Do Deficits Cause Inflation?
A High Frequency Narrative Approach

St. Louis Federal Reserve

Jonathon Hazell (LSE)   Stephan Hobler (LSE)
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Do Deficits Cause Inflation?

Fiscal stimulus worth 13% of US GDP in Dec '20 and Mar '21, inflation rose to 8%

Empirical debate: some find deficits important for '20s inflation [e.g. Barro & Bianchi '23]
- Others—deficits not important [e.g. Bernanke & Blanchard '23]

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- Especially hard with single, episode specific shocks

Single episodes influential for macro theories [e.g. Great Depression, 60s-80s Inflation, Post Pandemic]

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This paper: high frequency narrative approach for causal effect of deficits on inflation
- Narrative measure of shock: deficit news from key event [Friedman & Schwarz '67]
- High frequency response: inflation expectations from asset prices [Gurkaynak et al '05]

Advantage: causal effect of single episode specific shocks

A High Frequency Narrative Approach

Narrative identification of event: 2021 Georgia Senate Election Runoffs

- November 2020: Democrats win presidency + 48 senators
- January 5th 2021: runoff election for 2 senators from Georgia
- If Democrats win both: majority in senate + fiscal stimulus, small difference for non-fiscal
- → Democrat victory = news about deficits

A High Frequency Narrative Approach

Narrative identification of event: 2021 Georgia Senate Election Runoffs

Narrative measure of shock: deficit news from Georgia
- New hand collected data: time-stamped information from 20 investment banks
- P(Democrat victory) $\approx$ 50%, $\mathbb{E}$[Stimulus] = \$900 billion, 70% transfers, deficit financed
- $\rightarrow$ Deficit news of \$450 bn = 2.1% of GDP
- Reports: main consequence of Democrat victory was fiscal stimulus

A High Frequency Narrative Approach

Narrative identification of event: 2021 Georgia Senate Election Runoffs

Narrative measure of shock: deficit news from Georgia

High frequency response: inflation expectation from intraday swap prices
- Main identification strategy: single event study around election
    - Also: regression w/ daily beliefs of Dem. victory from betting markets
- Advantage: excludes lower frequency omitted variables
- Result: expected price level increase of 0.38% over 2 years [persistent effect on inflation]
- Dividend futures + forecast revisions suggest strong real GDP growth
- Robustness: Capitol Hill Riots

A High Frequency Narrative Approach

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Do deficits cause inflation?
- Many models: shocks to inflation expectations pass through to inflation via Phillips Curve
  [e.g. Coibion et al '18; Werning '22; Beaudry et al '24; Bigio et al '24]
- Stronger claim: expectations as unbiased forecast of inflation ["wisdom of the crowds"]
  - Evidence: response of expectations to shocks ≈ unbiased [Coibion & Gorodnichenko method]

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High frequency response: inflation expectation from intraday swap prices

Combining narrative + high frequency: inflation multiplier + overall effect of '21 deficits

    Inflation multiplier: 0.18% price level growth per 1% deficit-to-GDP shock

$\times$ 13.0% deficit-to-GDP shock in Dec '20 + Mar '21 [i.e. extrapolation]

$=$ 2.3% increase in price level over '21 + '22

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Bottom line: '21 deficits caused intermediate share of '21 + '22 inflation ($\approx 30\%$)
  $\rightarrow$ Deficits important for inflation but not only cause

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Loose monetary policy important: short term nominal rates unchanged after runoff

Standard Models and the Inflation Multiplier

Can standard models quantitatively match the inflation multiplier? [Angeletos et al '24]

- Post-Pandemic inflation + '21 deficits = powerful test of model

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Simple Heterogeneous Agent New Keynesian (HANK) model [Wolf '21, Angeletos et al '23]
- Calibrate to pre 2020 data incl. flat but upward sloping Phillips Curve [Hazell et al '22]
- Inputs: "deficit bundle" of interest rates + spending + transfers + debt
- From narrative + high frequency info

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Interpretations:
- HANK model "passes the market test"
- Stronger claim: HANK rationalizes response of inflation to deficits

Literature

High frequency + narrative identification. (Friedman & Schwarz '67, Romer & Romer '89, Ramey & Shapiro '98, Velde '09; Romer & Romer '10, Ramey '11, Mertens & Ravn '13; Coglianese et al '23; Gurkaynak et al '05, Krishnamurthy & Vissing-Jorgensen '11, Gertler and Karadi '15, Nakamura and Steinsson '18, Bahaj '20, Kaenzig '21, '23)

- Combine high frequency and narrative identification
- Causal effect of single episode specific shocks [e.g. Biden stimulus + Post pandemic inflation]

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- **Combine** high frequency and narrative identification
- Causal effect of **single episode specific shocks** [e.g. Biden stimulus + Post pandemic inflation]

Cause of Post Pandemic Inflation. (Reis '22, Bai et al '23, Bernanke & Blanchard '23, Gertler & Gagliardone '23, Guerrieri et al '23, di Giovanni et al '23; Benigno & Eggertsson '23, Bianchi et al '23, Bianchi & Barro '23, Cerrato & Gitti '23, Gitti '23, Benigno & Eggertsson '23; Cochrane, '22; Barro and Bianchi, '23; Bianchi, Faccini, and Melosi, '23; Kaplan, Nikolakoudis & Violante '24; Beaudry, Hou & Portier '24; Bigio, Caramp & Silva '24)

- Causal evidence that **deficits** explain **intermediate** share of '21-'22 inflation

Data

Data

Asset prices:

- Intraday risk neutral inflation expectations
  - 1, 2, 5 and 10 year inflation expectations from swaps (= contract on future inflation)
  - Inflation risk premium is stable over this period [Cieslak & Pflueger '23, Cleveland Fed]
- Intraday dividend futures 1, 2 years ahead [Gormsen & Koijen '20]
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Election odds from PredictIt—online exchange w/ traders betting on public events
- End-of-day and tick-by-tick probabilities associated with Georgia Senate election runoff
- Supplement with additional info. from BetFair

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New narrative data from investment banks
- Source: investment banks + similar, 20 sources [e.g. Goldman Sachs, Bloomberg, Moody's]
- Hand collected via contacting each bank
- Reports around events, distributed to market participants, time stamped, narrative detail
→ Proxy for markets' beliefs

Email distribution

Time stamp

GS Rates Research
Global Rates Trader: Softer data drive yields lower
To: jhazell@mit.edu,
Reply-To: gs-portal-emails@gs.com

Goldman Sachs | Economics Research

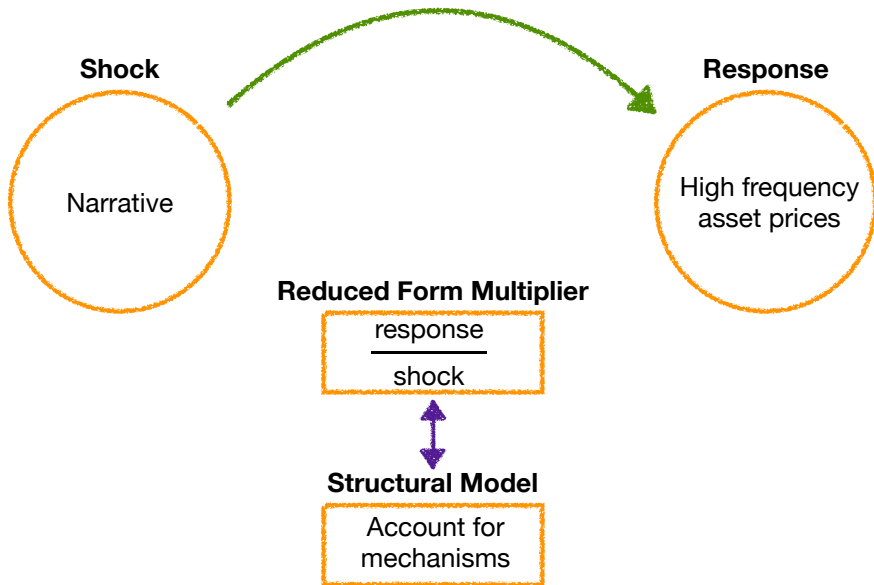📄 Print | Read

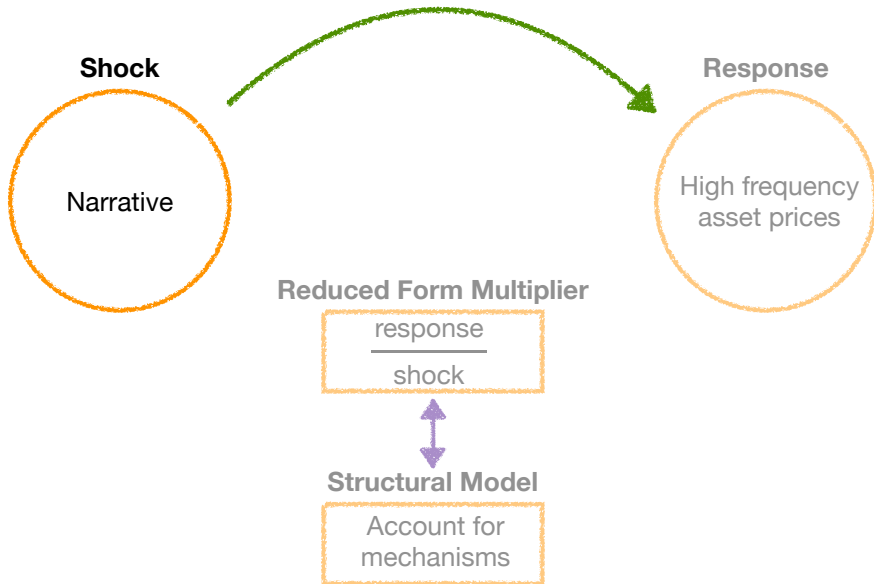Global Rates Trader: Softer data drive yields lower

17 November 2023 | 3:58PM EST

In this week's *Trader,* we discuss recent behavior of US yields and the outlook for the rate volatility. A stretch of

Narrative information

Shock

Narrative

Response

High frequency asset prices

Reduced Form Multiplier

$$\frac{\text{response}}{\text{shock}}$$

Structural Model

Account for mechanisms

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Mar '20: CARES Act $2.2 trillion $\approx 10.3\%$ of GDP

Nov '20: Biden elected, Democrats with 48 Senate seats
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Nov '20 — Election

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Georgia runoff pivotal for deficits: [cf. Mian et al '24]
- If Democrats win, can pass fiscal legislation w/o Republicans
- Not pivotal for non-fiscal legislation (requires 60 votes)

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Jan 5 '21 ├ Georgia Runoff

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- Jan 6 afternoon—Capitol Hill Riots
- Jan 7—both Democrats declared victors

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Democrat legislation:
- Mar '21: American Rescue Plan, $1.8 trillion, $\approx 8.4\%$ of GDP
- Aug '22: approx. deficit-neutral Inflation Reduction Act

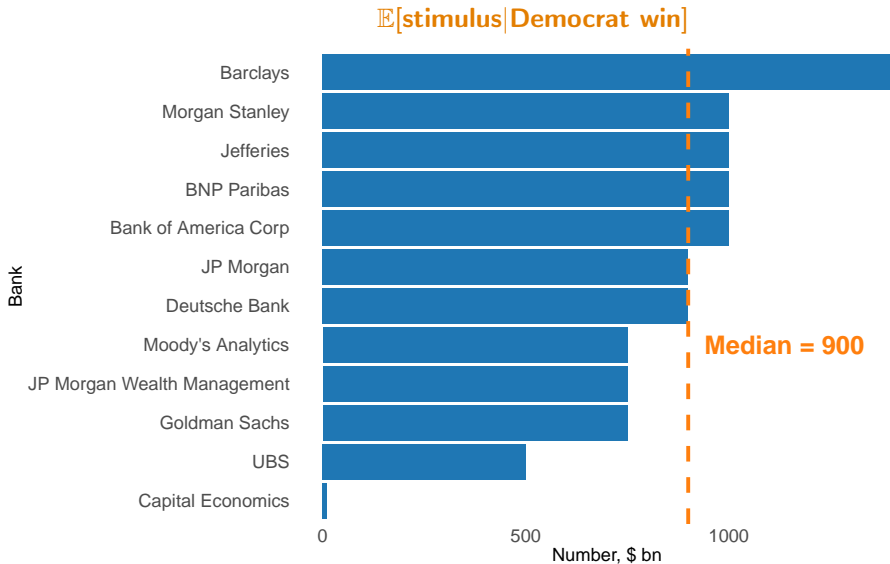|	
Nov '20	Election
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Jan 7 '21	Democrats Declared Victors
March '21	American Rescue Plan
Aug '22	Inflation Reduction Act

Narrative Measure of Shock to News About Deficits

What was the shock to expected fiscal deficits due to Georgia runoff?

