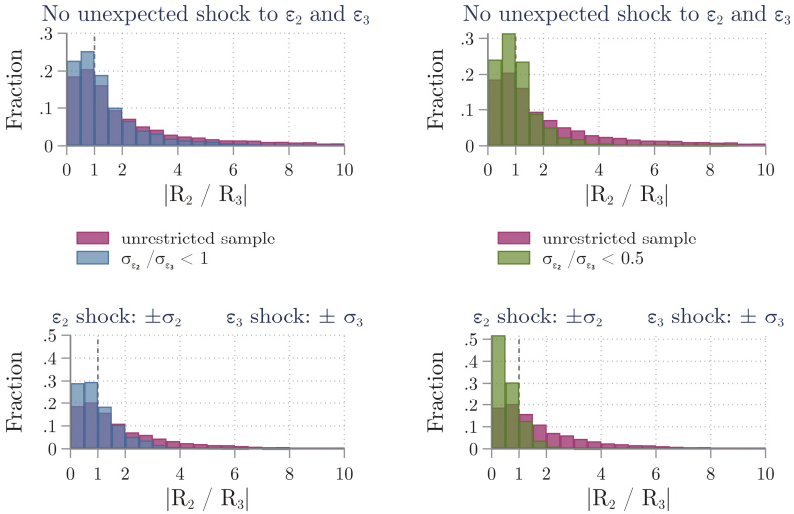
Solution


Step 1 - communicate or not
Dissent uncertainty
CB reaction to the shock
No communication
Reaction function disclosure
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0.2
0.25
0.3
0.35
0.4
0.45
0.5
0.55
0.6
0.65
0.7

Results

Results

Comparison of returns: $|R_2/R_3|$ density plots



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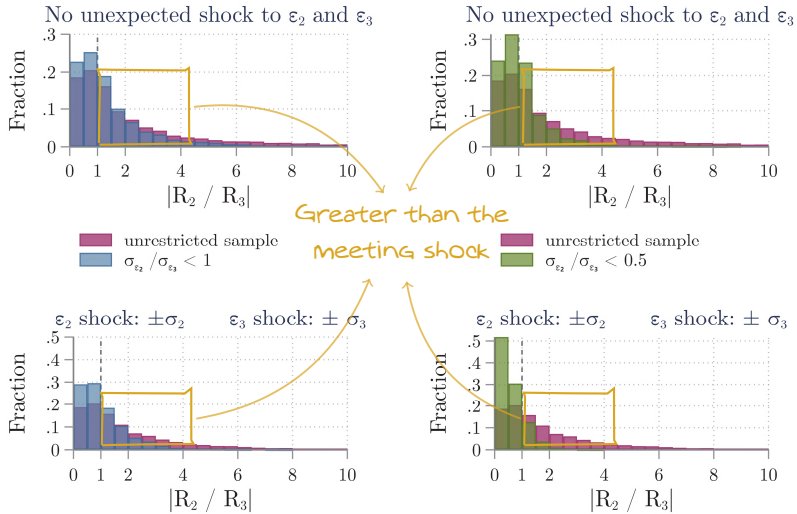
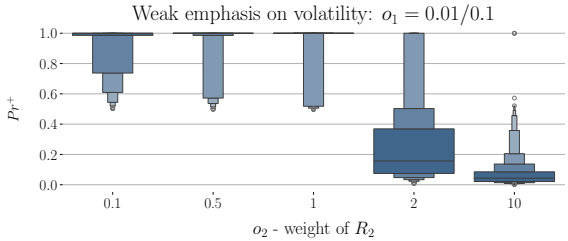
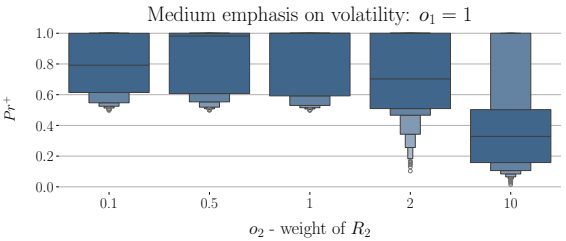
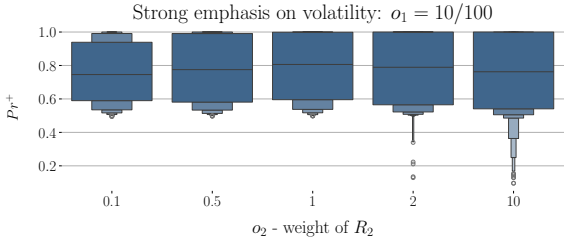


