

Central Bank Language as an Intuitive-Thinking Shock

Dual-System Expectations and the Macroeconomic Effects of Monetary Narratives

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Abstract

This paper develops and tests the idea that *central bank language* can act as an *intuitive-thinking shock* within a Dual-System Expectations (DSE) framework. Building on Bartels et al. (2025), I treat “decisive” monetary communication as a narrative stimulus that shifts agents away from effortful, model-based reasoning and toward intuitive inference based on subjective economic models. I (i) formalize a DSE-consistent mechanism in which language innovations tilt perceived persistence of a sentiment state; (ii) define and operationalize a *Decisive Language Intensity* (DLI) index from FOMC statements; and (iii) provide empirical evidence using U.S. survey inflation expectations—households (University of Michigan Survey of Consumers; hereafter *Michigan*) and professional forecasters (Survey of Professional Forecasters; *SPF*)—conditioning on high-frequency monetary surprises. Using Newey–West inference and local projections, I find that higher DLI is associated with economically modest but directionally robust movements in household inflation expectations even after conditioning on monetary surprises, with dynamics peaking around 1–2 quarters ahead. A mechanism test shows that the DLI channel is substantially stronger for households than for professionals, consistent with an intuitive-inference channel rather than a mechanical proxy for policy shocks. The analysis is fully reproducible: regression tables are read from CSV outputs and figures are included from produced images; replication materials are archived on Zenodo (10.5281/zenodo.18038311).

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1 Introduction

Expectations are central to monetary transmission, yet a large body of evidence shows that expectation formation systematically departs from the rational expectations benchmark. Households and firms display sluggish updating, persistent disagreement, and belief co-movements that are difficult to reconcile with full-information models (Carroll, 2003; Andrade and Le Bihan, 2013; Coibion and Gorodnichenko, 2012, 2015). These patterns are consistent with informational frictions (Sims, 2003), bounded rationality (Gabaix, 2020), and belief distortions driven by salient narratives (Shiller, 2017, 2019).

In parallel, modern monetary policy has become increasingly communication-intensive. Forward guidance and central bank statements shape expectations not only by conveying information about future policy, but also by framing risks, uncertainty, and resolve (Woodford, 2003; Gürkaynak et al., 2005; Campbell et al., 2012; Swanson, 2021). A growing literature documents that communication can move asset prices and expectations even in the absence of large policy-rate surprises, highlighting the independent role of language (Hansen and McMahon, 2016).

This paper studies a specific hypothesis: *decisive central bank language* can shift expectation formation by activating intuitive inference. The mechanism is grounded in Dual-System Expectations (DSE), in which agents combine deliberative, model-based reasoning with an intuitive component driven by sentiment and subjective models (Bartels et al., 2025). Salient narratives may tilt this balance, distort perceived persistence of shocks, and generate delayed and persistent movements in household expectations that are not mechanically accounted for by monetary surprises.

Contributions. The paper contributes (i) a transparent, document-based measure of decisiveness in central bank communication (DLI), consistent with text-as-data standards (Gentzkow et al., 2019); (ii) a tractable DSE-consistent mapping from language innovations to persistent expectation dynamics that connects to diagnostic belief amplification (Bordalo et al., 2018); and (iii) empirical evidence using U.S. survey expectations, explicitly separating household expectations (Michigan) from professional expectations (SPF) while conditioning on high-frequency monetary surprises (Nakamura and Steinsson, 2018; Miranda-Agrippino and Ricco, 2017; Jarociński and Karadi, 2020). The results emphasize three facts: (a) DLI has a small but directionally robust association with household expectations; (b) the effect survives conditioning on monetary surprises, supporting separation of channels; and (c) the DLI channel is much weaker (often statistically indistinguishable from zero) for professionals (SPF), supporting an intuitive-inference mechanism rather than a policy-shock proxy.

2 Related Literature

This paper connects four strands of literature.

Expectations and informational frictions. A large empirical literature documents sluggish adjustment, disagreement, and forecast errors in macroeconomic expectations (Carroll, 2003; Andrade and Le Bihan, 2013; Coibion and Gorodnichenko, 2012). These patterns motivated models of rational inattention (Sims, 2003), sticky information and noisy updating (Coibion and Gorodnichenko, 2015), and parsimonious bounded-rationality frameworks for macro (Gabaix, 2020).

Belief distortions and diagnostic expectations. Recent work emphasizes that agents rely on simplified, sometimes distorted, mental models of the economy. Diagnostic expectations amplify salient risks and can generate endogenous belief cycles (Bordalo et al., 2018), while belief distortions can account for macroeconomic comovement and persistence (Bianchi and Ma, 2022).

Narratives in macroeconomics. Narratives act as coordination devices that propagate through social and institutional channels, shaping beliefs and economic behavior (Shiller, 2017, 2019). This paper treats central bank communication as a structured narrative input with macroeconomic relevance.

Central bank communication and identification. Empirical work on monetary announcements shows that markets and expectations respond to both policy surprises and communication content (Gürkaynak et al., 2005; Campbell et al., 2012). High-frequency identification has become standard to separate policy-rate shocks from informational components (Nakamura and Steinsson, 2018; Jarociński and Karadi, 2020). Text-based approaches further document that language carries independent economic content (Hansen and McMahon, 2016; Gentzkow et al., 2019). Work on disentangling policy shocks from information effects further motivates conditioning on high-frequency surprises (Miranda-Agrippino and Ricco, 2021).