- Challenge: need counterfactual beliefs if either Democrats or Republicans were to win
- Search hand collected data from 20 investment banks, one week window around election

Needed: $\mathbb{E}[\text{stimulus}|\text{Democrat win}]$, $P(\text{Democrat win})$, $\mathbb{E}[\text{stimulus}|\text{Divided govt.}]$

Narrative Measure of Shock to News About Deficits

$\mathbb{E}[\text{stimulus}|\text{Democrat win}]$

Median = 900

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- $\mathbb{E}$[stimulus|Democrat victory] is $900 billion ▸ Table
- P(Democrat victory) ≈ 0.5

> Median of 5 banks
>
> Deutsche Bank: *"The web now has sites suggesting odds are only 52% in favour of the Republicans maintaining control of the Senate—so a bit of a toss-up."*
>
> — 4th January '21

  + Additional evidence from betting markets + polling data ▸ Table

Narrative Measure of Shock to News About Deficits

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- $\mathbb{E}$[stimulus|Republican victory] is zero

    Median of 6 banks
    Rabobank: *"If the Republicans manage to hold on to at least one of these two Georgia seats, they ... are likely to shoot down the ambitious spending plans of the Democrats."*
    — 5th January '21 `▸ Table`

Narrative Measure of Shock to News About Deficits

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Additional info:
- Expected: stimulus is deficit financed ▸ Table
- 70% transfers [rebates + unemployment insurance], 30% spending [state + local aid] ▸ Table

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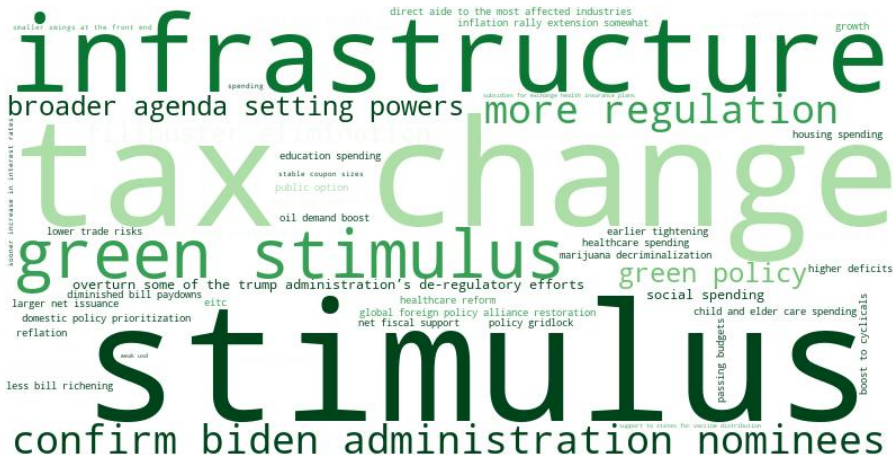- $\rightarrow$ **\$450 billion** of fiscal news after Democrat victory, 2.1% of 2020Q4 annualized GDP

Additional info:

- Expected: stimulus is deficit financed `▸ Table`
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Additional policy: delayed + tax financed infrastructure [quantitatively unimportant]
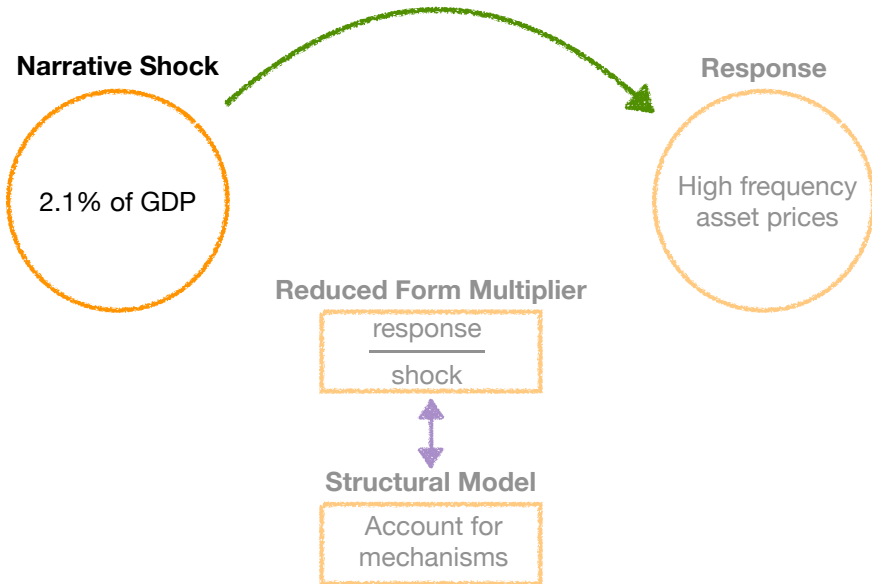
Main Outcome of Democrat Victory is Stimulus

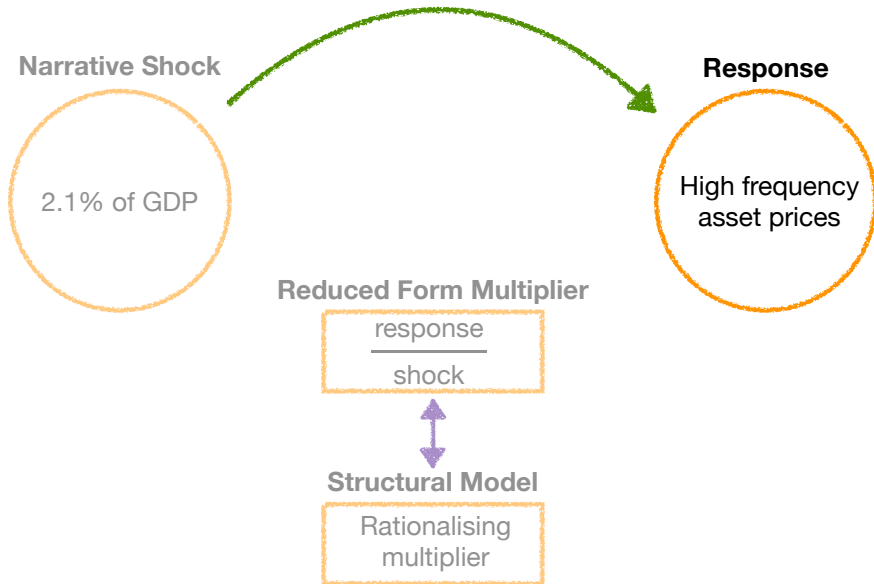Darker = more likely, Larger = mentioned by more investment banks

Main outcomes: stimulus, tax + infrastructure

Narrative Shock

2.1% of GDP

Response

High frequency
asset prices

Reduced Form Multiplier

$$\frac{\text{response}}{\text{shock}}$$

Structural Model

Rationalising
multiplier

High Frequency Response of Inflation Forecasts

- High frequency response of inflation expectations from swaps
  - → Eliminates lower frequency omitted variables [e.g. oil shocks, post pandemic bottlenecks]

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- **Single event study:** around Georgia shock, asset price y_t follows process [MacKinlay '97]

$$y_t = \begin{cases} \varepsilon_t & \text{if } t < T \\ \varepsilon_t + \alpha_t & \text{if } t > T \end{cases}$$

α_t is causal effect of election, ε_t is "typical" movement [e.g. liquidity shock]

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- **Estimated causal effect:** $\hat{\alpha}_{T+j} = y_{T+j} - \mathbb{E}_T \left[y_{T+j} | \{\alpha_{T+k}\} = 0 \right]$
  - Construct expectation using ARIMA estimated before T (selected via Akaike Criterion)

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  - Construct expectation using ARIMA estimated before T (selected via Akaike Criterion)

- Identification assumption: distribution of ε_t did not change just before vs. just after T
  - $\rightarrow$ No other "atypical" shocks just after Senate election
  - ... But typical shocks "allowed"

How Wide Should the Event Window Be?

Key decision: event window should capture effect but exclude omitted variables

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Event window from beginning of January 5th to end of January 7th in baseline
- Inflation swaps take 2-3 days to incorporate fundamental information [Bahaj et al 2023]
  - Goldman Sachs: *"democratic senate control looks likely"* — January 6th, 2:01 AM
  - Similar in high frequency betting data ▸ Details
  - Start on morning of election to include "pre-announcement drift" ▸ Details

- Narrative evidence: Georgia main shock to asset prices until payroll release on January 8th
  - Goldman Sachs: *"The Georgia senate runoff results remain the key event of the week for rates, notwithstanding the pandemic-driven drop in December payrolls."* — January 8th
  - Consistent with Bloomberg intraday "data surprise" index ▸ Details