Results

Communication likelihood letter-value plots for different values of o_1 and o_2







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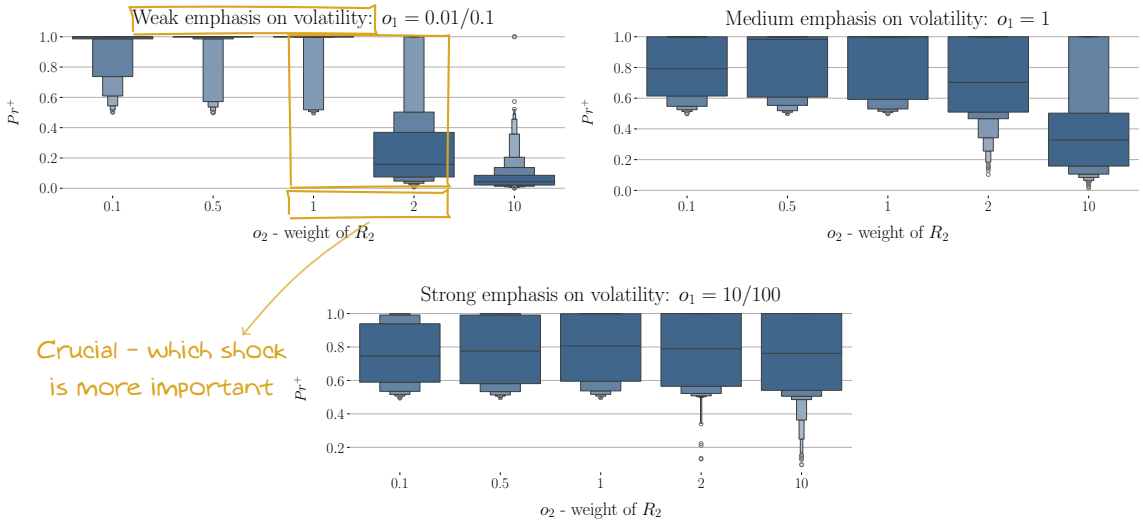
Communication likelihood letter-value plots for different values of o_1 and o_2



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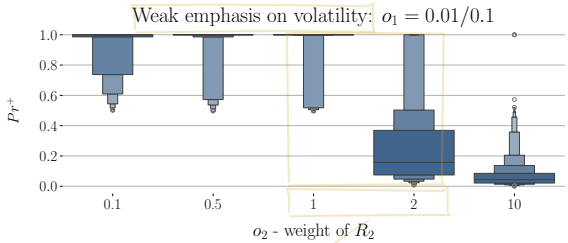
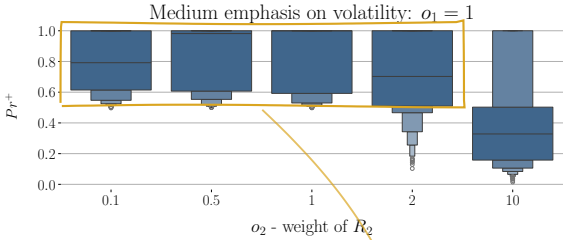
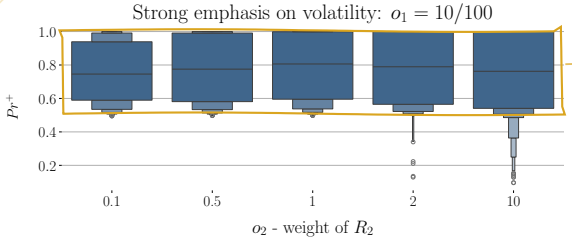