3 Framework: Dual-System Expectations and Narrative Shocks

3.1 Two systems and a sentiment state

Let x_t denote macro objects relevant for expectations (e.g. inflation π_t). Agents' one-step-ahead beliefs combine a deliberative component with a sentiment-based component:

$$\mathbb{E}_t^{(i)}[x_{t+1}] = \underbrace{\mathbb{E}_t^R[x_{t+1}]}_{\text{deliberative / model-based}} + \underbrace{B^{(i)} s_t}_{\text{intuitive / sentiment-based}}, \quad (1)$$

where $s_t \in \mathbb{R}^k$ is a sentiment state and $B^{(i)}$ captures heterogeneity across agent types. This structure follows Dual-System Expectations models in which agents combine deliberation with intuitive inference based on subjective models (Bartels et al., 2025), and it relates to deviations from full-information updating in rational inattention and bounded-rationality approaches (Sims, 2003; Gabaix, 2020).

The sentiment state follows the true law:

$$s_t = \rho s_{t-1} + u_t, \quad \|\rho\| < 1. \quad (2)$$

3.2 Perceived persistence and the narrative channel

A key behavioral wedge in DSE is that agents may perceive sentiment innovations as more persistent than they are. Let perceived persistence be $\tilde{\rho}$ and allow it to vary with a narrative cue L_t :

$$\tilde{\rho} = \rho + \Delta(L_t), \quad \Delta(\cdot) \geq 0. \quad (3)$$

Decisive language can increase salience and reduce perceived ambiguity, shifting inference toward intuition and amplifying perceived persistence. This is closely related to diagnostic amplification of salient risks (Bordalo et al., 2018) and to belief-driven persistence in macro fluctuations (Bianchi and Ma, 2022).

3.3 Language-induced sentiment innovations

Let L_t denote a measure of decisiveness in communication. The empirical target is an unanticipated *language innovation* that maps into sentiment:

Proposition 1 (Language-induced intuitive-thinking shock). *A salient communication act generates a sentiment innovation:*

$$u_t = \Gamma \varepsilon_t^L + \eta_t, \quad \varepsilon_t^L \perp \eta_t, \quad (4)$$

where ε_t^L is an unanticipated language shock and Γ loads it onto sentiment components relevant for expectations.

3.4 Falsifiable implication: households vs. professionals

If the language channel operates through intuitive inference, it should be stronger for households than for professional forecasters:

$$\|B^{\text{households}}\| > \|B^{\text{professionals}}\|. \quad (5)$$

This yields a direct empirical mechanism test comparing households (Michigan) to professional forecasters (SPF).

4 Measuring Decisive Language Intensity (DLI)

4.1 Statement-level index

Consider an FOMC statement d with token set $\mathcal{W}(d)$ and counts $c(w, d)$. Define:

$$\text{DLI}(d) = \sum_{w \in \mathcal{W}(d)} \omega_w \cdot \text{tfidf}(w, d), \quad \text{tfidf}(w, d) = \text{tf}(w, d) \cdot \log\left(\frac{N}{\text{df}(w)}\right), \quad (6)$$

where ω_w are decisiveness weights and N is the number of documents. The approach follows best practices in text-as-data applications in economics (Gentzkow et al., 2019).

4.2 Quarterly aggregation and implementation (DLI1 vs. DLI2)

Let \mathcal{D}_t be the set of FOMC statements in quarter t . I report two quarterly implementations used in the empirical analysis:

$$\text{DLI1}_t = \frac{1}{|\mathcal{D}_t|} \sum_{d \in \mathcal{D}_t} \text{DLI}(d), \quad (7)$$

$$\text{DLI2}_t = \text{DLI}(d_t^{\text{last}}). \quad (8)$$

DLI1 captures average decisiveness over the quarter, while DLI2 captures a recency-weighted variant based on the last statement within the quarter. Quarterly aggregation is a reduced-form way to accommodate slow processing and memory in attention-limited expectation formation (Coibion and Gorodnichenko, 2015; Sims, 2003).

5 Identification: Conditional Language Innovations and an Event-Time Upgrade

5.1 Baseline proxy: residualized DLI

A baseline proxy for ε_t^L is constructed as unexpected DLI net of monetary surprises and observable controls:

$$\varepsilon_t^L \equiv \widehat{\nu}_t \quad \text{from} \quad \text{DLI}_t = \alpha + \beta \text{ Surprise}_t + \delta' Z_t + \nu_t. \quad (9)$$

Conditioning on high-frequency monetary surprises aligns the strategy with identification approaches that separate policy-rate surprises from other announcement components (Nakamura and Steinsson, 2018; Jarociński and Karadi, 2020).

Remark 1 (Interpretation). *Equation (9) isolates conditional variation in DLI net of monetary surprises and observed controls. The empirical goal is channel separation: whether DLI has predictive content for expectations beyond high-frequency monetary surprises. Interpretation is strengthened by a mechanism comparison showing that effects concentrate among households rather than professionals.*

5.2 Event-time language surprises (reproducible upgrade path)

A stronger design measures language innovations in tight windows around announcements. Let $L(\tau)$ denote the statement-level DLI at event time τ and let Δm_τ denote high-frequency monetary surprises (e.g. futures/OIS in narrow windows). Define:

$$\varepsilon_\tau^{L,HF} = \Delta L_\tau - \kappa' \Delta m_\tau. \quad (10)$$

Aggregating $\varepsilon_\tau^{L,HF}$ across events yields a high-frequency-based language shock measure with reduced scope for macro omitted-variable contamination, paralleling the logic used in high-frequency studies of announcement effects (Gürkaynak et al., 2005; Swanson, 2021; Jarociński and Karadi, 2020). The analysis below reports results using the quarterly proxy and also reports a quarterly *shock proxy* consistent with (9).