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Potential confounder: January 6th Capitol Hill Riots
- Robustness: end event window at 2PM on January 6th + other robustness to come
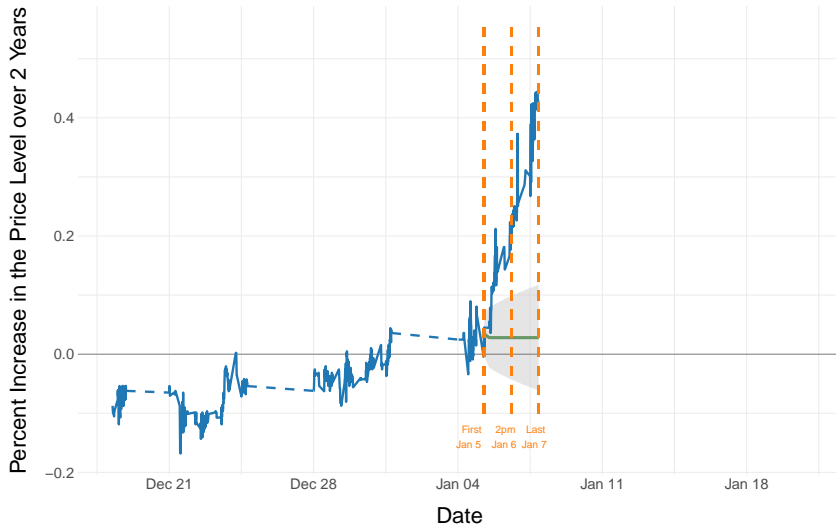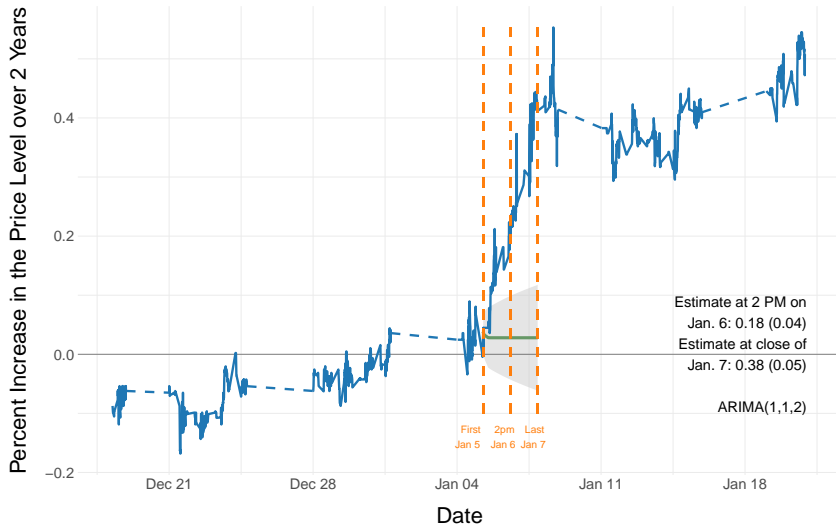- Bloomberg daily "round up": no other significant events `▸ Details`

Event Study: Causal Effect of Georgia Shock on Inflation Expectations

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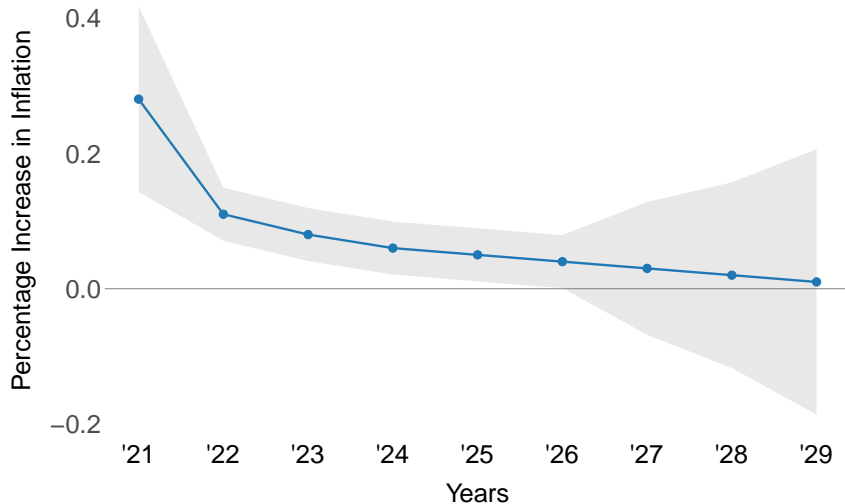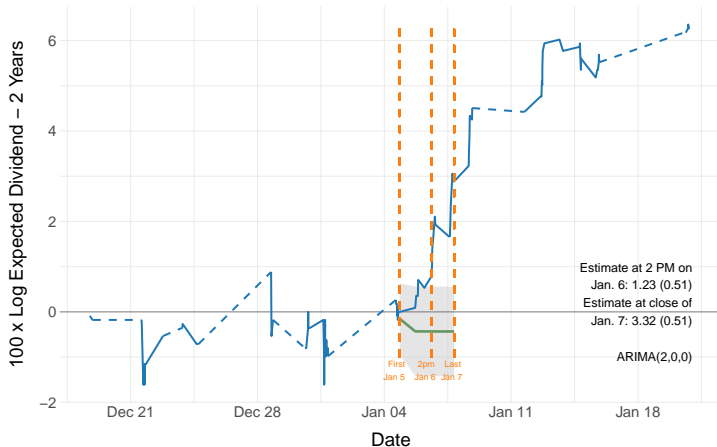# Event Study: Causal Effect of Georgia Shock on Inflation Expectations

Dynamics: Causal Effect of Georgia Shock on Inflation Expectations

2 year nominal dividend future $\approx$ forecast of 2 year nominal dividends ▸ Details ▸ Additional Results

2 year nominal dividend future ≈ forecast of 2 year nominal dividends ▸ Details ▸ Additional Results

→ Increase in '22 real GDP of ≈ 1.9% [Gormsen & Koijen '20]

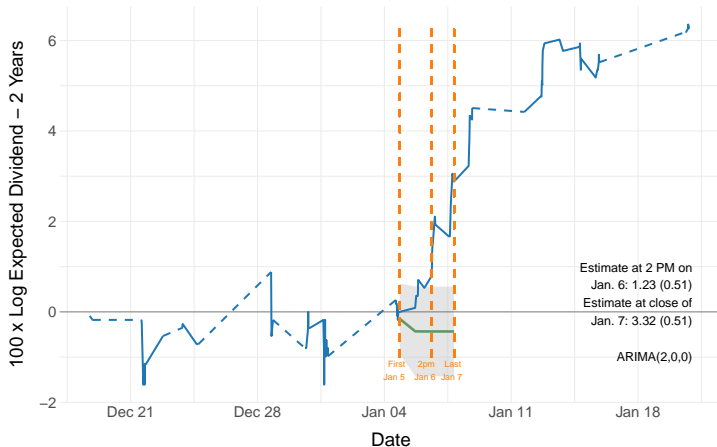# Dividend Futures + Investment Banks: Positive Growth ("Demand Shock")

2 year nominal dividend future ≈ forecast of 2 year nominal dividends ▸ Details ▸ Additional Results
  → Increase in '22 real GDP of ≈ 1.9% [Gormsen & Koijen '20]
After runoff: median investment bank raises '22 output forecast by 1.8%

Robustness: Capitol Hill Riots

1. Similar results excluding January 6th riots

2. Inflation forecast remains high after Riots disperse

3. Real outcomes suggest expansionary shock

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4. Narrative evidence from news: Capitol Hill Riots not important for asset prices

"The markets appear to be putting zero probability on the U.S. becoming a banana republic ... [o]n Jan. 6, as a mob stormed the Capitol, the S&P 500 merely trimmed its gains."
— Bloomberg Economics, January 19th '21

1. Similar results excluding January 6th riots

2. Inflation forecast remains high after Riots disperse

3. Real outcomes suggest expansionary shock

4. Narrative evidence from news: Capitol Hill Riots not important for asset prices

5. Credit default swaps did not respond ▸ Details

1. Single event study

   - Drawback: relies on a single, high-powered observation

2. **Regression specification** $\leftarrow$

Motivation:

- Variation over November–January in probability of Democrat victory in Georgia
- Markets paid close attention ▸ Barclays Example

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Daily probability of Democrat victory from betting markets as measure of fiscal news

$$y_t = \alpha + \beta\, \text{probability}_{t-1} + \varepsilon_t,$$

- probability_{t-1} is daily probability of Democrat victory from PredictIt
- Sample: one week after November presidential election to one week after Georgia runoff
- Identification assumption: macro news does not cause P(Democrat Victory)
  + No correlated macro shocks
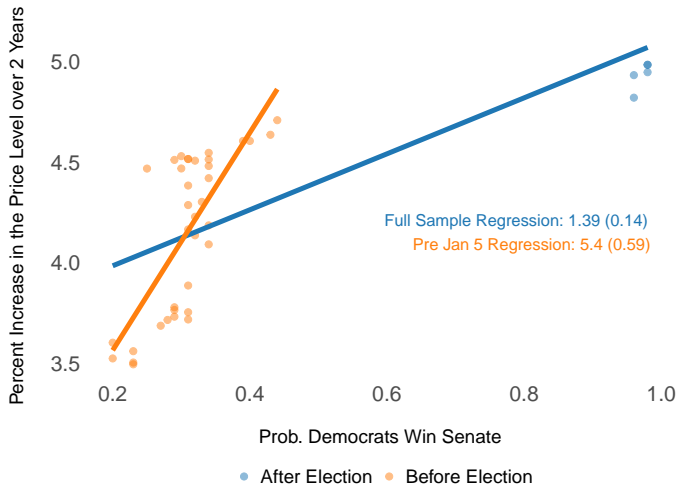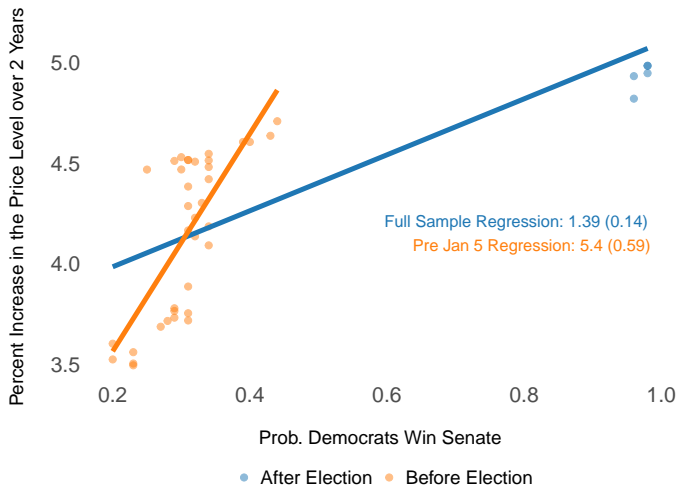
Comparison across strategies: regression $\approx$ 40% larger than single event study (▸ Table + Robustness)

- Robustness: IV with polls, controls, differences

Narrative Shock

2.1% of GDP

High Frequency Response

$\mathbb{E} \Delta$Price Level: 0.38%, 2 years

Reduced Form Multiplier

$$\frac{\text{response}}{\text{shock}}$$
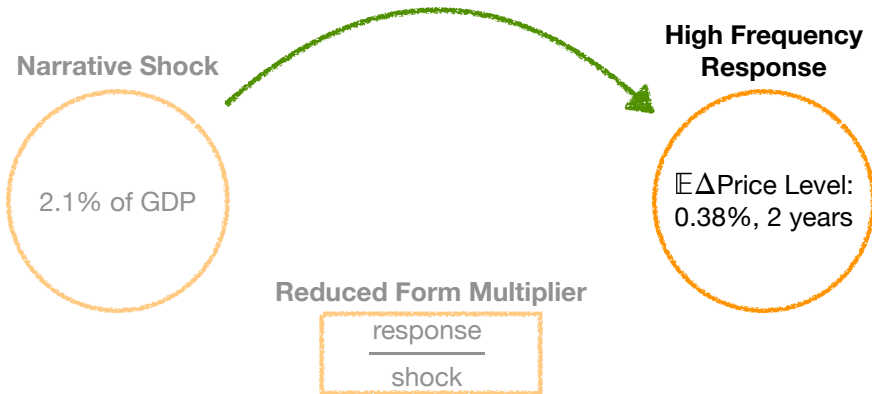
Two possibilities so far ...