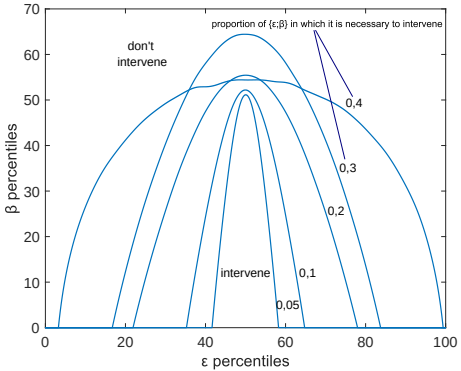


Crucial - which shock is more important

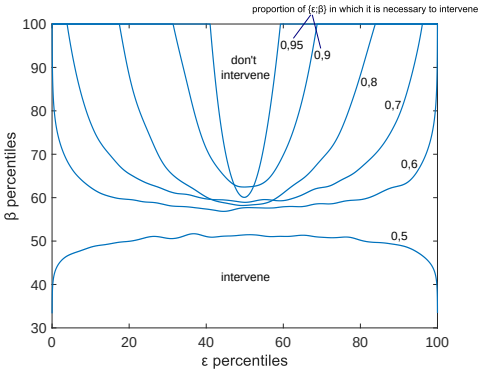
Beneficial to communicate

Results

Communication decisions under different ε_2 and β



(a) For $Pr^{+} < 0.5$



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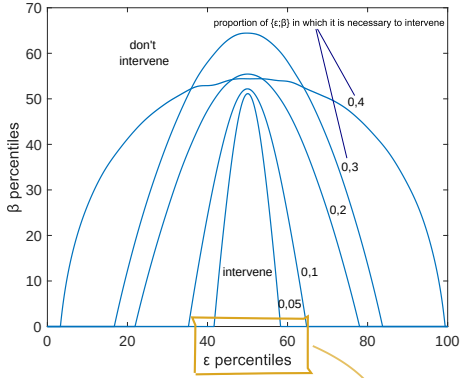

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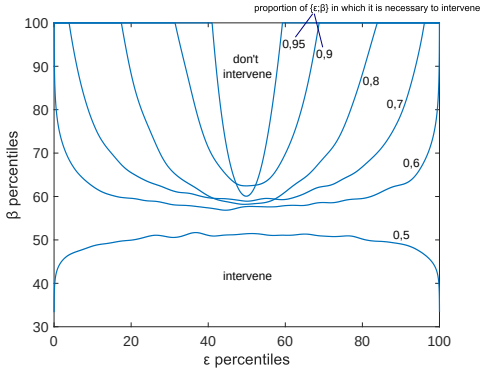


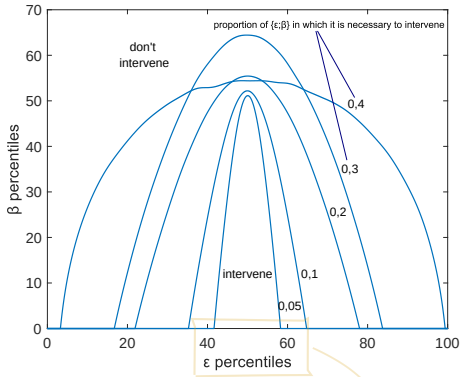
(b) For $Pr^+ \geq 0.5$

Rarely communicate – hide large CB reactions

Results

Communication decisions under different ε_2 and β

Often communicate – more likely to disclose large shocks



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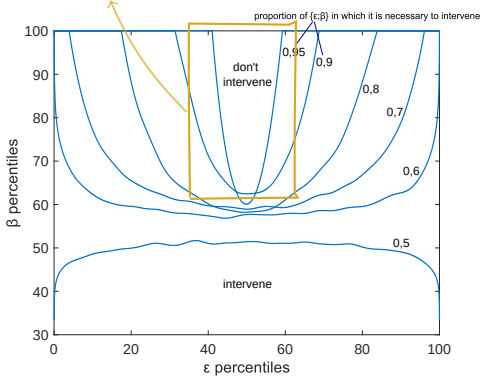