6 Data and Empirical Design

6.1 Outcomes and sample

The baseline outcomes are survey measures of U.S. inflation expectations aggregated to quarterly frequency: (i) household inflation expectations from the University of Michigan Survey of Consumers (hereafter *Michigan*), and (ii) professional inflation expectations

from the Survey of Professional Forecasters (*SPF*). The main explanatory variable is quarterly DLI, implemented as DLI1 and DLI2. Monetary surprises are constructed from high-frequency FOMC event windows and aggregated to the quarter (Gürkaynak et al., 2005; Nakamura and Steinsson, 2018).

6.2 Controls

Controls include the number of statements per quarter (*n_statements*) and lagged expectations. Specifications in levels and changes are reported. Newey–West inference is used throughout to account for serial correlation in quarterly regressions (Newey and West, 1987).

6.3 Baseline regression (levels)

$$\pi_t^e = a + b \text{DLI}_t + c \text{Surprise}_t + d' Z_t + \varepsilon_t. \quad (11)$$

6.4 Dynamics: local projections

Dynamic responses are estimated using local projections (Jordà, 2005):

$$\pi_{t+h}^e = a_h + b_h \text{DLI}_t + c_h \text{Surprise}_t + d'_h Z_t + \varepsilon_{t,h}, \quad h = 0, 1, \dots, H. \quad (12)$$

6.5 Mechanism test: heterogeneity

To test (5), estimate:

$$\pi_t^{e,(g)} = a^{(g)} + b^{(g)} \text{DLI}_t + c^{(g)} \text{Surprise}_t + d^{(g)'} Z_t + \varepsilon_t^{(g)}, \quad g \in \{\text{Households (Michigan)}, \text{Professionals (SPF)}\} \quad (13)$$

with the prediction $|b^{(\text{Households})}| > |b^{(\text{Professionals})}|$.

7 Empirical Results

7.1 Stylized facts: co-movement and separation from surprises

Inflation expectations and FOMC decisive language (standardized)

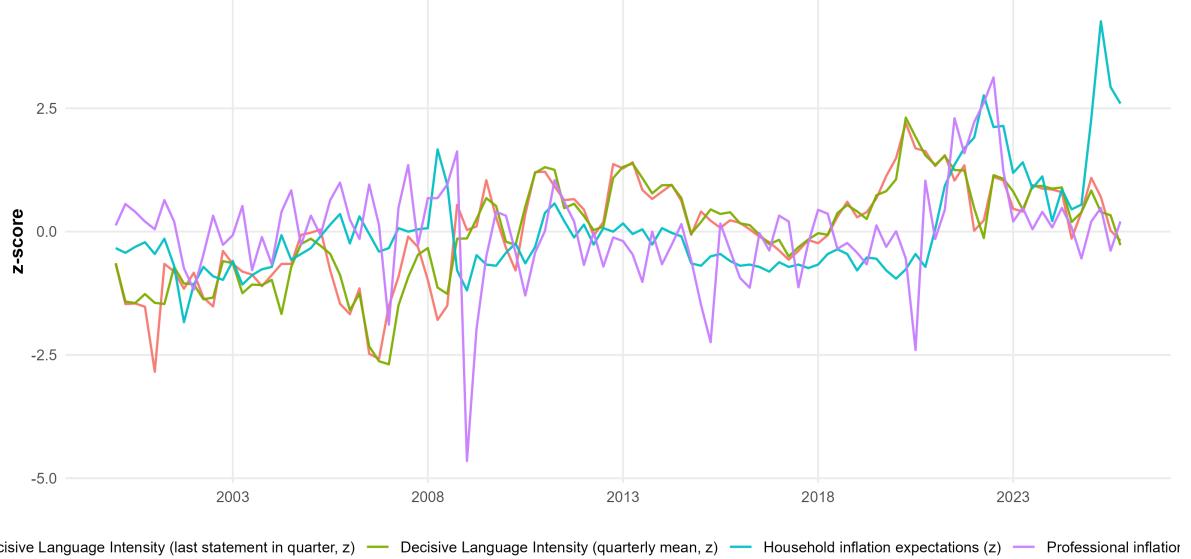


Figure 1: DLI and inflation expectations: Households (Michigan) vs. Professionals (SPF), standardized.

Decisive language, expectations, and monetary policy surprises (standardized)



Figure 2: DLI, inflation expectations (Households vs. Professionals), and FOMC monetary surprises, standardized.

7.2 Partial relationships: net of controls and surprises (households)

The partial plots show a small association between DLI and household inflation expectations net of controls. Conditioning on monetary surprises can attenuate or alter the partial slope in narrower subsamples, consistent with the idea that DLI is not a mechanical proxy for policy-rate surprises.