1. Many models: shocks to inflation expectations pass through to inflation via Phillips Curve
   [e.g. Coibion et al '18; Werning '22; Beaudry et al '24; Bigio et al '24]
   - → These models + our evidence: deficits cause inflation ‣ Household vs. Markets

2. Stronger claim: if response of expectations to shocks is unbiased ["wisdom of the crowds"]
   - Then Δinflation expectations/Δdeficits ≈ $\mathbb{E}$[Δactual inflation]/Δdeficits
   - → From high frequency response of expectations to (low frequency) response of actual inflation

Evidence: Inflation Expectations as an Unbiased Forecast

Standard test: is response of expectations to shocks unbiased? [Coibion & Gorodnichenko '15]

$$\pi_{t,t+1} - F_t \pi_{t,t+1} = \alpha + \beta \left(F_t \pi_{t,t+1} - F_{t-1} \pi_{t,t+1} \right) + \varepsilon_t$$

- $\pi_{t,t+1}$ = year-over-year CPI inflation, sample: 2004-2023
- $F_t \pi_{t,t+1}$ = forecast of $\pi_{t,t+1}$ from swaps, $F_{t-1} \pi_{t,t+1}$ = forecast of $\pi_{t,t+1}$ a year earlier
- If $\beta = 0$, revisions do not predict errors $\rightarrow$ inflation forecast likely unbiased

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Estimates: $\beta = 0.05\ (0.3)$ [cf. professional forecasters]
- Additional tests: Mincer-Zarnowitz & serial correlation of forecast errors
  - 2019-2023 estimates + additional

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  2019-2023 estimates + additional

Implication:

- Use response of expectations to learn about response of actual inflation
- Next section takes this approach

Narrative + High Frequency: Effect of '21 Deficits on Inflation

Narrative Shock

2.1% of GDP

High Frequency Response

$\mathbb{E}\Delta$Price Level: 0.38%, 2 years

Inflation Multiplier

1% deficit/GDP: ΔPrice Level 0.18% over 2 years

Assumes: Δinflation forecast/Δdeficits $\approx$ Δactual inflation/Δdeficits

Inflation Multiplier

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13% of GDP [Dec '20 + Mar '21 stimulus] × 0.18 [inflation multiplier]
= 2.3% ΔPrice Level over '21-'22

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Explains 30% of '21-'22 inflation
→ Deficits important but not only cause

Inflation Multiplier

1% deficit/GDP:
ΔPrice Level 0.18% over 2 years

'21 Deficits + '20 CARES Act
explains 50% of '21-22 inflation

Extrapolation: Effect of Deficits on '21-'22 Inflation

13% of GDP [Dec '20 + Mar '21 stimulus] × 0.18 [inflation multiplier]
= 2.3% ΔPrice Level over '21-'22

Explains 30% of '21-'22 inflation
→ Deficits important but not only cause

Loose Monetary Policy Important: Short Term Rates Unchanged
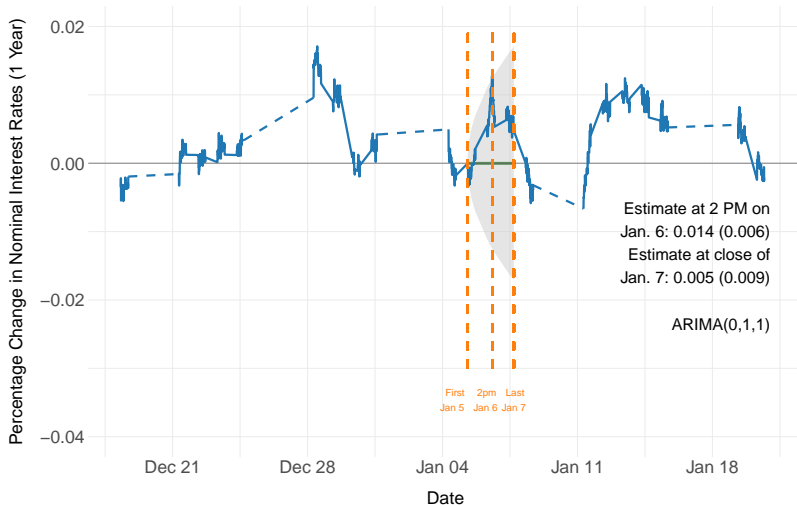
But long term rates rise [cf. Mian, Straub & Sufi 2024] ▸ Long Term Rates + Robustness
- Real rate multiplier of 0.1pp per 1% deficit-to-GDP shock (5 year - 5 year forward)

Can HANK Models Match the Inflation Multiplier?

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Can HANK models match the inflation multiplier?

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- Fraction $1 - \mu$ of overlapping generation households with mortality risk
    Accurate approximation to richer HANK model [Wolf 2021, Angeletos et al 2023]
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- Standard calibration to pre 2020 data [Hazell et al 2022; Angeletos et al 2023]

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Results:
- Model quantitatively matches size + persistence of inflation multiplier
- Loose monetary policy key mechanism for multiplier

Environment:

- Fraction μ hand to mouth: consume after tax income $C_{H,t} = W_t N_{H,t} - T_{H,t}$

- Fraction $1 - \mu$ of OLG households with survival probability ϕ [Wolf '21; Angeletos et al '23]

$$\max_{\{\mathbf{C}_i, \mathbf{A}_i\}} \mathbb{E}_t \sum_{j=0}^{+\infty} (\beta\phi)^j \left[\frac{C_{i,t+j}^{1-\frac{1}{\sigma}} - 1}{1 - \frac{1}{\sigma}} - \frac{N_{i,t+j}^{1+\frac{1}{\varphi}}}{1 + \frac{1}{\varphi}} \right] \quad \text{s.t.} \, C_{i,t} + A_{i,t} = \frac{1}{\phi} \frac{1 + i_{t-1}}{\Pi_t} A_{i,t-1} + W_t N_{i,t} - T_{i,t} + Z_{i,t}$$

- Market clearing: $Y_t = C_t + G_t$

- Sticky wages: $\pi_t = \kappa \left(y_t - \frac{\varphi}{\varphi + \sigma \frac{C_{ss}}{Y_{ss}}} g_t \right) + \beta \mathbb{E}_t \pi_{t+1}$ [Phillips Curve]

A Simple Heterogeneous Agent Model

Environment:

- Fraction μ hand to mouth: consume after tax income $C_{H,t} = W_t N_{H,t} - T_{H,t}$

- Fraction $1 - \mu$ of OLG households with survival probability ϕ [Wolf '21; Angeletos et al '23]

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Policy: government sets $\{i_t, T_t, T_t^H, G_t\}_{t=0}^{\infty}$ s.t. budget constraint

Calibration and Modelling '21 Deficit Shock

Standard calibration to pre 2020 data: [▸ Calibration Details]

- Calibrate consumption block to target intertemporal MPC [Fagereng et al '21; Auclert et al '23]
- Flat but positively sloped Phillips Curve [Hazell et al '22]

Main exercise: evaluating inflation response implied by model to "deficit bundle" from Georgia

Measuring policy shock $\{i_t, T_t, T_t^H, G_t\}_{t=0}^{\infty}$

- Deficit size + composition (i.e. G vs. T) from narrative reports
- Timing of spending from realized American Rescue Plan [Edelberg & Sheiner '21]
- Debt repayment from long term interest rates + Congressional Budget Office debt forecast
- Nominal interest rate shocks from high frequency response of interest rates
- Assume economy in steady state after 10 years

Fiscal stimulus

Monetary policy

Fiscal stimulus

Monetary policy

Output
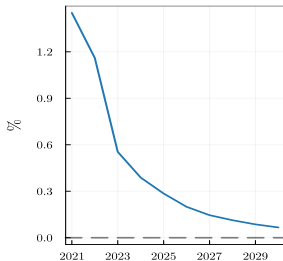
Inflation
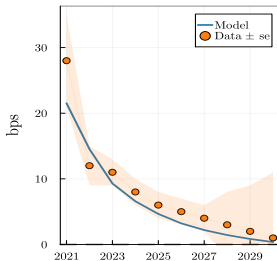
Cumulative output multiplier
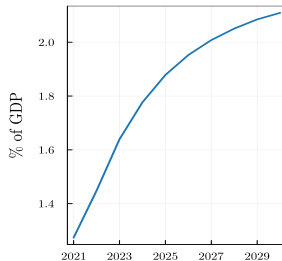
Key Mechanism for Inflation Response: Loose Monetary Policy

Counterfactual: Fed follows historical policy rule [Orphanides & Williams 2002, Campos et al 2024]

$\rightarrow i_t = i_{t-1} + \phi_\pi \pi_t \quad \phi_\pi = 1.5$

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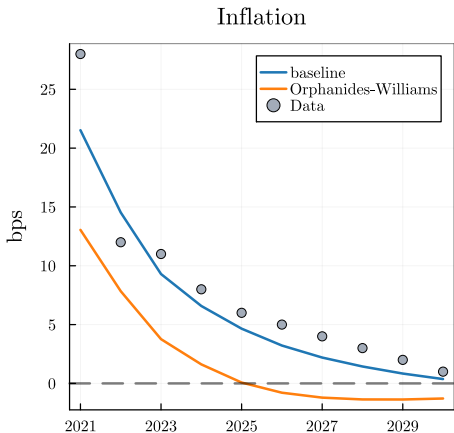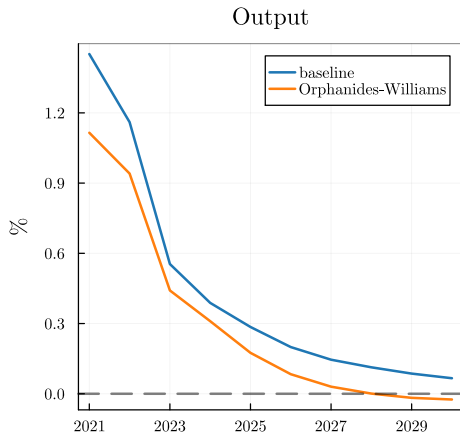
1. HANK "passes the market test": market agrees w/ HANK about how inflation affects deficits

2. Stronger claim: HANK rationalizes response of inflation to deficits

Conclusion

Conclusion

This paper: high frequency narrative approach for causal effect of deficits on inflation

- Narrative measure of shock: deficit news from key event
- High frequency response: inflation expectations from asset prices

Bottom line:

- Dec '20 + Mar '21 stimulus explains intermediate share of '21-'22 inflation
- → Deficits important for inflation but not only cause

High frequency narrative approach estimates causal effect of single episode specific shocks

- In principle applicable to other influential episodes

Appendix
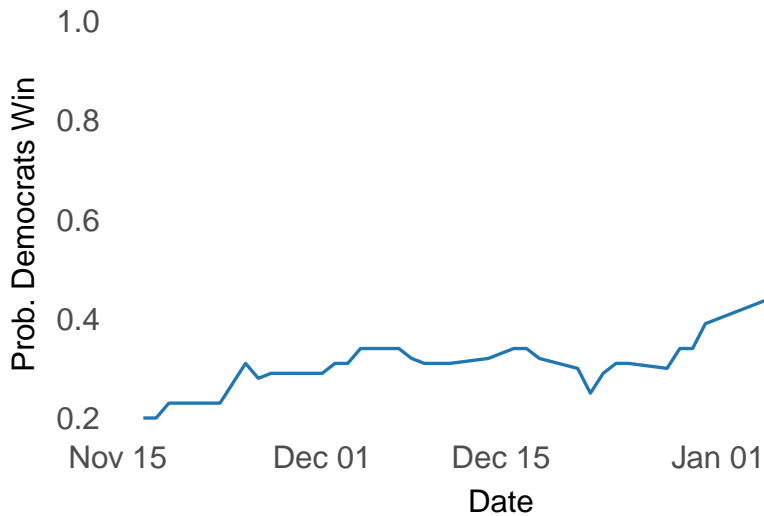
Polling Data

Georgia's regular Senate election

Republican Sen. David Perdue is running for reelection against Democrat Jon Ossoff in a regularly scheduled election.