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Rarely communicate – hide large CB reactions

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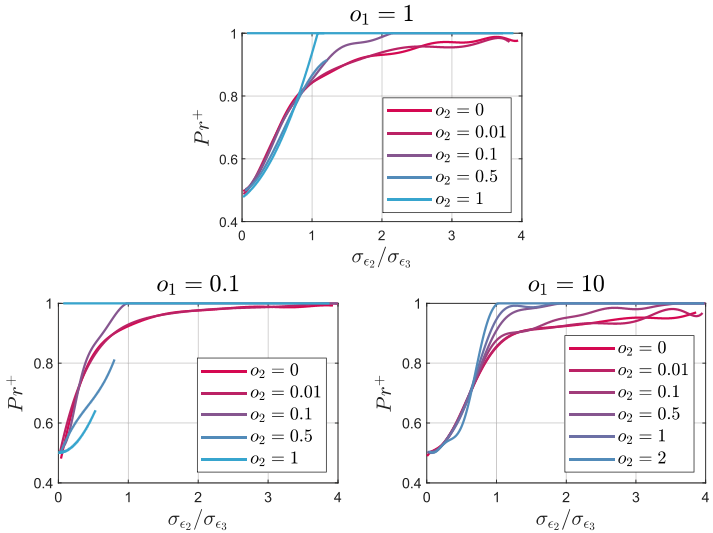
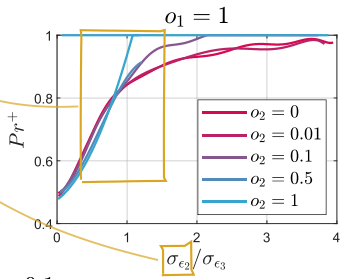
Communication likelihood under different uncertainty sources

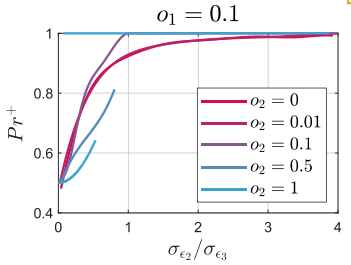


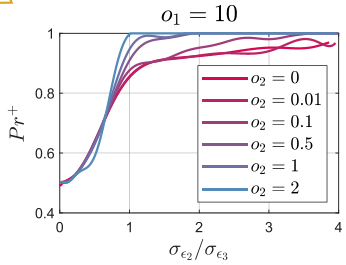
Results

Communication likelihood under different uncertainty sources

More uncertainty about the reaction function – communicate more often

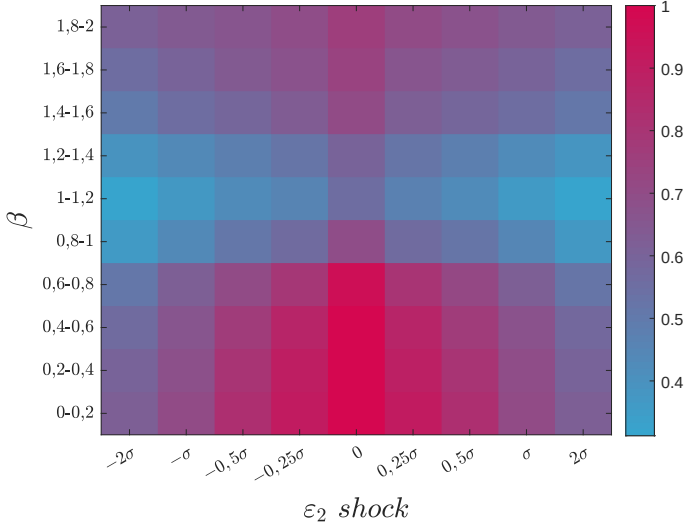






Results

Comparison of the "never intervene" and "endogenously intervene" regimes for $o_2 = 2$