Partial relationship: decisive language and household expectations

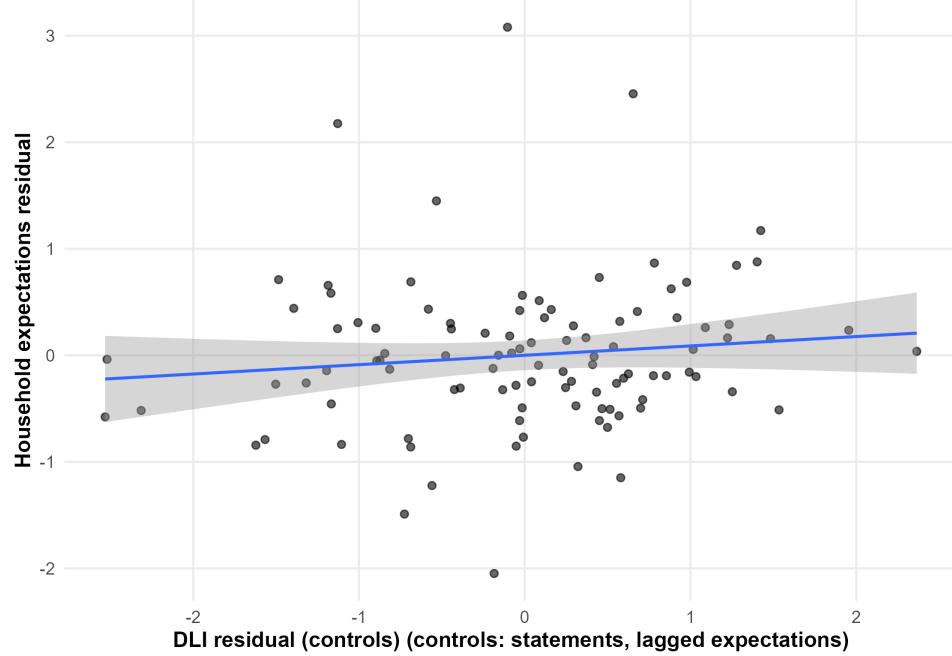


Figure 3: Partial relationship: DLI2 and household expectations (Michigan) (residualized controls).

Partial relationship: decisive language and household expectations (net of sur

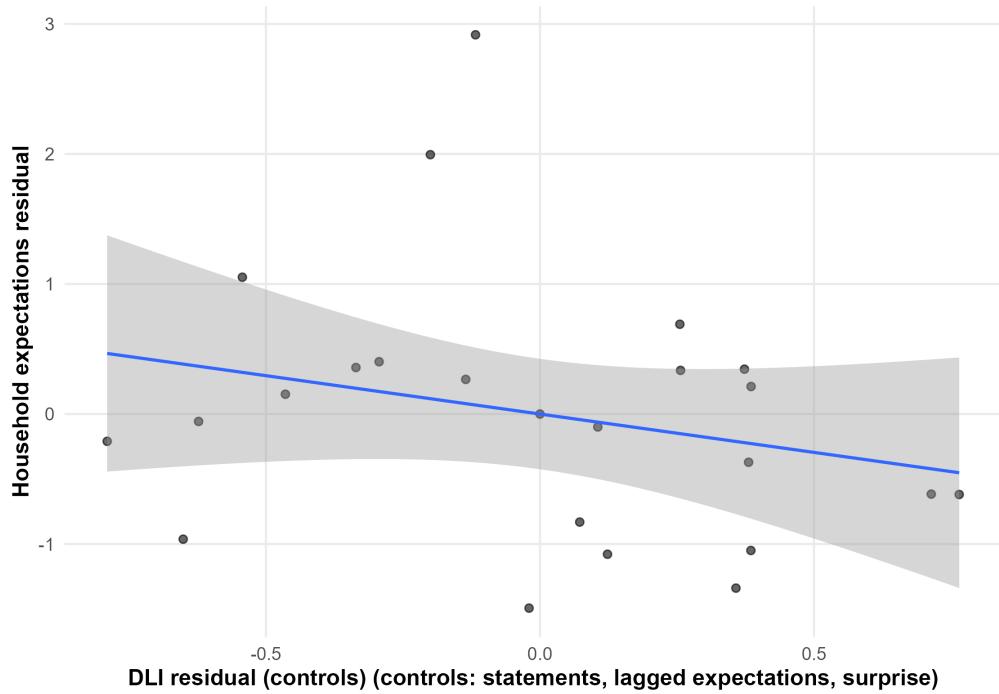


Figure 4: Partial relationship: DLI2 and household expectations (Michigan) (net of monetary surprises and controls).

Changes: decisive language and changes in household expectations

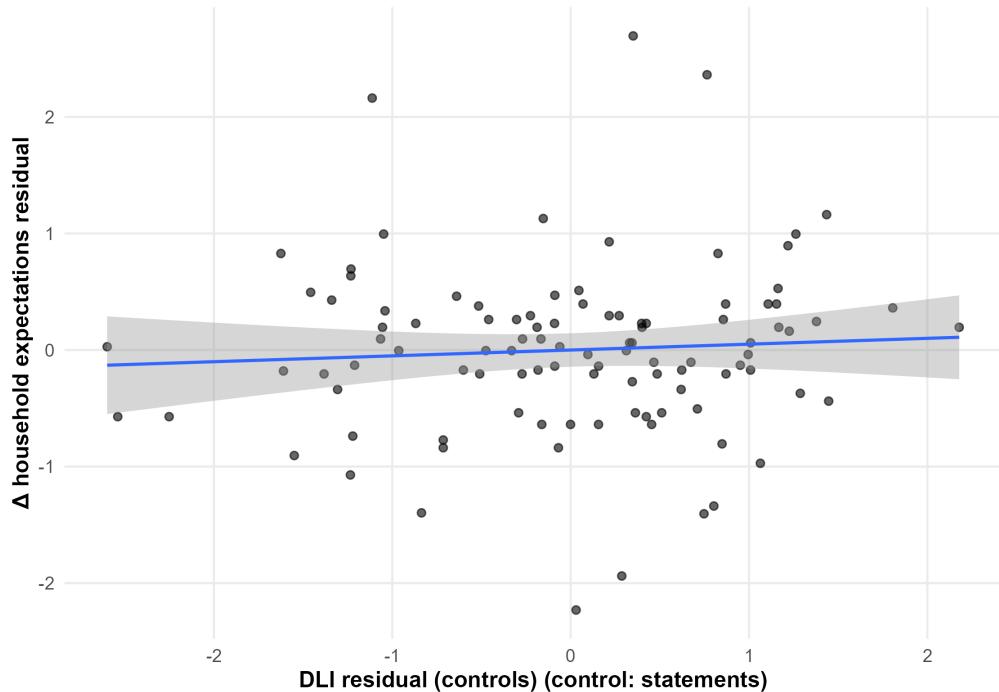


Figure 5: Changes specification: Δ household expectations (Michigan) vs. DLI2 (residualized controls).

