Do Deficits Cause Inflation? A High Frequency Narrative Approach[*]

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Abstract

This paper measures the causal effect of deficits on inflation using a "high frequency narrative approach". We identify an event that released news about the 2021 deficits in the United States—the Georgia Senate election runoff. We calculate the size of the shock using new narrative data from investment banks. We then study the high frequency response of inflation forecasts from asset prices, in order to separate deficits from other factors affecting inflation. We estimate an "inflation multiplier" of 0.19% price level growth over two years, for a 1% deficit-to-GDP shock. Our estimate implies that the 2021 deficits caused around a third of the 2021-22 inflation—meaning deficits were important but not the only cause. A heterogeneous agent New Keynesian model quantitatively matches the size and dynamics of the inflation multiplier.

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1 Introduction

One classic question in macroeconomics is whether fiscal deficits raise inflation. The question has become even more important in recent years. Around the world, governments ran large budget deficits. Inflation followed. For instance, in December 2020 and March 2021, the United States carried out deficit financed fiscal stimulus worth 13% of GDP. Inflation rose soon afterwards, reaching a peak of 8% during the following summer.

How much did deficits contribute to the post-Pandemic inflation? Some research finds that deficits were a primary cause (e.g. Barro & Bianchi 2023). Others argue that supply side factors such as bottlenecks and commodity prices mattered more (e.g. Bernanke & Blanchard 2023). These other factors act as omitted variables, making the effect of deficits on inflation hard to single out. More generally, it is hard to estimate the causal effect of a single, episode-specific shock. Several shocks typically hit the economy at once, and isolating one shock is difficult.

Certain episodes are a crucible for macroeconomic models, meaning evidence about their cause is valuable. The Great Depression and the 1960s-80s inflation both led economists to question the prevailing model (Keynes 1936, Friedman 1968). The post-Pandemic inflation may prove just as influential. The setting—a large, deficit financed transfer—is a powerful test of state-of-the-art macroeconomic models, which often study precisely this shock. As a result, the post-Pandemic inflation has already motivated new theoretical work (e.g. Angeletos, Lian & Wolf 2024). Clearly, estimating the cause of the post-Pandemic inflation is important.

This paper measures the causal effect of the 2021 deficits on inflation—using a "high frequency narrative approach" designed to study single, episode-specific shocks. The first, *narrative* step is in the tradition of Friedman & Schwartz (1963). We find an event that released news about deficits, and then calculate the size of the shock using new narrative data.

The event is the Georgia Senate election runoffs of early 2021. In November 2020, Democrats won the presidency and held 48 seats out of 100 in the Senate. Both Georgia Senate seats were to be decided by runoff elections on January 5th, 2021. The main implication of the runoff was for fiscal policy. If Democrats won both seats they would have a majority in the Senate for fiscal stimulus. Under Senate procedure, only fiscal legislation can be passed with a simple majority. Non-fiscal legislation requires a supermajority of 60 votes, unattainable regardless of the runoffs. By January 7th, Democrats won both seats. Afterwards, in March 2021 Democrats passed $1.9 trillion of deficit financed fiscal stimulus (8.8% of GDP). This stimulus added to the $900 billion (4.2% of GDP) passed in December 2020, for a total of 13% of GDP in stimulus during late 2020 and early 2021. Shortly after, inflation started to rise.[1]

We then measure the size of news about deficits due to the Democrat victory. The challenge is determining how much deficit spending was expected on the eve of the election—not only if Democrats, but also Republicans, were to win. We introduce a new dataset: hand collected reports from 20 investment banks and other macroeconomic research groups. Investment banks distribute time stamped reports widely, around market moving events, with quantitative information about various scenarios.

Using the reports, we size the deficit news from the Georgia runoff. The median investment bank expected Democrats to win both seats with 50% probability, and to spend $900 billion of stimulus if they won. If Republicans had won at least one seat, banks expected no stimulus. Therefore the Democrat victory in both seats was a shock to expected deficits, due to going from a 50% chance of $900 billion stimulus to a 100% chance—i.e. a shock of $450 billion, or 2.1% of GDP. Banks expected that the stimulus would be deficit financed in the short run. 70% of stimulus was expected to be transfers, such as "stimulus checks"; with the remainder government spending.

We also use the reports to assess the main consequences of Democrat victory. In principle, markets could have expected the election to have many consequences, each with effects on inflation. For instance, Democrats could have been expected to pass regulations that would lead to inflation. However we find that according to investment banks, the main consequence of Democrat victory was fiscal stimulus—consistent with the overall approach of the paper. There is inevitably some uncertainty about how to interpret the reports. Throughout, we buttress our interpretation with extensive quotations from the text.