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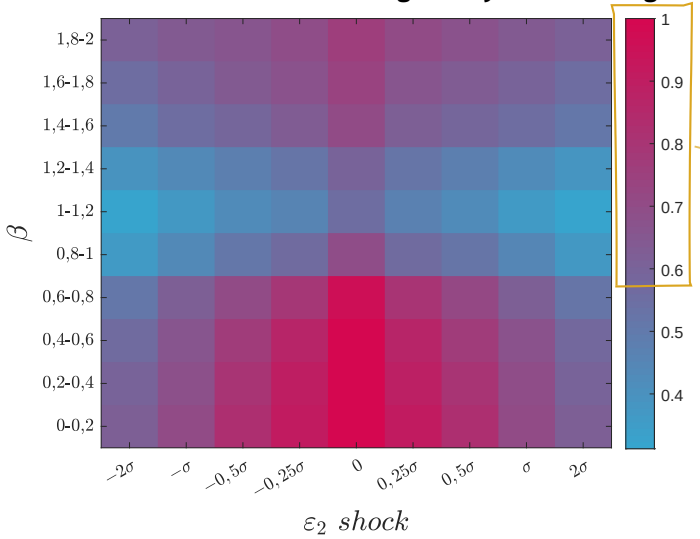

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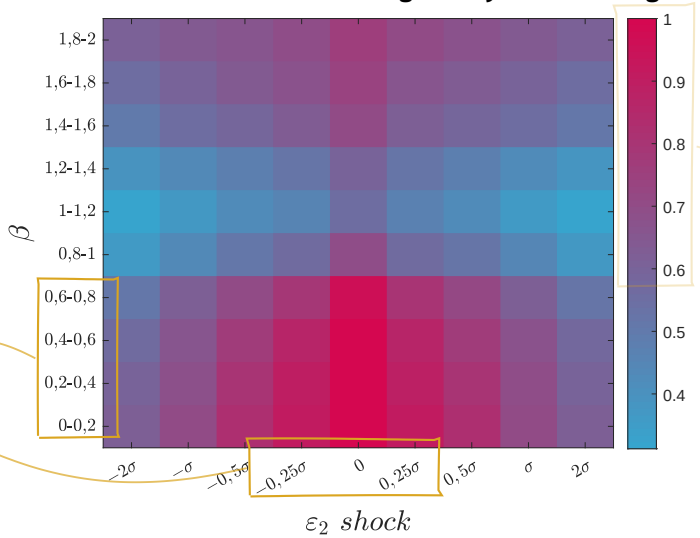
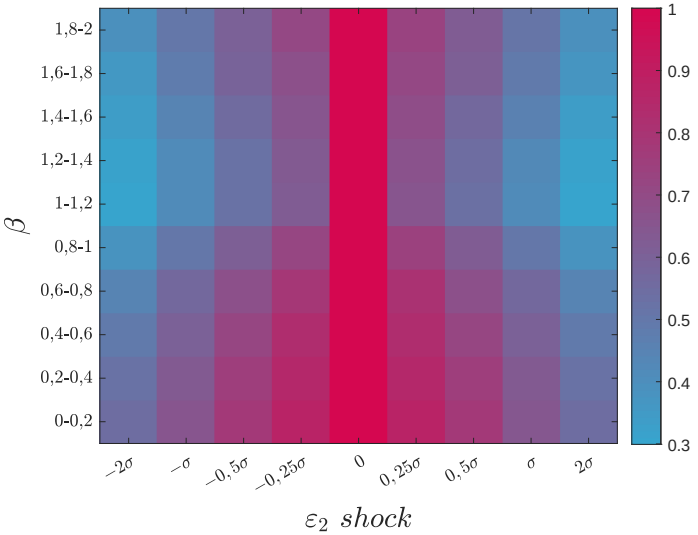