JAN. 5 LEADER
Ossoff
+1.8

Ossoff 49.1%
Perdue 47.4%
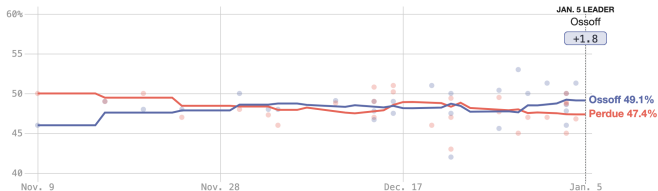
Georgia's special Senate election

Republican Sen. Kelly Loeffler faces Democrat Raphael Warnock in a special election. Loeffler was appointed to fill former Sen. Johnny Isakson's seat after he resigned.

JAN. 5 LEADER
Warnock
+2.1

Warnock 49.4%
Loeffler 47.2%

Normalised Win Probability for Democrats with LOESS Smoothing and Sum of Volumes

Swaps IV - 1 Year

Percent Increase in the Price Level over 1 Year (y-axis)
Prob. Democrats Win Senate (x-axis)

Full Sample Regression: 0.87 (0.09)
Pre Jan 5 Regression: 3.42 (0.4)

Swaps IV - 5 Years

Percent Increase in the Price Level over 5 Years

Full Sample Regression: 2.12 (0.22)
Pre Jan 5 Regression: 8.24 (0.91)

Prob. Democrats Win Senate

Swaps IV - 10 Years

Full Sample Regression: 2.84 (0.34)
Pre Jan 5 Regression: 12.3 (1.6)

Percent Increase in the Price Level over 10 Years (y-axis)

Prob. Democrats Win Senate (x-axis)

Dividends IV - 1 Year

100 x Log Expected 1 Year Dividend (y-axis)

Prob. Democrats Win Senate (x-axis)

Full Sample Regression: 6.06 (0.73)
Pre Jan 5 Regression: 17.14 (3.55)

Dividends IV - 2 Years

Full Sample Regression: 9.69 (1.07)
Pre Jan 5 Regression: 27.2 (3.72)

x-axis: Prob. Democrats Win Senate
y-axis: 100 x Log Expected 2 Years Dividend

Betfair Regular IV - 2 Years

Full Sample Regression: 1.01 (0.14)
Pre Jan 5 Regression: 2.14 (0.82)

Percent Increase in the Price Level over 2 Years

Prob. Democrats Win Senate BetFair Regular
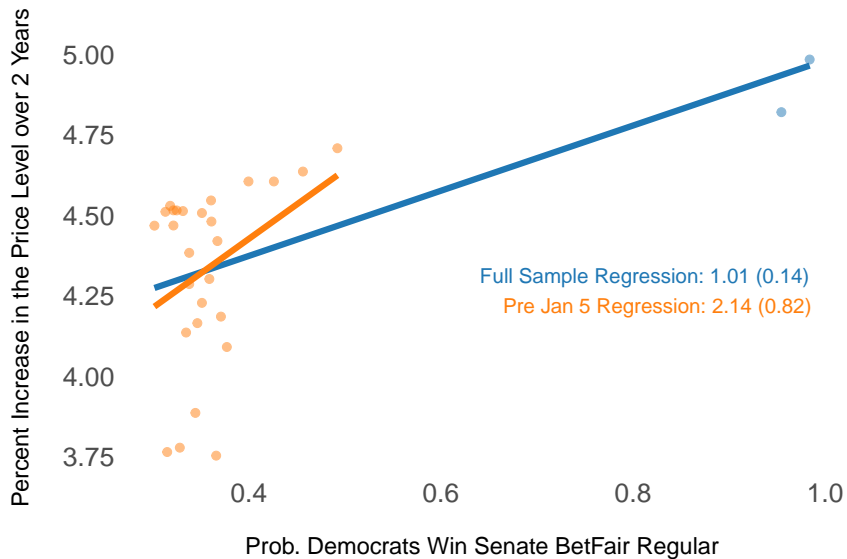
Coefplot IV Full Model Swaps

Percent Increase in the Price Level Over
(Coef and SE divided by 2)
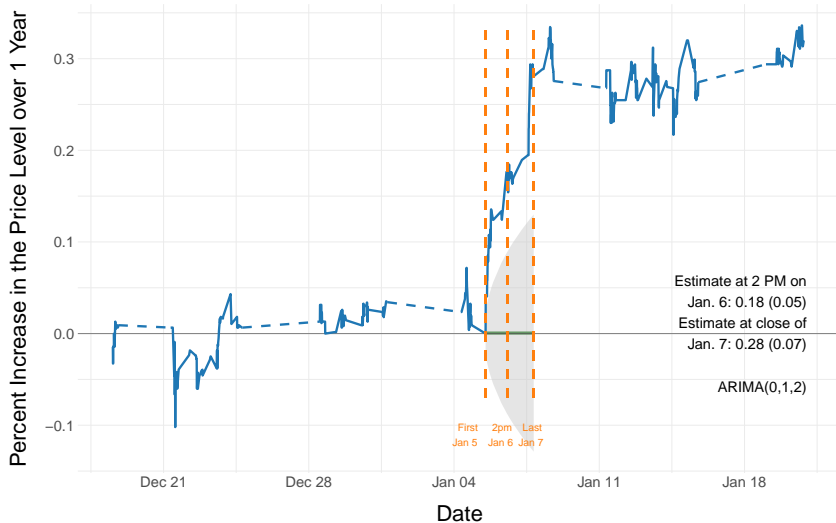
Swaps Single Event Study - 5 Years
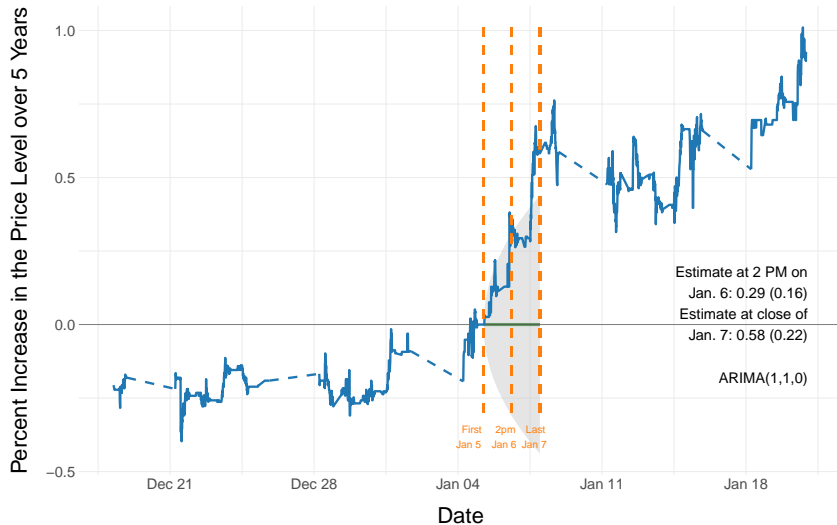
Swaps Single Event Study - 10 Years

Dividends Single Event Study - 1 Year ▸ Return
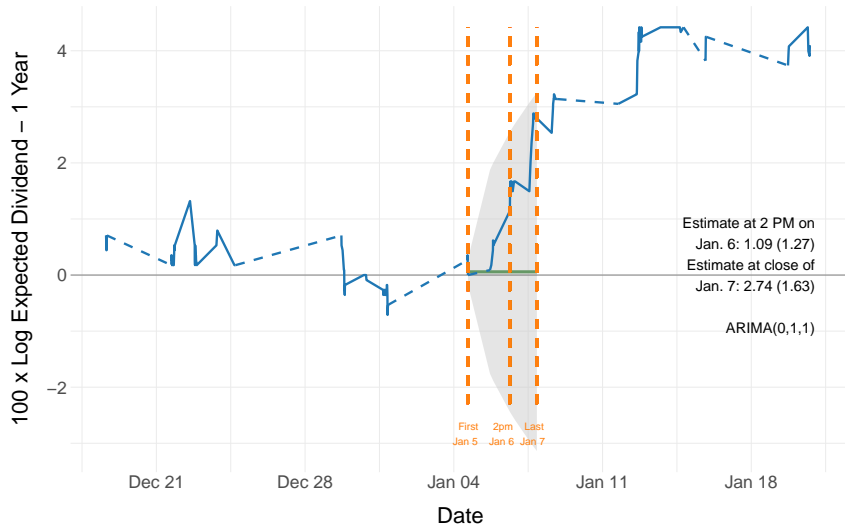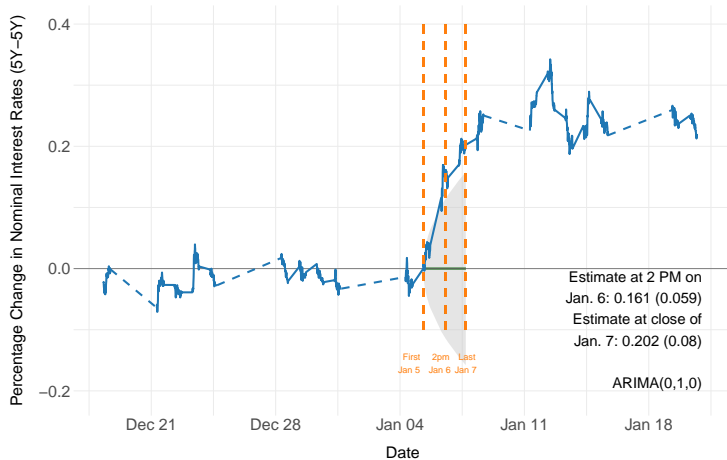
Estimate at 2 PM on
Jan. 6: 1.09 (1.27)
Estimate at close of
Jan. 7: 2.74 (1.63)

ARIMA(0,1,1)

First
Jan 5

2pm
Jan 6

Last
Jan 7

100 x Log Expected Dividend − 1 Year

Date

Regression: Causal Effect of Georgia Shock on Short Term Rates
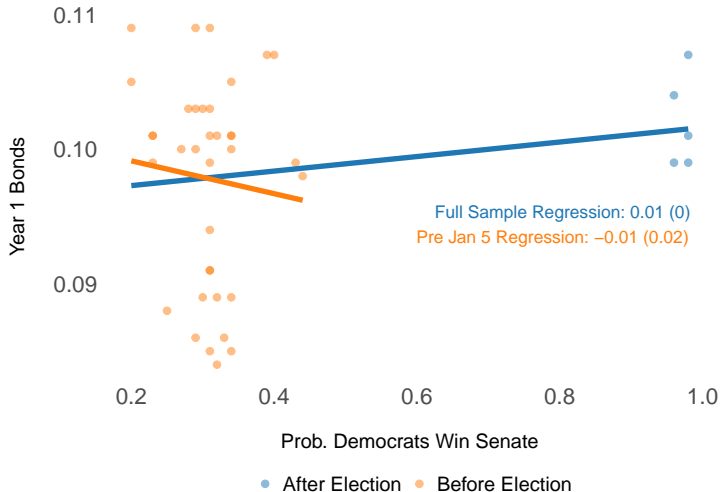
Year 1 Bonds