The second, *high frequency* step studies the response of inflation forecasts from asset prices, as in Gürkaynak, Sack & Swanson (2004) and others. Our main identification strategy is a single event study examining inflation swaps in a window around the runoff. High frequency variation separates deficits from other factors that could have mattered during the post-Pandemic inflation. For instance, oil shocks will not confound our estimate, unless news about these shocks occurred in the window.

We estimate that the Democrat victory led to an increase in expected prices of 0.39% (standard error of 0.05%) over 2 years. The shock is expected to have persistent effects until 2026. The shock seems to have increased demand, since dividend futures suggest strong expected real GDP growth, and investment banks revise their growth forecasts upward because of the

[1] Levy (2021) linked the Georgia runoff to inflation expectations in a Twitter thread. Mian, Straub & Sufi (2024) used this event to study the response of convenience yields on government debt, instead of inflation.

Democrat victory. The identification concern is that other inflationary shocks happened during the window around the runoff. The main candidate is the January 6th Capitol Hill riots; however, a range of evidence suggests the riots do not confound our estimates.

The drawback of the event study is that it relies on a single, high-powered observation. We therefore add a supplementary, regression based strategy. Our motivation is that between the November presidential election and the January runoff, there were large changes in the chance of Democrats winning, and markets paid attention. In effect, during November to January there were many events during which news about deficits were released. We use the daily probability of Democrat victory, measured from betting markets, as a measure of news about deficits. The regression strategy finds similar estimates of how deficits affect inflation to the single event study, albeit larger.

Our evidence shows that deficits caused forecasts of inflation to increase. What are the implications for actual inflation, as opposed to forecasts? Studying the effect of deficits on actual inflation requires additional assumptions. Using the framework of Coibion & Gorodnichenko (2015), we show that forecasts underreact to shocks, relative to the effect of these shocks on actual inflation. Then according to the framework, the response of forecasts to deficits is a lower bound for the response of actual inflation to deficits.

To complete the approach, we combine narrative and high frequency information to calculate the causal effect of the 2021 deficits on inflation. We summarize our estimates with an "inflation multiplier", which divides the high frequency response by the narrative measure of the shock. The inflation multiplier is a price level increase of 0.19% over 2 years after a 1% deficit-to-GDP shock. In a "back of the envelope" exercise, we calculate the effect of the stimulus as the product of the inflation multiplier and the 13% of GDP from the 2021 deficits. The result is an increase in prices of 2.5% over 2021-22, which is around a third of total 2021-22 headline inflation. We conclude that the 2021 deficits were important for the post-Pandemic Inflation, though not the only cause.[2]

Our final empirical result suggests that loose monetary policy was one reason why deficits caused inflation. We find that short term nominal interest rates did not respond to the Georgia shock—meaning that in real terms, rates fell. Our result matches several papers finding monetary policy was loose after the Pandemic.[3]

In the past, influential episodes led macroeconomists to re-evaluate their models. We ask

[2] Our calculation does not include the effect of the April 2020 CARES Act, which was $2.2 trillion (10% of GDP). If the same inflation multiplier applies, the CARES Act raised prices by another 1.8% over 2 years.

[3] See, for instance, Gagliardone & Gertler (2023), Cieslak, McMahon & Pang (2024), Bocola, Dovis, Jørgensen & Kirpalani (2024) and Bauer, Pflueger & Sunderam (2024).

how the state of the art model addressing deficits and inflation, the Heterogeneous Agent New Keynesian (HANK) model, fares after the Pandemic. It is well known that in HANK models, stimulus raises inflation—qualitatively matching our findings. What is less clear is whether the model can *quantitatively* match the size and dynamics of the inflation response. We calibrate a version of the HANK model to pre-2020 statistics, including a flat but upward sloping Phillips Curve (Hazell, Herreno, Nakamura & Steinsson 2022), and estimates of the marginal propensity to consume (Fagereng, Holm & Natvik 2021).[4]

We show that the standard model can match the size and dynamics of the inflation multiplier after the Georgia shock. The Georgia runoff is a reduced form combination of various structural shocks, including shocks to government spending, transfers, interest rates and the path of debt. We measure the structural shocks using our high frequency and narrative evidence, and feed them into the model. The model quantitatively matches both the size and the persistence of inflation dynamics, even though these dynamics are not directly targeted. The dynamics of output in the model are "plausible" in the sense of Orchard, Ramey & Wieland (2023)—being consistent with contemporaneous forecasts of real GDP around the Georgia runoff. One part of the mechanism is loose monetary policy.

According to narrative reports, a secondary consequence of the Democrat victory—alongside the primary impact of the stimulus—was a delayed and deficit-neutral infrastructure bill. We consider an extension of the model with infrastructure. Consistent with past work, the effect of infrastructure spending is small relative to the stimulus (Ramey 2021), and does not affect our calculations about the inflation multiplier much.