7.3 Robustness across specifications (households)

Estimated effects of decisive language on household expectations (Newey-West 95% CI)

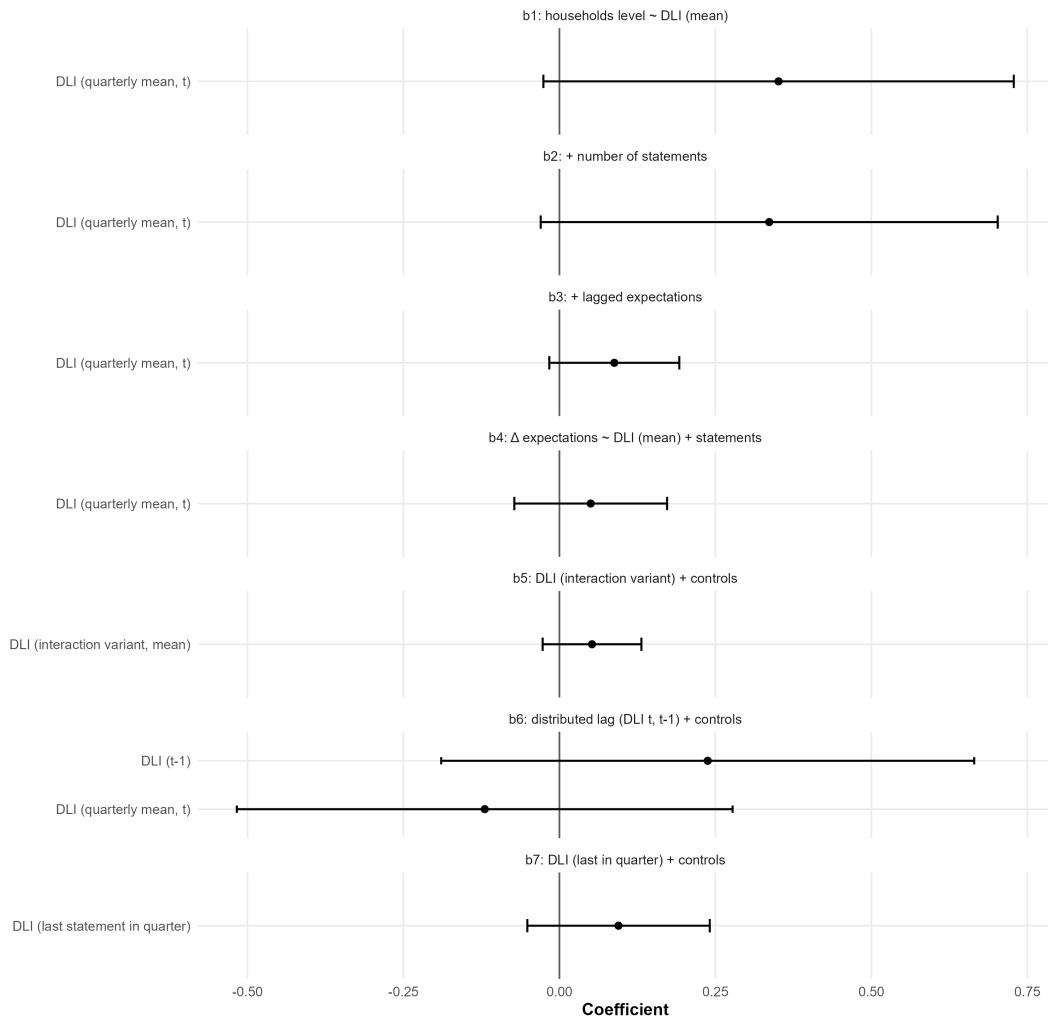


Figure 6: Estimated DLI effects (Households / Michigan) across specifications (Newey-West 95% CI).

Decisive language and monetary policy surprises: coefficients (Newey-West 95% CI)