0.11
0.10
0.09

Full Sample Regression: 0.01 (0)
Pre Jan 5 Regression: −0.01 (0.02)

0.2   0.4   0.6   0.8   1.0

Prob. Democrats Win Senate

● After Election ● Before Election

Regression: Causal Effect of Georgia Shock on Long Term Rates

Full Sample Regression: 0.47 (0.04)
Pre Jan 5 Regression: 0.9 (0.15)

5 Year Nominal Forward Rate After 5 Year

Prob. Democrats Win Senate

● After Election ● Before Election
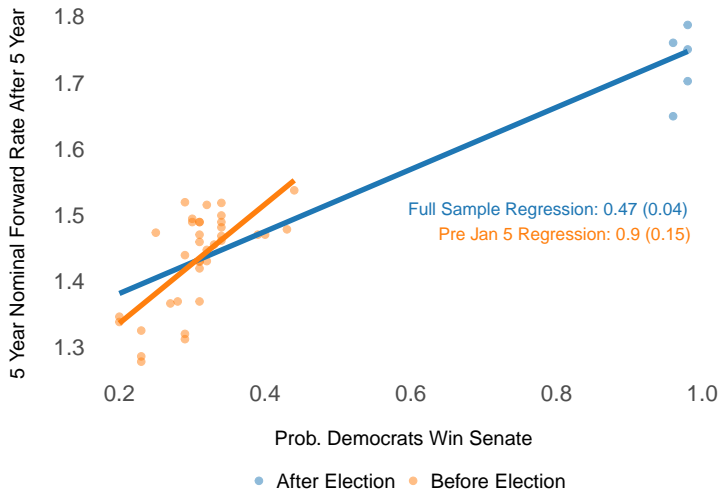
Credit Default Swaps
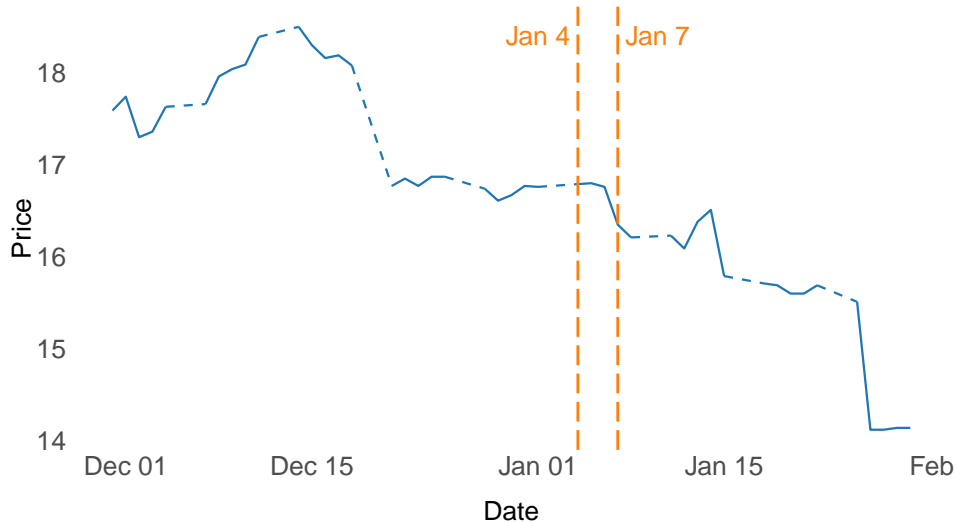
Surprise Index Hourly ▸ Return

Price

Date

0.3

0.2

0.1

Jan 4   Jan 7

Dec 01   Dec 15   Jan 01   Jan 15

Event Study: Percent increase in the price level from inflation swaps

	Jan 7, non Stationary	Jan 6, non Stationary	Difference	Jan 7, Stationary	Drop missing
	Panel A: Percent increase over 1 year				
	(1)	(2)	(3)	(4)	(5)
Jump in Expectations	0.28	0.18	0.28	0.28	0.28
	(0.07)	(0.05)	(0.03)	(0.03)	(0.12)
Observations	231	231	231	232	231
	Panel B: Percent increase over 2 year				
Jump in Expectations	0.38	0.18	0.37	0.45	0.38
	(0.05)	(0.04)	(0.04)	(0.05)	(0.09)
Observations	659	659	659	660	659

Event Study: Percent increase in the price level from inflation swaps

			Panel C: Percent increase over 5 year		
Jump in Expectations	0.58	0.29	0.58	0.76	0.58
	(0.22)	(0.16)	(0.08)	(0.08)	(0.23)
Observations	1048	1048	1048	1049	1048
			Panel D: Percent increase over 10 year		
Jump in Expectations	0.77	0.44	0.74	0.99	0.75
	(0.18)	(0.14)	(0.12)	(0.11)	(0.49)
Observations	647	647	647	648	647

Event Study: Causal Effect of Georgia Shock on Price Level

Estimate

0.9

0.6

0.3

0.0

1 Year   2 Years   5 Years   10 Years

Percent Increase in the Price Level
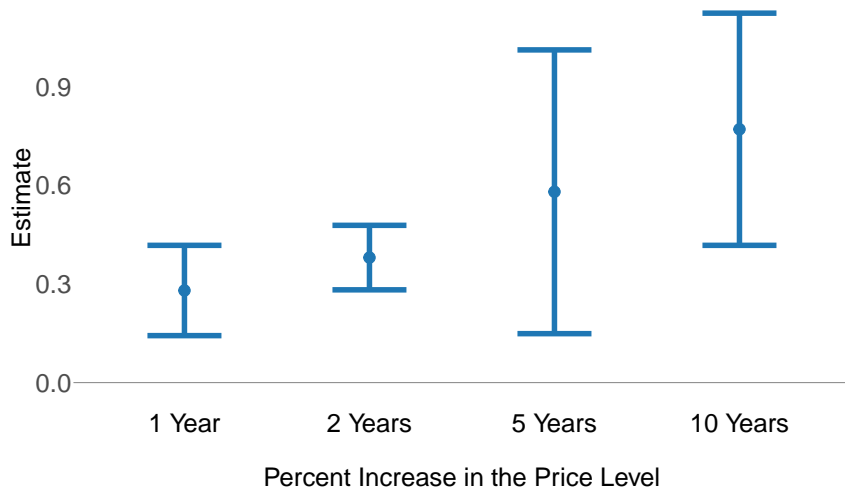
Regression: Causal Effect of Democrat Victory on Swaps

Overall Outcome: Percent increase in the price level from inflation swaps

	Full Sample	Before Jan 5	Outliers Dropped	Diff
	(1)	(2)	(3)	(4)
Panel A: Percent increase over 1 year				
Democrats Win Probability	0.87	3.42	0.95	0.08
	(0.09)	(0.40)	(0.14)	(0.04)
Observations	40	35	35	38
Panel B: Percent increase over 2 years				
Democrats Win Probability	1.39	5.40	1.50	0.23
	(0.14)	(0.59)	(0.22)	(0.07)
Observations	41	36	36	40

Regression: Causal Effect of Democrat Victory on Swaps

Democrats Win Probability	2.12	8.24	2.33	0.33
	(0.22)	(0.91)	(0.33)	(0.10)
Observations	41	36	36	40
Panel D: Percent increase over 10 years				
Democrats Win Probability	2.84	12.30	3.16	0.64
	(0.34)	(1.60)	(0.51)	(0.19)
Observations	41	36	36	40

Event Study: Nominal Interest Rates

	Panel A: Percentage increase over 1 year				
	Jan 7, non Stationary	Jan 6, non Stationary	Difference	Jan 7, Stationary	Drop missing
	(1)	(2)	(3)	(4)	(5)
Jump in Interest Rate	0.005	0.014	0.0047	0.005	0.005
	(0.009)	(0.006)	(0.0051)	(0.005)	(0.015)
Observations	570	570	570	571	570
	Panel B: Percentage increase over 5 years, after 5 years				
Jump in Interest Rate	0.202	0.161	0.2024	0.202	0.202
	(0.08)	(0.059)	(0.0213)	(0.025)	(0.106)
Observations	570	570	570	571	570

Event Study: Dividends

Overall Outcome: Increase in 100*Log(Expected S&P 500 dividends)

	Jan 7, non Stationary	Jan 6, non Stationary	Difference	Jan 7, Stationary	Drop missing
	(1)	(2)	(3)	(4)	(5)

Panel A: 2021 dividends

	Jan 7, non Stationary	Jan 6, non Stationary	Difference	Jan 7, Stationary	Drop missing
Jump in Expectations	2.74	1.09	2.79	2.79	2.89
	(1.63)	(1.27)	(0.31)	(0.54)	(1.55)
Observations	77	77	77	78	77

Panel B: 2022 dividends

	Jan 7, non Stationary	Jan 6, non Stationary	Difference	Jan 7, Stationary	Drop missing
Jump in Expectations	3.32	1.23	2.88	3.32	3.49
	(0.51)	(0.51)	(0.52)	(0.51)	(0.51)
Observations	76	76	75	76	76

Controls	1 Year	2 Years	5 Years	10 Years
1. No Control	3.93	5.78	10.31	16.41
	(0.70)	(1.17)	(1.81)	(3.12)
Observations	29	30	30	30
2. 10-year Bonds	2.12	2.77	6.30	10.97
	(0.84)	(1.39)	(1.60)	(2.91)
Observations	29	30	30	30
3. Surprise Index	0.90	1.38	5.90	11.84
	(0.63)	(1.20)	(1.83)	(3.50)
Observations	23	23	23	23
4. Oil Price	-0.05	-0.003	4.39	9.13
	(1.29)	(1.87)	(1.59)	(3.36)
Observations	29	30	30	30

Regression Specification: IV + Controls

5. S&P 500	1.1	1.03	5.34	10.46
	(1.03)	(1.71)	(1.89)	(3.67)
Observations	28	29	29	29
6. Vaccine Dummy	3.77	5.51	9.96	15.9
	(0.66)	(1.11)	(1.7)	(2.95)
Observations	29	30	30	30
7. COVID Effect	3.96	5.76	10.39	16.5
	(0.74)	(1.22)	(1.97)	(3.45)
Observations	29	30	30	30

Regression: Causal Effect of Georgia Shock on Inflation Expectations

Real Dividends

Overall Outcome: Increase in the real dividends

	Jan 7, non Stationary	Jan 6, non Stationary	Difference	Jan 7, Stationary	Drop missing
	(1)	(2)	(3)	(4)	(5)
	Panel A: 1-year real dividends				
Jump in Expectations	2.46	0.91	2.51	2.51	2.61
	Panel B: 2-years real dividends				
Jump in Expectations	2.94	1.05	2.51	2.87	3.11

Date	Bank	Number, $(billion)	Exact Phrasing
06.01.2021	Goldman Sachs	750	"With control of the Senate by a narrow margin, Democrats are likely to pass further fiscal stimulus in Q1 that we expect to total about $750bn."
06.01.2021	BNP Paribas	1000	"We expect the unified Democratic government to enact significantly more near-term spending – upwards of $1trn, split between Covid-19 and non-Covid related fiscal support – than under our previous assumption of a GOP-led Senate and divided government."
06.01.2021	Jefferies	1000	"Jefferies LLC economists … see Democratic victories in both seats spurring an additional $1 trillion of stimulus in the next few months."
06.01.2021	Capital Economics	0	"We are not going to be factoring in any further fiscal stimulus into our forecasts yet."
07.01.2021	JP Morgan Wealth Management	750	"We are assuming another support bill of around $750 billion will be passed sometime between February and early April."
07.01.2021	JP Morgan	900	"Our best guess … is a spending package of around $900 billion passed in the next few months."
07.01.2021	Deutsche Bank	900	"In the first quarter, we anticipate passage of a bill of approximately $900bn."