Our results have two lessons for macroeconomic models. First, in HANK models deficits generate significant inflation in empirically relevant cases—supporting recent work advancing this view (Angeletos et al. 2024).[5] Second, a stable and flat but upward sloping Phillips Curve is consistent with the post-Pandemic inflation, as some evidence suggests (Beaudry, Hou & Portier 2024; Barnichon & Shapiro 2024).[6] A major caveat is that the HANK model cannot explain the response of inflation or output when calibrated to lower and more transitory marginal propensities to consume (e.g. Orchard et al. 2023; Boehm, Fize & Jaravel 2023).

Related literature. A defining challenge in empirical macroeconomics is how to estimate

[4] We study several HANK models, including the tractable overlapping-generations version of Wolf (2021) and Angeletos et al. (2024); the bond-in-utility and one-asset models of Auclert, Rognlie & Straub (2023); and versions with "sticky expectations" (Auclert et al. 2020). Appropriately calibrated, the models deliver similar results.

[5] We show that a simple version of the fiscal theory of the price level can also fit the inflation response (Bianchi, Faccini & Melosi 2023, Cochrane 2023).

[6] See Cerrato & Gitti (2022), Benigno & Eggertsson (2023) or Gitti (2024) for the opposite view that the Phillips Curve became steeper after the Pandemic.

the causal effect of shocks to the economy. One method is the narrative approach pioneered by Friedman & Schwartz (1963): searching the historical record for moments when an important shock happened, and studying the response of the economy.[7] A second method is the high frequency approach: studying movements in asset prices around a series of events such as monetary policy announcements or macroeconomic data releases.[8] Both the high frequency and the narrative approach have limitations for understanding single, episode specific shocks. The narrative approach typically studies the economy at a monthly or quarterly frequency. At this lower frequency, other confounding shocks may matter. The high frequency approach typically studies a time series of shocks, spanning a range of episodes. However the behavior of the economy during a single episode is often of particular interest. Combining high frequency and narrative information, as in this paper, is a way to estimate the causal effect of single, episode specific shocks. We apply the approach to the 2021 deficits, but one can apply the same method to other important episodes and shocks.

There is previous academic work that also combines high frequency and narrative identification, such as Velde (2009) and Bahaj (2020). Closely related to our paper, Gomez Cram, Kung & Lustig (2023) ask how inflation forecasts respond at high frequency to a series of announcements about deficits from the Congressional Budget Office. One distinguishing feature of our approach is to measure the size of the shock associated with the event, using new narrative data from investment banks. Combining the narrative shock and the high frequency response, one can calculate useful targets for quantitative models such as the inflation multiplier.

There are many papers on the causes of the post-Pandemic inflation. Some argue that deficits were important (e.g. Reis 2022, Cochrane 2022, Bianchi, Faccini & Melosi 2023, Barro & Bianchi 2023, Giannone & Primiceri 2024, Bigio, Caramp & Silva 2024). Other papers emphasize different causes of inflation, and occasionally suggest that deficits were not important (e.g. Mondragon & Wieland 2022, Bernanke & Blanchard 2023, Gagliardone & Gertler 2023, Guerrieri, Marcussen, Reichlin & Tenreyro 2023, Ferrante, Graves & Iacoviello 2023, Crump, Eusepi, Giannoni & Şahin 2024). Disentangling the effect of deficits from the other shocks is challenging with monthly or quarterly data—we suggest that higher frequency information combined with narrative methods can advance the debate.

Paper outline. Section 2 introduces the data. Section 3 identifies an event that released

[7] Important papers within this vast literature include Romer & Romer (1989), Ramey & Shapiro (1998), Romer & Romer (2010), Ramey (2011), Cloyne (2013), Antolín-Díaz & Rubio-Ramírez (2018), Barnichon & Mesters (2020), Coglianese, Olsson & Patterson (2023), Drechsel (2024), Cloyne, Dimsdale & Postel-Vinay (2024) and Cloyne, Dimsdale & Hürtgen (2025).

[8] See, for instance, Gürkaynak et al. (2004), Gertler & Karadi (2015), Nakamura & Steinsson (2018), Känzig (2021, 2023), Bauer & Swanson (2023) and Swanson & Jayawickrema (2023).

news about deficits, the Georgia Senate runoff, and measures the size of the shock with new narrative data. Section 4 studies the high frequency response of asset prices. Section 5 combines narrative and high frequency information to form an inflation multiplier. Section 6 shows that versions of the HANK model can quantitatively match the inflation multiplier.