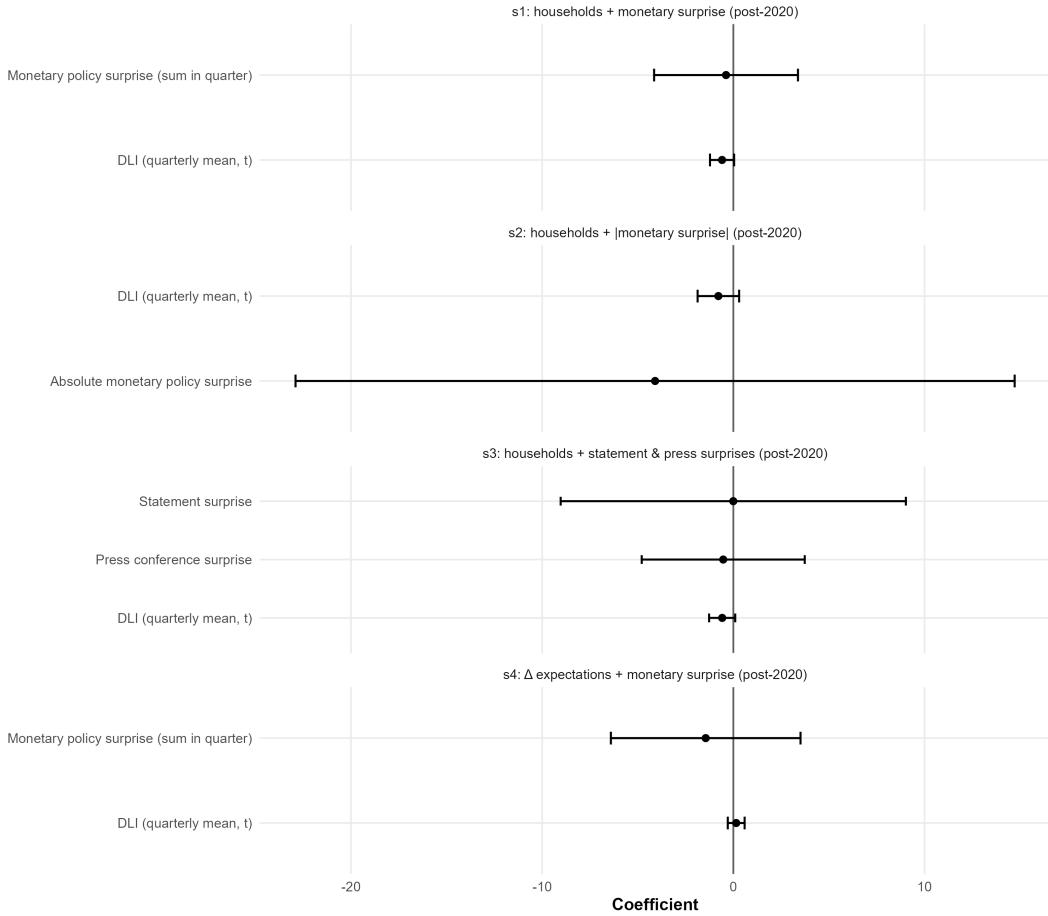


Figure 7: DLI and monetary surprises (Households / Michigan): coefficients across specifications (Newey-West 95% CI).

7.4 Dynamics: local projections (households)

Local projections indicate delayed dynamics, with responses peaking around 1–2 quarters ahead; uncertainty is substantial but the qualitative shape is stable across the DLI level and the shock-proxy implementations.

Local projections: response of household expectations to decisive language

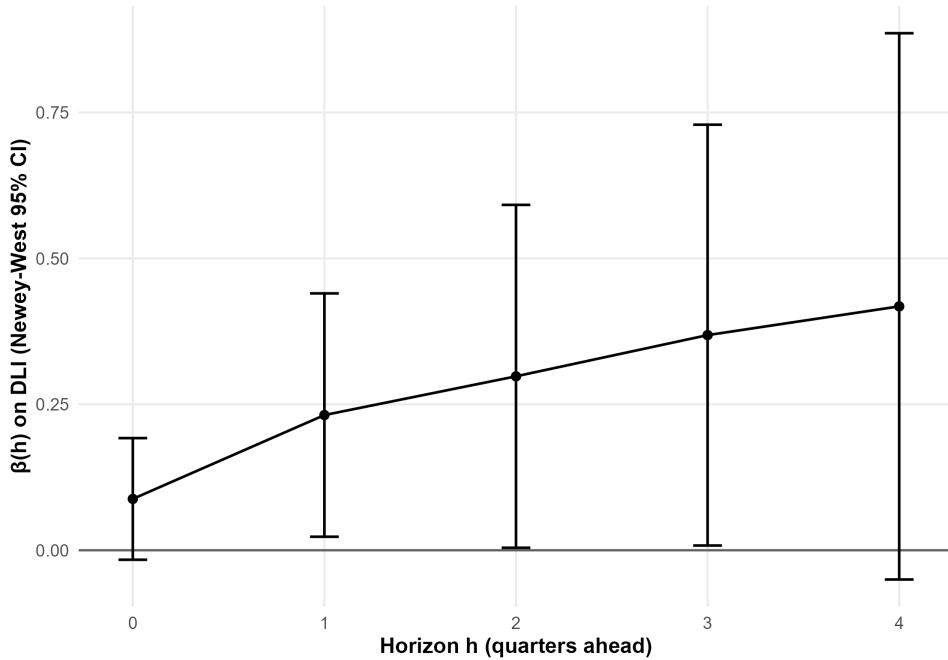


Figure 8: Local projection: response of household expectations (Michigan) to DLI2 (quarterly).

Local projections: response of household expectations to decisive language (with surprise controls)