Expected Stimulus Dem Win Before Elections

Date	Bank	Election Results	Number, $(billion)	Expectation Phrase	Exact Phrasing
04.01.2021	Goldman Sachs	before	600	"we would expect"	"If Democrats manage to win both of the Senate seats in play in Georgia, they would win 50 seats, which would allow Vice President-elect Harris to cast the tie-breaking vote. This would lead to greater fiscal stimulus—**we would expect around $600bn more on top of the recently enacted $900bn**—but would also likely mean tax increases to finance additional spending."
05.01.2021	Barclays	before	2000	"the size of the package could possibly be"	"If the Democrats control the Senate, a larger stimulus package could be more likely, with a sizable portion dedicated to state and local governments. With the focus in Q1 likely to be on the virus, **the size of the package could possibly be $2trn**, and Democrats might expand it to include significant spending for infrastructure, clean energy initiatives, etc. if the political climate is advantageous."
05.01.2021	Bloomberg	before	700	"we think"	"In the event of a Democratic sweep in Georgia, we think additional near-term pandemic relief and **accompanying stimulus could stretch into the $600 billion to $800 billion range**."

Date	Bank	Number, $(billion)	Expectation Phrase	Exact Phrasing
31.12.2020	Deutsche Bank	0	"do not see"	"As such, unless the Senate switches to Democratic control on the results of the Georgia election, **we do not see much scope for further stimulus**."
04.01.2021	Goldman Sachs	0	"we would not expect"	"If Senate Republicans hold one or both of these Georgia seats, this will leave them with a narrow majority and probably will not have substantially different implications for legislation than in the last Congress when they held 53 seats ... In that environment, **we would not expect much further fiscal stimulus**. President Trump recently proposed $2000/person stimulus payments, but these are unlikely to move forward under a Republican controlled Senate, we believe, as it would cost around $450bn, Republican leaders and many Republican senators don't support it, and there is likely to be less momentum behind it once individuals start receiving the smaller payments that Congress recently passed."
05.01.2021	Moody's Analytics	0	"not penciling"	"Our baseline forecast does not assume that Democrats will pick up both Georgia seats, which would be necessary for that party to retake the Senate from Republicans. As a result, **Moody's Analytics is not penciling in a sixth piece of federal pandemic legislation following the $900 billion economic relief package that was enacted over the holidays**, nor do we expect President-elect Biden to get his tax and spending policy proposals from the campaign through Congress."

Date	Bank	Prob Democratic Government	Exact Phrasing
04.01.2021	Deutsche Bank	0.5	"The web now has sites suggesting odds are only 52% in favour of the Republicans maintaining control of the Senate - **so a bit of a toss-up**. Same story on the individual races with the Ossoff â Perdue now essentially 50/50 while Warnock- Loeffler is 60/40 in the Democratic candidates favour. All this well within the poll margin of errors, to say the least."
05.01.2021	Barclays	0.5	"Polling in both Georgia Senate run-off elections is well within the margin of error, and we **consider them both toss-ups**."
05.01.2021	Goldman Sachs	0.5	"Polls show Democratic candidates with a very **slim advantage** and early voting appears to have moved slightly in the Democratic direction (vs early voting in November) ... **race remains a toss-up** with a slight Republican lean ... Prediction markets appear to take the same view and imply nearly even odds that Democrats win both seats"
05.01.2021	Moody's Analytics	<0.5	"Our baseline forecast **does not assume that Democrats will pick up both Georgia seats**, which would be necessary for that party to retake the Senate from Republicans."

Date	Bank	Initial Number	Transfers	Government Spending	Other Spending
05.01.2021 (before, case of Dem. win)	Bloomberg	$850bn	UI: - $250bn - 29.4% stimulus checks: - $350bn - 41.2% **Total: $600bn** **Total Share: 70.6%**	state and local fiscal aid: - $250bn - 29.4% **Total: $250bn** **Total Share: 29.4%**	
06.01.2021 (after)	Goldman Sachs	$750bn	UI: - $150bn - 20% stimulus checks: - $300bn - 40% **Total: $450bn** **Total Share: 60%**	state and local fiscal aid: - $200bn - 26.7% **Total: $200bn** **Total Share: 26.7%**	other: - $100bn - 13.3% **Total: $100bn** **Total Share: 13.3%**

Date	Bank	Fiscal Package	Exact Phrasing
30.12.2020	Financial Times	Deficit Financed	"The Treasury department plans to sharply shift its bond sales towards debt maturing well into the future as the government seeks to fund vast spending programmes."
06.01.2021	DWS North America	Deficit Financed	"**More fiscal support will likely require huge Treasury issuance to fund it**, which is already pushing yields higher, and could increase borrowing costs for companies."
06.01.2021	Bloomberg	At least some deficit financing implied	"While stimulus will be the primary focus, high-earners and corporations could be tasked with helping to pay for it ... tax hikes may be limited and possibly delayed until the economy is on stronger footing."
06.01.2021	BNP Paribas	Deficit Financed	"In order to finance our increased 2021 fiscal deficit projection of USD2.5trn+, we expect US Treasury issuance to remain at elevated levels (averaging USD370bn/month) throughout 2021."
08.01.2021	HSBC	Deficit Financed	"The benchmark 10-year Treasury yield has moved above 1.0 per cent for the first time since March 2020. **This has been driven by expectations that the Senate elections in Georgia will pave the way for even greater fiscal stimulus, which will ultimately have to be financed by more bond issuance.**"

Date	Bank	Infrastructure Number	Exact Phrasing
30.12.2020	Moody's Analytics	**Rep. win:** sizeable infrastructure is possible once the pandemic winds down	"A divided government will prevent additional fiscal stimulus from being passed next year. However, **there are reasonable odds that once the pandemic winds down, Biden will be able to get Congress to agree to a sizable infrastructure package, though likely not in 2021.**"
31.12.2020	Deutsche Bank	**Dem win:** possible infrastructure package	"However, if Democrats take both seats, another large fiscal stimulus package would be likely, possibly including some of the more structural priorities of the new Administration such as infrastructure."
04.01.2021	Goldman Sachs	**Dem win:** meaningful infrastructure package; **Rep win:** some infrastructure package	"Infrastructure, for example, continues to be an area where some bipartisan support appears possible...Democratic control of the Senate would increase the odds of a meaningful infrastructure package becoming law, though this is more of an indirect effect as such legislation would still require bipartisan support to pass."
05.01.2021	Rabobank	**Dem win:** more expansive fiscal policy; **Rep win:** 0	"**Biden's ambitious plans to boost the economy through expansive fiscal policy will be shot down in the Senate if the Republicans keep a majority.** ... So we can forget about all those plans to spend on education, public R&D, green infrastructure, health care, unemployment benefits and social programs. The same is true for tax hikes for corporations and high income and high wealth individuals. **If the Democrats win both run-off elections in Georgia this would open the door to a large fiscal stimulus package and more expansive fiscal policy in the coming years.** Part of this will likely be financed by higher taxes somewhere down the road."

Infrastructure Number After Elections

Date	Bank	Infrastructure, $(billion)	Type	Exact Phrasing
06.01.2021	Cornerstone Research	1000	infrastructure	"Infrastruct. Larger deal **($1 trillion) via budget recon**; surface infrastr + schools/housing"
06.01.2021	BNP Paribas	600	infrastructure and industrial policy	"We also see a strengthened likelihood of a bipartisan passage of President-elect Biden's **infrastructure and industrial policy plans (≈USD600bn) roughly evenly spread across 2021 and 2022.**"
06.01.2021	Capital Economics	0	infrastructure	"Biden's major legislative priorities, including a large Green New Deal-style infrastructure package partly funded by higher taxes on high-income individuals and corporations are still unlikely to become a reality, so we are not minded to change our (above-consensus) forecasts for 2021 or 2022."
07.01.2021	Deutsche Bank	1000	infrastructure	"While at this point the size and scope of these policies are highly uncertain, we have in mind an **infrastructure package of about $1tn and tax reform raising revenues of about half that much.**"
10.01.2021	Moody's Analytics	1150	net fiscal support	"We also expect an additional $1.15 trillion in net fiscal support to be signed into law later this year with government spending and tax increases in the spirit of the "Build Back Better" policy agenda that Biden proposed during the campaign."
11.01.2021	Saxo	3500	green infrastructure	"With Harris to break the 50/50 potential Tie in the Senate, about $7 trillion in Green Infrastructure that Biden and Harris campaigned on has risen several magnitudes in not just probability but scope ... We are not saying the full $7 trillion will come into fruition, it could actually be more – but even if it's "only" $3.5 trillion the ripples are huge."

Infrastructure Financing

Date	Bank	Infrastructure	Exact Phrasing
06.01.2021	Morgan Stanley	Partially by taxes	"US public policy strategist Michael Zezas ... sees ... a lighter touch on taxes, used as a partial offset to infrastructure and/or healthcare spending initiatives later in 2021."
06.01.2021	Capital Economics	Partly funded by higher taxes on high-income individuals and corporations (but unlikely)	"But Biden's major legislative priorities, including a large Green New Deal-style infrastructure package partly funded by higher taxes on high-income individuals and corporations are still unlikely to become a reality, so we are not minded to change our (above-consensus) forecasts for 2021 or 2022."
07.01.2021	Deutsche Bank	Half by tax	"While at this point the size and scope of these policies are highly uncertain, we have in mind an infrastructure package of about \$1tn and tax reform raising revenues of about half that much."
08.01.2021	UBS	Partially financed by taxes	"Our Dem sweep scenario also assumed that there would be a multi-year fiscal package that included infrastructure spending along with other measures. We had penciled in an annual flow rate of about \$275bn, but not starting until the second half of 2021. In addition, we had assumed that there would be a set of tax increases, including higher business taxes, that would be used to partially pay for the extra spending."
10.01.2021	Moody's Analytics	Financed by taxes	"We also expect an additional \$1.15 trillion in net fiscal support to be signed into law later this year with government spending and tax increases in the spirit of the "Build Back Better" policy agenda that Biden proposed during the campaign."