2 Data

This paper uses three main datasets. The first dataset is new hand collected narrative data, from which we will measure the shock: markets' expectations about stimulus during the Georgia Senate runoffs. Investment banks such as Goldman Sachs or Barclays Capital provide regular information about market news, as do other macroeconomic research outfits such as Bloomberg Economics or Moody's Analytics. Banks tend to issue reports directly before and after market moving events, such as major data releases, monetary policy announcements, and electoral events. Banks also provide regular summaries and discussion of market behavior. We hand collected these data by contacting the chief economist of each bank. We assembled reports from 20 organizations in total. Typically a bank gave us access to a research portal, containing the universe of reports written by the bank.

There are three qualities of these reports which will let them proxy markets' expectations about stimulus. First, the reports are widely distributed. They are available to be sent by email, for free, to anyone who trades with an investment bank, which includes most inflation swaps traders. Second, the reports are time stamped. Therefore one can use these reports to gauge when information has been revealed to markets. For instance, emailed reports discussing major data releases are normally released within an hour of the release. Finally, banks discuss quantitative statements about various scenarios as well as their likelihood, including around market moving events such as fiscal and monetary policy announcements. Appendix Figure C.1 gives the example of a report from Goldman Sachs that illustrates these qualities.

The second dataset contains asset prices measured at the daily and intra-daily level, to measure high frequency responses. One asset price is inflation swaps, with which we measure inflation expectations. An inflation swap is a financial derivative used to exchange a fixed cash flow, for a cash flow linked to the US Consumer Price Index (CPI). Inflation swaps allow parties to hedge against or speculate about future inflation levels, and as such provide a measure of markets' inflation expectations, albeit including risk premia. Over this period, inflation risk premia seem to be stable (Cieslak & Pflueger 2023), and we will interpret movements in inflation swaps as changes in expected inflation at various horizons.[9] We obtain zero coupon inflation swaps for inflation over the following 1, 2, 5 and 10 years. The data are reported at ten minute intervals during market hours, as the median price quoted by broker-dealers in Bloomberg.[10]

We measure expectations about dividends following Gormsen & Koijen (2020), by using dividend futures on the S&P 500 stock market index. S&P dividend futures allow investors to speculate on or hedge against the future dividends paid by the companies in the S&P 500 index. The n year contract settles based on the actual dividends distributed by the index's companies during over the course of that year. We will interpret movements in dividend futures as changing expectations about dividends.[11] We obtain dividend futures for 1 and 2 years ahead (longer horizon futures are not traded at intraday frequency). The data are reported at ten minute intervals during market hours, based on transactions from the Chicago Mercantile Exchange (CME).

We measure intraday interest rates on government bonds. We obtain transaction prices on 2, 3, 5, 7 and 10 year positive coupon bonds from CME. We aggregate to ten minute windows and then infer the zero coupon yield curve using the procedure of Cieslak, Morse & Vissing-Jorgensen (2019), which pins down the short end of the yield curve using 3 month treasury bills. We will also use daily end-of-day data on swaps, rates and futures.

The third dataset is election probabilities from online betting exchanges. Our main source is PredictIt. PredictIt is an online exchange that allows traders to buy and sell securities whose value is indexed to political events. The market-clearing price represents the market's probability of the political event. PredictIt provides intradaily and daily information on the likelihood that Democrats would win both Senate seats in Georgia and hence overall control of the Senate. We supplement PredictIt with election probabilities from BetFair. BetFair provides daily probabilities that each individual Senate election would be won in Georgia, though not a probability that Democrats would win both Senate seats or intraday information.

3 A Narrative Shock: the 2021 Georgia Senate Runoffs

The first step of our approach is to find an event that released information about the 2021 deficits, and then use investment bank reports to size the shock.

[9] See also the measure of inflation risk premia from the Cleveland Federal Reserve, which was unchanged between December 2020 and February 2021.

[10] Pflueger & Viceira (2016) and Cieslak & Pflueger (2023) discuss how an alternative measure of expected inflation—the gap between inflation protected (TIPS) and nominal government bonds—is less reliable.

[11] This interpretation requires that dividend risk premia are stable at short horizons, which is consistent with options data (Gormsen, Koijen & Martin 2021).

3.1 The Georgia Senate Election Runoffs and the 2021 Deficits

The key event that released information about the 2021 deficits was the Georgia Senate election runoffs of early 2021. In November 2020, Democrat Joe Biden won the presidency, while Democrats held 48 seats out of 100 in the Senate. In November, there were elections for both Senate seats in Georgia, but neither produced a majority for one candidate. By Georgia law, the top two candidates in each election—Democrat Jon Ossoff and Republican David Perdue in one, and Democrat Raphael Warnock and Republican Kelly Loeffler in the other—would contest runoff elections on January 5th.