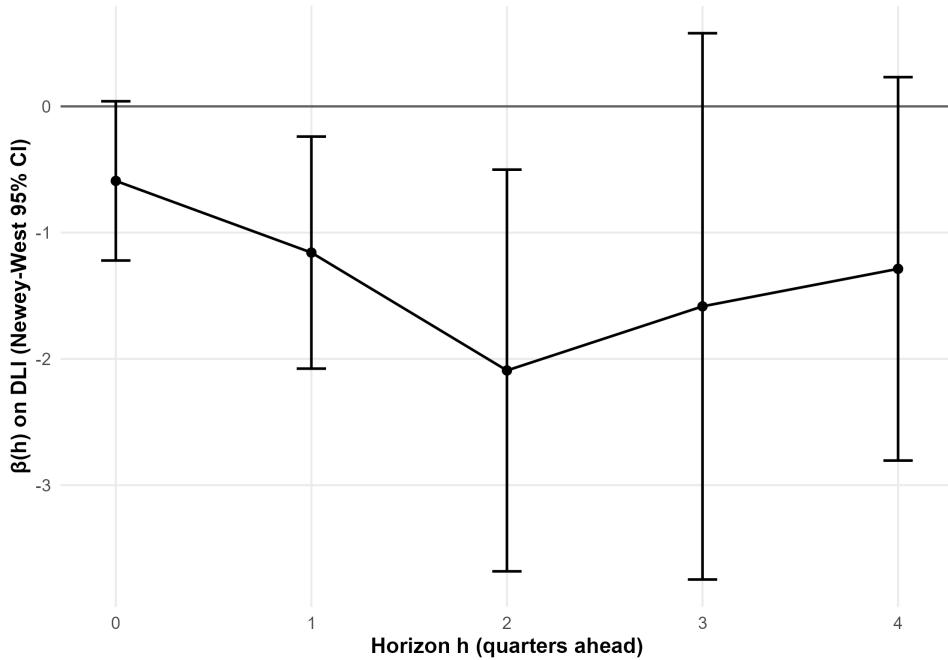


Figure 9: Local projection (with surprise controls): response of household expectations (Michigan) to DLI2 (quarterly).

Local projections: response of household expectations to DLI shock proxy

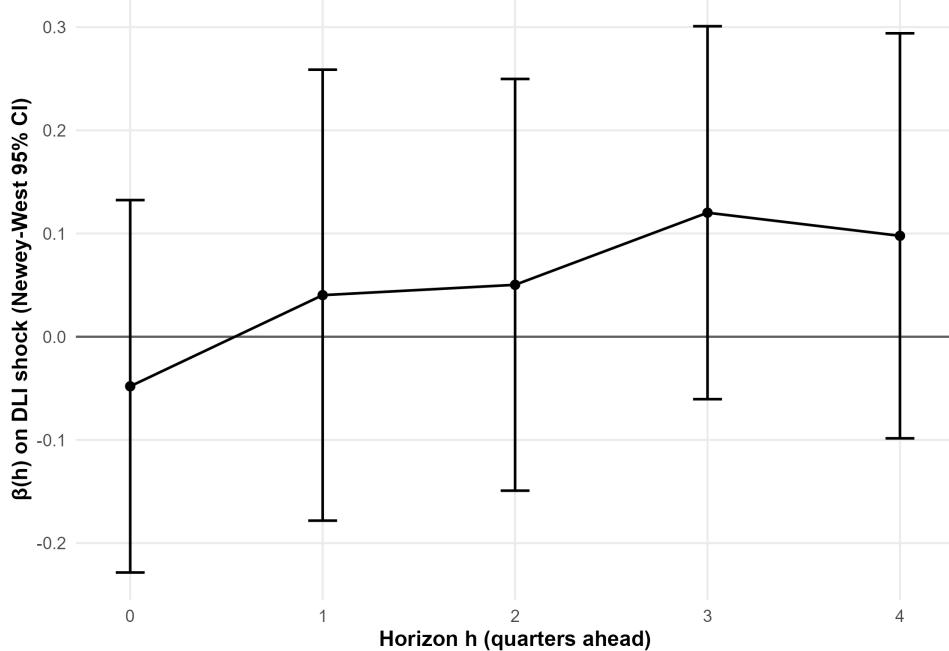


Figure 10: Local projection: response of household expectations (Michigan) to a language shock proxy (quarterly).

7.5 Mechanism test: households vs. professionals

A key mechanism implication of the DSE narrative channel is that effects should concentrate among households (Michigan) rather than professional forecasters (SPF). The estimates support this pattern: DLI effects are materially stronger for households and notably weaker (often indistinguishable from zero) for professionals, including post-2020 specifications with monetary surprises.

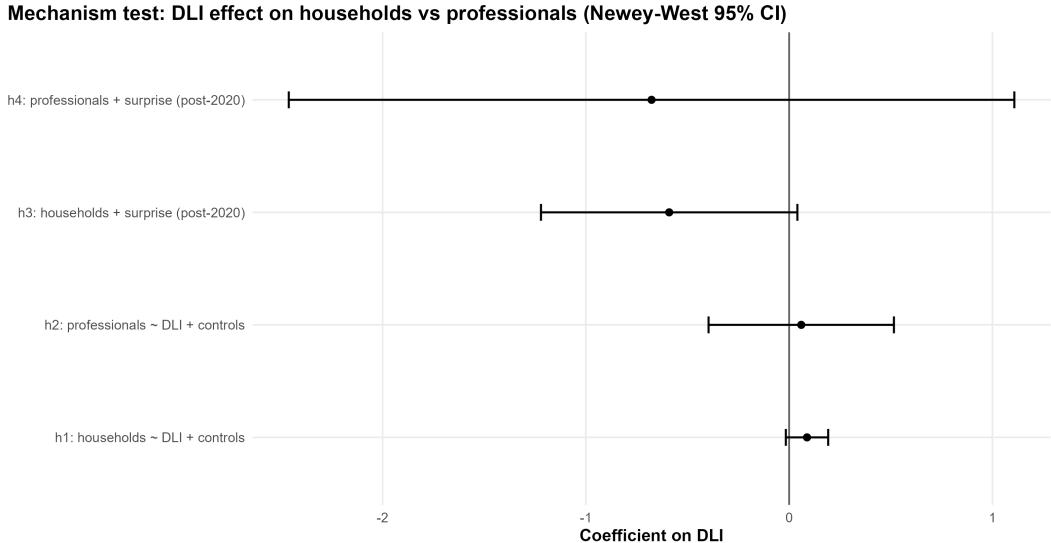


Figure 11: Mechanism test: DLI2 effects for Households (Michigan) vs. Professionals (SPF), Newey–West 95% CI.