Types of Tax Change for Infrastructure Financing

Date	Bank	Taxes
10.01.2021	Moody's Analytics	Capital gains taxes: - Increase to 0.28
11.01.2021	Goldman Sachs	Personal tax: - no net increase in personal taxes - increase in marginal rate on top earners: 0.396 Capital gains taxes: - increase to 0.28 - $160bn Corporate tax: - increase to 0.25 - $400bn Social Security Tax and Payroll Tax: - no change Deductions and restorations: - increase to 0.28 - $225bn - itemized deductions

Barclays Policy Outcomes

Date	Bank	Outcome	Probability	Exact Phrasing
06.01.2021	Barclays	aggressive progressive policy agenda	unlikely	We believe ... the probability of an âaggressive progressive policy agenda' is unlikely even if the Democrats win both seats in Georgia ... [w]e generally agree with Maneesh that near-term corporate tax hikes are unlikely given policy priorities during the pandemic.
06.01.2021	Barclays	stimulus	likely	the outcome of the two Georgia elections, which are likely to give control of Congress to Democrats, will raise expectations for further COVID-related fiscal support and, potentially, spending on infrastructure
06.01.2021	Barclays	infrastructure	moderately likely	the outcome of the two Georgia elections, which are likely to give control of Congress to Democrats, will raise expectations for further COVID-related fiscal support and, potentially, spending on infrastructure
07.01.2021	Barclays	lower trade risks	likely	With a Democratic Congress, we expect the Biden administration likely will pursue additional stimulus, revert to a more active regulatory agenda, and lower trade risks.
07.01.2021	Barclays	tax change	moderately unlikely	While infrastructure remains a distinct possibility, we assign a lower probability to significant tax changes or a public option.
07.01.2021	Barclays	public option	moderately unlikely	While infrastructure remains a distinct possibility, we assign a lower probability to significant tax changes or a public option.
08.01.2021	Barclays	confirm Biden administration nominees	likely	With full control of Congress, we expect Democrats are more likely to confirm all of the Biden administration's nominees
08.01.2021	Barclays	broader agenda setting powers	likely	With full control of Congress, we expect Democrats are more likely to confirm all of the Biden administration's nominees, control the Congressional policy agenda with the power to call hearings

Source	Date	Real GDP Increase	Real GDP Phrasing
Barclays	14.01.2021	2.3% increase after 2 years	"With Democratic control of Congress, we expect another virus- related relief package of about $1.4trn. Should the vaccine rollout proceed in line with our expectations, additional fiscal support could lead to a positive output gap later this year, though rising participation should help limit inflationary pressures...[w]e now expect Q4/Q4 real GDP growth of 7.0% in 2021 (up 3.2pp) and 1.5% in 2022 (down 0.9pp). On a calendar-year basis, these revisions boost real GDP growth to 6.3% y/y in 2021 and 3.9% y/y in 2022."
Bloomberg	06.01.2021	2.3% increase after 2 years	"In the event of a Democratic sweep in Georgia, we think additional near-term pandemic relief and accompanying stimulus could stretch into the $600 billion to $800 billion range. The high end could be sufficient to lift growth by roughly 1.7 percentage points in 2021, to 5.2% year-over-year, with a faster pace continuing into 2022 (above 3%), compared to our current baseline of 2.4%."
BNP Paribas	06.01.2021	1.4% increase over 2 years	"Both Democratic candidates are projected to win their Georgia run-off races...[w]e revise our annual average 2021 and 2022 GDP forecasts up by 0.5pp and 0.9pp, respectively, with growth expected to register 4.2% and 4.1%."
Deutsche Bank	07.01.2021	2% increase over 2 years	"The first priority of the Biden administration and Democratic Congress is likely to be another tranche of Covid-related fiscal support. In the first quarter, we anticipate passage of a bill of approximately $900bn that is built around further stimulus checks, funds for state and local governments, and enhancements to unemployment benefits, among other provisions. In response, we have lifted our growth forecast for 2021 by about 2 percentage points to 6.3% (Q4/Q4) and reduced our year-end forecast for the unemployment rate to 4.3% from 5% previously."

Date	Source of Probability	Probability of Democratic Majority	Exact Phrasing
06.11.2020	Barclays	< 0.5	"With a split Congress highly likely, prospects for another large fiscal package seem remote, putting pressure on the Fed to boost monetary policy support. Although many votes remain to be counted, **the likelihood of a divided government outcome is high.**"
04.12.2020	Prediction Markets	0.2	"On November 3 (or shortly thereafter), we thought that we would have all the answers, but with the Senate's fate still in limbo, the muni market faces a lot of uncertainty. **Prediction markets assign a nearly 80% probability of Republicans winning at least one of the Georgia Senate seats in the January run-off.**"
11.12.2020	Barclays	unlikely (< 0.5)	"Looking ahead, as discussed in our 2021 municipal outlook, **although it appears somewhat unlikely, if Democrats win both Senate seats in Georgia,** Treasuries and tax-exempt yields might sell off sooner and to a larger degree."
18.12.2020	Prediction Markets	0.35	"Regardless, the main focus of muni investors going into 2021 will be on the Georgia Senate elections, with a possibility of a large stimulus bill, with a sizable portion dedicated to municipalities, implemented **if Democrats win both races (although prediction markets assign less than a 35% probability to this outcome).**"
05.01.2021	Barclays	0.5	"Polling in both Georgia Senate run-off elections is well within the margin of error, and **we consider them both toss-ups.** '

Date	News	Summary	US
5th Jan	European stocks fluctuated with U.S. equity futures as traders weighed concerns about the impact of rising coronavirus cases and braced for key U.S. runoff elections.	European stocks fluctuated with U.S. equity futures as traders weighed concerns about the impact of rising coronavirus cases and braced for key U.S. runoff elections. Energy firms and retailers led the Stoxx 600 Index as the U.K. went back into lockdown in an attempt to prevent hospitals being overwhelmed.	✓
5th Jan	The New York Stock Exchange said it will no longer delist China's three biggest state-owned telecommunications companies	The New York Stock Exchange said it will no longer delist China's three biggest state-owned telecommunications companies, backtracking on a plan that had threatened to escalate tensions between the world's largest economies. NYSE's U-turn came with scant explanation just four days after the exchange said it would remove the shares to comply with a U.S. executive order barring investments in businesses owned or controlled by the Chinese military.	✓
5th Jan	The U.S. Food and Drug Administration delivered a clear rebuke to health officials:... [D]on't mess with our guidelines.	The U.S. Food and Drug Administration delivered a clear rebuke to health officials attempting to alter the timing and dosage of Covid-19 vaccines: Don't mess with our guidelines. The agency, in a statement late yesterday, urged that vaccines be given according to how the FDA has authorized them after a key U.S. official proposed cutting dosage levels for Moderna Inc.'s shot as a way to immunize more people.	✓
5th Jan	Qatar's ruler landed in Saudi Arabia today	Qatar's ruler landed in Saudi Arabia today to a warm embrace from host Crown Prince Mohammed bin Salman, hours after their nations re-established travel ties and eased a regional dispute. Qatari Emir Sheikh Tamim bin Hamad Al Thani is attending the Gulf Cooperation Council summit for the first time since a 2017 row that cut trade, travel, and diplomatic ties with Saudi Arabia, the U.A.E., Bahrain, and Egypt. Saudi Arabia reopened its air, land, and sea borders with Qatar on Monday, a leap toward easing the crisis that had complicated U.S. efforts to isolate Iran amid heightened tensions.	

Parameter	Description	Value	Target
μ	Share of hand-to-mouth	0.275	1 & 2 year intertemporal MPC
ϕ	OLG survival rate	0.68	
σ	Intertemporal elasticity of substitution	1	Standard
φ	Frisch elasticity	1	Standard
β	Discount factor	0.99	Standard
Nominal rigidities			
κ	NKPC slope	0.055	Hazell et al. (2022)
Steady State Fiscal			
B_{ss}/Y_{ss}	Steady state Debt-to-GDP	0.8	Standard
τ_y	Marginal tax rate	0.27	Provided by CBO (2019)
G_{ss}/Y_{ss}	Gov't spending-to-GDP	0.2	Standard
Fiscal Rule			
τ_B	Response of surpluses to debt	0.189	Persistence of debt, CBO (2021)
H	Period where debt repayment starts	3	Provided by CBO (2021)
$\bar{B}/Y_{ss}$	Steady state Debt-to-GDP after shocks	80.6%	9 year ahead 1 year interest rate

Start on election morning, January 6th, to include preannouncement drift

Reasons:

- Democrats' best poll released after close of markets on January 5th
  - Betting markets move towards Democrats during election day
  - Markets also moved towards Democrats during election day

- Pre-announcement drift larger in tenors where "smart money" is active
  - Consistent with informed speculation in advance of election outcome
  - Hedge funds disproportionately operate in shorter tenors (Bahaj et al 2023)
  - Preannouncement drift only visible in these tenors
  - Hedge funds buy exit polls around high stakes political events (e.g. Brexit)

Dividend Futures (1/2)

Nominal *n* year ahead dividend growth from dividend futures:

- The *n* year dividend future is

$$F_t^n = \frac{E_t D_{t+n}}{1 + \theta_t^n}$$

  $E_t D_{t+n}$ is expected dividend, θ_t^n is *n* year dividend risk premium

- Identification assumption: θ_t^n unaffected by deficit shock
  - θ_t^n varies little at short horizons [Gormsen et al '21]

$\rightarrow$ Then $\Delta \log F_t^n$ is *n* period dividend growth

Real *n* year ahead GDP growth:

- Adjust for inflation using swaps

- Convert dividend growth to GDP growth using

$$\Delta \log \text{GDP}_t = b \Delta \log \text{dividend}_t$$

- $b = 0.76$ [Gormsen & Koijen '20]

Sources of bias?

- Market likely expected higher dividend taxes
- → Suggests real GDP growth even higher than baseline

Liquidity: >>25 transactions per day during event window

Restricting to 2019-2023: $\beta = 0.6\,(0.3)$

  → Expectations under-react to shocks

- Caveat: only 4 years of data

In Coibion-Gorodnichenko framework w/ noisy information:

$$\frac{d\mathbb{E}\,[\text{actual inflation}]}{d\,\text{deficit shock}} = 1.6 \times \frac{d\,[\text{inflation forecast}]}{d\,\text{deficit shock}}$$
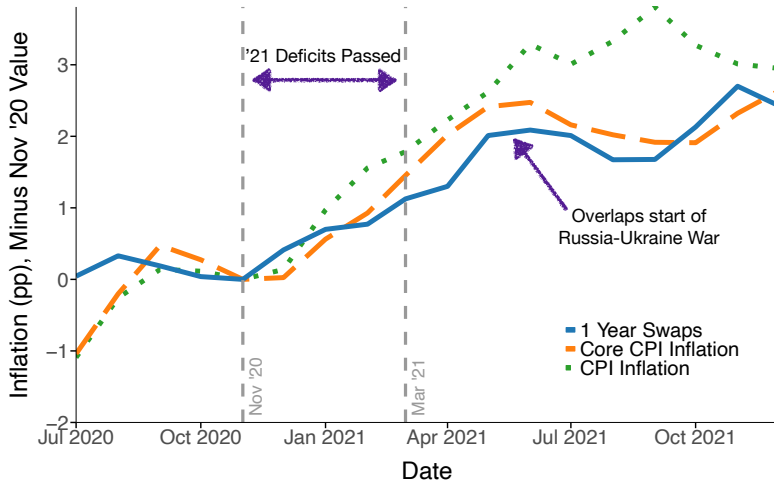
→ Response of expectations is lower bound for response of actual inflation

	CPI Inflation	CPI Core Inflation	Δ CPI Inflation	Δ CPI Core Inflation
	(1)	(2)	(3)	(4)
Year 1 Swaps	1.237	1.034		
	(0.524)	(0.284)		
Δ Year 1 Swaps			1.168	0.828
			(0.547)	(0.334)
Observations	51	51	39	39
R^2	0.426	0.653	0.336	0.521

Swaps Predict Inflation Changes Around '21 Deficits

- Graph: swaps and realized inflation for same horizon
- Swaps predict actual inflation changes well around '21 deficits
- Later: predictive power deteriorates due to energy + food shocks [Russia-Ukraine War]