The Georgia Senate runoff would determine fiscal policy over the next two years, but matter less for other policy. If Democrats were to win, they would have 50 seats in the Senate. Given Democratic Vice President Harris as a tie-breaking vote, they would have a majority. Under Senate procedure, legislation relating to fiscal policy can be passed by a simple majority, through a procedure known as budget reconciliation. For this procedure, fiscal policy is defined as legislation related to spending, taxes and the federal debt limit. Other legislation that does not relate to fiscal policy requires a supermajority of 60 votes to pass in the Senate—although what qualifies as fiscal policy is often contested. Therefore other legislation would be impossible for Democrats, regardless of the runoffs. A Senate majority also allows the President to confirm appointments without bipartisan support.

In December, between the presidential election and the Georgia runoffs, bipartisan stimulus was passed. This bill, the Consolidated Appropriations Act, involved $900 billion of stimulus, or 4.2% of 2020Q4 annualized GDP. 70% of the stimulus was transfers, principally unemployment insurance, stimulus checks of $600 and transfers to businesses; while the remainder was government spending, principally education and pandemic-related funding for tests and vaccines.

Before the Senate runoffs, Democrats campaigned for additional support for the economy through stimulus checks (see article). However Senate Republicans did not support the stimulus. An attempt by Democrats at the end of December 2020 to pass "stimulus checks" was blocked by the then Republican Senate majority leader, Mitch McConnell (see article).

Immediately after the November presidential election, a Democrat victory in both races seemed unlikely. However, the probability of a Democrat victory increased, particularly in the days just before the election. Appendix Figure C.2 plots the daily probability of Democrat victory from betting markets.

In the event, Democrats won both seats. On January 5th, the election took place. Networks confirmed that Warnock had won by the early hours of January 6th, and determined that Ossoff had also won by the late afternoon. As such, the Democrat victory released news about deficits. Beforehand, there was some chance that Democrats would win and pass stimulus. Afterwards, given that Democrats had won, some kind of stimulus would almost definitely pass.

Another major event happened at 2 PM on January 6th. Protestors against Democrat victory in the presidential election hurdled barricades and invaded buildings on Capitol Hill, in Washington DC. This moment initiated the Capitol Hill Riots of January 6th.

The Democrat majority led to two significant pieces of legislation. In March 2021 Democrats passed $1.9 trillion of deficit financed fiscal stimulus through the American Rescue Plan (8.8% of 2020Q4 annualized GDP). The Plan was 60% transfers, primarily "stimulus checks" of $1400 dollars and an extension of the generous unemployent insurance benefits of the Pandemic. The remaining 40% was government spending, primarily state and local aid (Edelberg & Sheiner 2021). This stimulus added to the $900 billion (4.2% of GDP) passed in December 2020 in a bipartisan bill, for a total of 13% of GDP in stimulus during late 2020 and early 2021 (collectively the "2021 deficits").[12] The second consequential piece of legislation passed by Democrats was the $891 billion Inflation Reduction Act (IRA). Passed in August 2022, the IRA was an approximately deficit neutral bill that increased infrastructure spending financed by prescription drug price reform and corporation tax, supported only by Democrats.[13]

After fiscal stimulus, in the spring and summer of 2021, inflation started to rise. Inflation had been around 2% prior to fiscal stimulus. During and after the stimulus, inflation rose towards its peak of 8% in the summer of 2022.

3.2 Sizing the Shock to Deficits after the Democrat Victory

Clearly, the Democrat victory in Georgia led to some news about stimulus—but how much? One needs a range of information to measure the deficit news shock. One must measure not only i) expectations about how much Democrats would spend if they were to win, but also ii) what would happen in the counterfactual scenario in which Republicans were to win, and iii) the likelihood of each scenario. Our narrative information from investment bank reports contains this information.

In brief, we find that Democrat victory represented a shock to expectations of fiscal stimulus worth 2.1% of GDP. There is inevitably some uncertainty in how to interpret the reports.

[12] There was also an earlier large stimulus during the start of the Pandemic in March 2020—this stimulus, the CARES Act, was 10.2% of GDP.

[13] Two bipartisan infrastructure bills were also passed around the same time, namely the $550 billion Infrastructure Investment and Jobs Act (November 2021); and the $280 billion CHIPS and Science Act (July 2022).

Therefore this section and Appendix Tables C.1-C.10 contains extensive quotes from the reports, which we use to support our interpretation.

To arrive at the narrative information, we search each investment bank's reports for information about the Georgia runoff and deficit spending, in a window from a week before to a week after Democrats' victory.[14] We extract by hand from the reports each bank's view about the relevant aspects of fiscal policy. As we discuss, investment banks often but not always discuss key information both before and after the election. In many cases banks provided only qualitative information about certain variables, which we discard.

The main objective is to measure news about stimulus. One requires three pieces of information: (i) the expected stimulus if Democrats were to win both seats, (ii) the expected stimulus if Republicans were to win at least one seat, and (iii) the probability that Democrats would win.