8 Testable Implications

1. **Heterogeneity: households vs. professionals.** If the mechanism operates through intuitive inference, language innovations should have larger effects on household inflation expectations than on professional forecasts, consistent with stronger information rigidities and disagreement in household surveys (Carroll, 2003; Coibion and Gorodnichenko, 2012; Andrade and Le Bihan, 2013).
2. **Channel separation from monetary surprises.** If DLI captures a distinct communication channel, its predictive content for household expectations should not vanish when conditioning on high-frequency monetary surprises; instead, surprises and DLI may load on different components (rate shocks vs. narrative framing) (Nakamura and Steinsson, 2018; Jarociński and Karadi, 2020).
3. **Delayed dynamics under limited attention.** If households process and internalize narrative cues gradually, local projections should show delayed responses peaking at 1–2 quarters, rather than purely contemporaneous reactions (Sims, 2003; Coibion and Gorodnichenko, 2015).
4. **Event-time corroboration.** Using event-time language surprises (10), the direction and qualitative persistence patterns should be consistent with the quarterly proxy evidence, paralleling high-frequency identification approaches used for monetary announcements (Gürkaynak et al., 2005; Swanson, 2021).

9 Limitations

Residualizing DLI on surprises and controls isolates conditional variation; it does not guarantee the absence of omitted contemporaneous narrative forces (e.g. media narratives correlated with both language and expectations). Similar concerns arise in broader identification of information effects in monetary announcements (Jarociński and Karadi, 2020). The event-time construction (10) provides a direct approach to reduce this concern by measuring unanticipated language movements in narrow windows around announcements and orthogonalizing them to monetary surprises, consistent with high-frequency identification logic (Gürkaynak et al., 2005; Nakamura and Steinsson, 2018). The heterogeneity mechanism comparison (Households vs. Professionals) further constrains interpretation: a pure policy-shock-proxy story would not predict systematically weaker effects among professionals.

10 Conclusion

This paper formalizes and tests the hypothesis that decisive central bank language can act as an intuitive-thinking shock within a Dual-System Expectations framework (Bartels et al., 2025). The evidence supports three core claims: (i) DLI has an economically modest but directionally robust association with household inflation expectations; (ii) the association is not mechanically absorbed by high-frequency monetary surprises, supporting separation between communication intensity and rate surprises; and (iii) the effect is materially weaker for professional forecasters (SPF), consistent with an intuitive-inference channel rather than a generic policy-shock proxy. Local projections suggest delayed dynamics peaking around 1–2 quarters, consistent with gradual narrative processing under limited attention (Sims, 2003; Coibion and Gorodnichenko, 2015). Replication materials (code, cleaned data, regression outputs, and figures) are archived on Zenodo at 10.5281/zenodo.18038311.

A Replication Package

All code, cleaned data, regression outputs (CSV), and figure files required to reproduce the results in this paper are archived on Zenodo:

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The archive should be cited as: Zimmermann, E. D. (2025), *Replication Package for “Central Bank Language as an Intuitive-Thinking Shock”*, Zenodo.

A Measurement Details and Validation

A.1 Baseline lexicon construction

The baseline DLI lexicon is organized into (i) certainty terms, (ii) commitment/resolve terms, (iii) urgency terms, and (iv) hedge/uncertainty terms with negative weight. For reproducibility, the lexicon file and tokenization rules should be versioned and released alongside the replication package. The overall measurement strategy follows the “text as data” paradigm (Gentzkow et al., 2019) and aligns with work emphasizing economically meaningful variation in central bank language (Hansen and McMahon, 2016).

A.2 Supervised calibration protocol

A supervised variant constructs ω_w by:

1. Sampling a balanced subset of statements across regimes.
2. Having at least two independent annotators score decisiveness on a fixed rubric (certainty/commitment/urgency; threat framing; hedging).
3. Reporting inter-rater reliability (e.g. Cohen’s κ) and adjudication rules.
4. Estimating token weights via penalized regression and validating out-of-sample prediction of decisiveness scores.

B Tables from CSV outputs

B.1 Main regression results (seminar)

model	n	r2	adj'r2
b1: households level DLI (mean)	103	0.057311501276050385	0.047977951783733985
b2: + number of statements	103	0.07070270026271609	0.052116754267970355
b3: + lagged expectations	103	0.7443703606940884	0.7366240079878486
b4: Δ expectations DLI (mean) + statements	103	0.029104111563329895	0.009686193794596454
b5: DLI (interaction variant) + controls	103	0.7429243591414652	0.735134188206358
"b6: distributed lag (DLI t-1) + controls"	103	0.7494037573183626	
b7: DLI (last in quarter) + controls	103	0.7450689353356569	0.7373437515579495

B.2 With surprises (post-2020 and related specifications)

model	n	r2	adj'r2
s1: households + monetary surprise (post-2020)	24	0.7099234355841754	0.6488546851808439
s2: households + —monetary surprise— (post-2020)	24	0.7150117338004371	0.6550142040742134
s3: households + statement & press surprises (post-2020)	24	0.7100320013312186	0.6294853350343349
s4: Δ expectations + monetary surprise (post-2020)	24	0.018340566382881507	-0.12890834865968626

B.3 Heterogeneity: households vs. professionals

model	n	r2	adj'r2
h1: households DLI + controls	103	0.7443703606940884	0.7366240079878486
h2: professionals DLI + controls	103	0.14939113637934198	0.12361511020901905
h3: households + surprise (post-2020)	24	0.7099234355841754	0.6488546851808439
h4: professionals + surprise (post-2020)	24	0.32280137061678077	0.18023323811505032

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