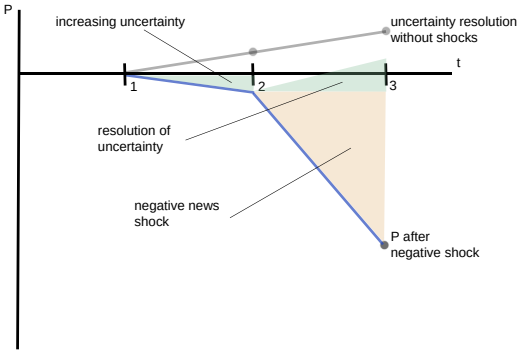
Results

Comparison of "never intervene" and "always intervene" regimes for $o_2 = 2$

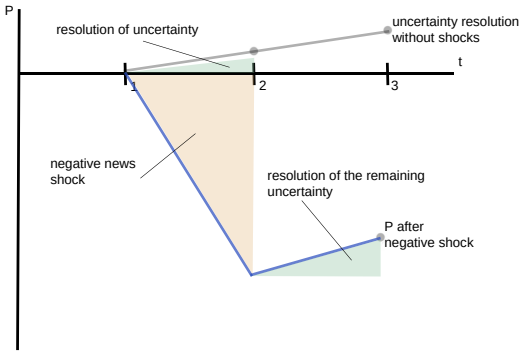


Results

Central bank uncertainty management mechanism



Quiet period



Communication

Results

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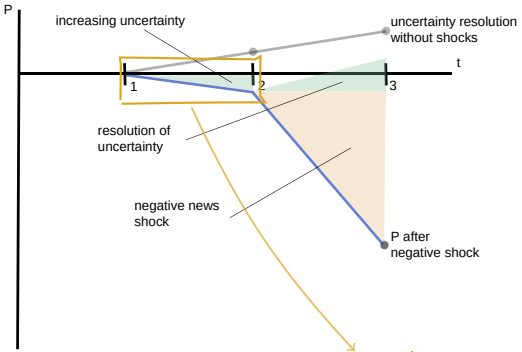
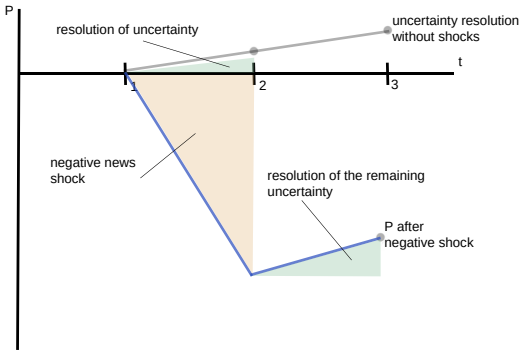


Quiet period

- Hide bad news
- Markets demand RP
- Move price to smooth the fluctuations



Communication

Contribution/Policy

Contribution/Policy

- We contribute to the literature on
  - Central bank communication: effects and transparency
    Morris, Shin (2002), Vissing-Jorgensen (2020), Cieslak, Vissing-Jorgensen (2021), Herbert (2021), Gati (2022);
  - Quiet period
    Ehrmann, Fratzscher (2007), Ehrmann, Fratzscher (2009), Gnan, Rieder (2022), Ehrmann, Gnan, and Rieder (2023);
  - Pre-announcement drift and uncertainty prior to the FOMC meetings
    Lucca, Moench (2015), Lucca, Moench (2018), Hu et al. (2022), Bauer, Lakdawala, Mueller (2019).

Contribution/Policy

- Policy implications
  - Currently – consider instantaneous effects. However, markets also gain insights into the central bank's reaction function and the level of dissent within the Board.
  - At times, optimal to communicate, even if this significantly shakes the markets.
  - Design – complex issue. Centralized communications (managed by the staff rather than individual FOMC members) + disclose some of the information on the table on the decision day (e.g., Tealbook without Alternatives).
  - Endogenous communications – even more intricate. Endogenous can be the amount of information disclosed.