First, we measure expected stimulus if Democrats were to win. In total, 11 investment banks forecasted the size of the Democrat stimulus in the week after the election. The median stimulus size is $900 billion, or 4.2% of 2020Q4 annualized GDP. Table 1 and Figure 1 summarize this information. A typical quote, from JPMorgan, reads "our best guess ... is a spending package of around $900 billion passed in the next few months." All reports expect that the stimulus will be passed early in 2021. We will interpret the $900 billion number as an expectation. Table 1 shows that banks use language consistent with this interpretation, with phrases like "expect" and "anticipate".[15] The stimulus expected in January was smaller than the $1.9 trillion eventually passed in the American Rescue Plan. The stimulus ended up being unexpectedly large, relative to beliefs in early January, due to successful efforts by party leadership to sway moderate Democrats in February and March (see article).

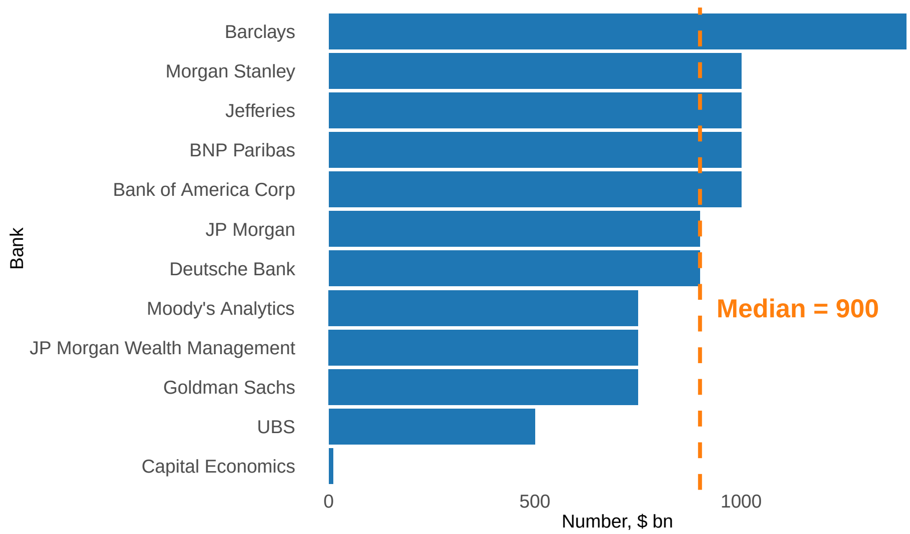
Next, we measure the stimulus that before the election, banks expected would pass with divided government. 5 investment banks forecasted stimulus in the case of divided government, prior to the election. The median forecast was no further stimulus, as Appendix Table C.2 summarizes. A typical quote, from Rabobank on 5th January, reads "in this case Republicans are likely to shoot down the ambitious spending plans of the Democrats". This forecast is consistent with a casual reading of political events, since as we discussed, Senate Republicans were unwilling to pass further stimulus.

We then measure the probability that Democrats would win both seats. Five investment

[14] We do not consider reports from more than a week after the Georgia election, since the Biden administration released the first details of the American Rescue Plan on January 15th.

[15] Only 3 investment banks provided a numerical forecast of the size of the Democrat stimulus before the election, with a median of 700 billion (Appendix Table C.1). Pooling pre- and post-election forecasts, the median remains $900 billion.

Figure 1: Expected Stimulus after Democrat Victory



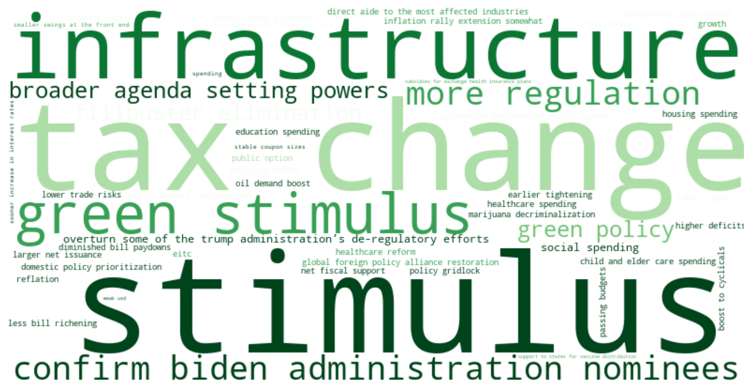
Notes: this graph contains expected stimulus after Democrat victory, taken from reports of investment banks after the election.

banks provided a probability of Democrat victory before the election (Appendix Table C.3). No bank commits to a specific numerical probability. However, four of the banks use language such as “toss-up”, “very close” and “a very slim advantage” which we interpret as a 50% chance of Democrat victory in both seats. Consistent with this interpretation, several reports cite prediction markets, which had a 50% probability of Democrat victory in both seats. A typical quote, from Goldman Sachs on 5th January, states that the “race remains a toss-up with a slight Republican lean”.

With this information, we can calculate the news to deficits from the Democrat victory in Georgia. The reports imply a shock to expected deficits worth $450 billion, or 2.1% of 2020Q4 annualized GDP.

The reports provide additional information that is useful for interpreting the stimulus. First, five banks stated what they expect the composition of stimulus will be (Appendix Table C.4). The median bank expects that the stimulus will be 70% transfers, principally unemployment insurance and stimulus checks; and the remainder government spending, principally state and local aid. One bank provided this information before the election and the rest afterwards, providing similar numbers in each case. The expected breakdown between spending and transfers would prove to be roughly the same as the final American Rescue Plan. 7 investment banks discuss financing, and agree that the stimulus was going to be partly or perhaps entirely deficit financed (see Appendix Table C.5).

Figure 2: Outcomes after the Democrat Victory



Notes: this figure contains a word cloud of outcomes of the Democrat victory discussed by investment banks in the week after the election. In the cloud, an outcome is larger if more banks discuss it, and darker if banks on average assess that it is more likely.

3.3 Other Outcomes of Democrat Victory

According to banks, the main outcome of the election, other than deficit financed stimulus, is a delayed and tax financed environment and infrastructure bill. The infrastructure bill is quantitatively less important than the stimulus. Before the election five banks discuss expected infrastructure spending (Appendix Table C.6). On the whole, the banks suggest that infrastructure spending would happen with either a Democrat majority or divided government, albeit more with the Democrat majority. No bank commits to a numerical forecast. After the election, 8 banks forecast a specific size of the infrastructure package (Appendix Table C.7). The median bank expected a $1 trillion dollar stimulus, and banks expected that the infrastructure would take place in late 2021 or 2022. Banks agree that the infrastructure package would be partly or wholly financed by tax increases, especially corporation and capital gains taxes (Appendix Tables C.8 and C.9). In Section 6, we will use a version of our model to quantitatively study the effects of the infrastructure bill. The effects are small, consistent with past work (Ramey 2021). As a result, infrastructure is not a primary consequence of the Democrat victory.

We claim that the main effect of the Democrat victory was to raise expected deficits. Alternatively, markets could have expected the election to raise inflation for other reasons. For instance, Democrats could have been expected to pass regulations that would lead to inflation. If the election were to affect inflation through other channels, then isolating the effect of deficits would be difficult.

We now support our view that the main effect of Democrat victory was to raise deficits. For each bank we read their discussion of what would happen after the Democrats won. We then manually collect the various outcomes and their perceived likelihood. We do the exercise for all banks, but for illustration Appendix Table C.10 contains a summary for a single bank, Barclays.

We find that the main outcome discussed by banks was the stimulus, followed by tax rises and infrastructure spending. Banks hardly discuss other outcomes. To visualize this information, Figure 2 presents a word cloud. In the word cloud, a word is larger if more banks discuss this outcome. The word is shaded darker if banks typically believe the outcome is more likely. Evidently banks believe that stimulus is important and likely. The second most important policies are tax changes and infrastructure (as well as the related green stimulus), though they are less likely. Other issues are less important. Appendix Figure C.3 carries out the same exercise, but uses ChatGPT to read the reports, with similar results.[16]

4 High Frequency Response of Inflation Forecasts from Swaps

We have the first ingredient of our approach: a shock to news about the 2021 deficits from the Georgia Senate election runoffs, identified and sized from the narrative. We now turn to the second ingredient: the high frequency response of inflation forecasts from swaps, in a narrow window around the election.

High frequency changes in inflation forecasts allow us to eliminate omitted variables. At monthly or quarterly horizons, other inflationary shocks hit the economy after the Pandemic, such as oil shocks or bottlenecks. Disentangling these omitted variables from deficits is difficult. However changes in inflation forecasts, in a narrow window around the election, will not be affected by the omitted variables—unless news about the other variables coincides with the election. Our method requires that movements in swaps prices represent changes in inflation forecasts, and not changes in inflation risk. Consistent this interpretation, we have discussed that inflation risk premia were stable around the election.[17]

4.1 Main Identification Strategy: Single Event Study

We now introduce our main identification strategy: a single event study in a narrow window around the election. Single event studies of this kind are common in corporate finance, meaning we can use standard methods (e.g. MacKinlay 1997). We assume that around the Georgia shock, an asset price y_t follows the process

[16] Some banks do believe that confirming Biden administration nominees is important. The main appointment that matter for the macroeconomy is the Federal Reserve Board; we study monetary policy in Section 5.

[17] Inflation risk premia are only available at monthly frequency. Daily proxies for other risk premia, such as VIX, are stable or declining during the election (Appendix Figure C.4).

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

In this equation, the event happens at time T. Before time T, the "typical" movement in the asset price is some process ε_t, due to factors such as the liquidity shocks that are common in inflation swaps markets. Then, α_{T+j} is the causal effect of the election on asset prices, j periods after the event occurs.

The estimate of the causal effect is $\hat{\alpha}_{T+j} = y_{T+j} - \mathbb{E}_T\left[y_{T+j}|\alpha_{T+j} = 0\right]$. That is, the estimate of the causal effect is the actual asset price y_{T+j}, minus the expectation of what the asset price would have been, using information from just prior to the event, and supposing that the event had not come to pass. In practice, one estimates $\mathbb{E}_T\left[y_{T+j}|\alpha_{T+j} = 0\right]$ using a simple ARIMA process estimated in a relatively short window before the event date T.

The identification assumption is that the distribution of typical shocks to asset prices, ε_t, did not change from just before versus just after the event date T. That is, there where no other "atypical" shocks to asset prices just after the Senate runoff. However typical shocks to asset prices are allowed after the Senate election. Information on the distribution of the typical shocks—measured from asset prices before the election—will let us construct standard errors for the estimate of the causal effect. The ARIMA model easily provides these standard errors, and flexibly deals with missing data due to weekends and public holidays.

With this identification strategy, the key decision is the width of the event window. The event window should be wide enough to capture the full effect of the shock on asset prices. However it should be narrow enough to exclude other atypical shocks that otherwise would confound estimates of the causal effect.

In our baseline analysis, the event window begins on the morning of election day, January 5th, and ends at the end of January 7th. This window is our baseline because state of the art estimates, from Bahaj, Czech, Ding & Reis (2023), suggest that inflation swaps markets take 2-3 days to incorporate news about inflation. Therefore the window should be 2-3 days long to account for the full effect of the shock. The election outcome was known in the early morning of January 6th. For instance, Goldman Sachs wrote a report at 2:01 AM on January 6th stating "[d]emocratic Senate control looks likely". Similarly, high frequency data from betting markets suggests that the Democrat victory was known in the small hours of January 6th (see Appendix Figure C.5). Therefore ending the window two full days after the early morning of January 6th seems reasonable. We start on the morning of January 5th in order to account for "pre-announcement drift".[18]

Consistent with the identification assumption, narrative evidence suggests that the Georgia election was the main shock to asset prices within this window. Consider for instance Goldman Sachs' *Global Rates Trader* report, which summarizes the main movements in macro-related markets over the last week. For the week around the election, Goldman Sachs wrote: "[t]he Georgia senate runoff results remain the key event of the week for rates, notwithstanding the pandemic-driven drop in December payrolls." The latter event, an unexpectedly low value for the December employment data release, happened on January 8th i.e. directly after the event window.[19] Bloomberg News carries out daily summaries of major market moving events (Appendix Table C.11). The only potential confounder mentioned by Bloomberg is the January 6th Capitol Hill Riots. To avoid this confounder, we consider a specification that ends the event window at 2 PM on January 6th, i.e. before the riots began, as well as other robustness exercises to be discussed.

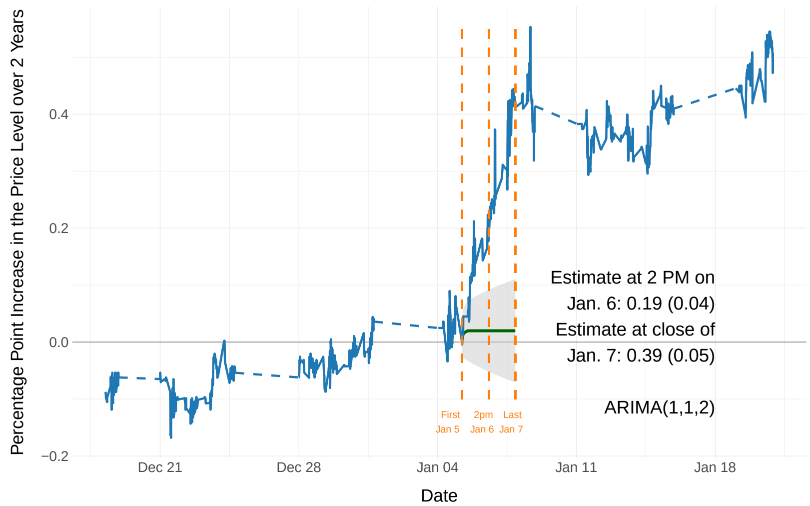
Effect on inflation. Figure 3 presents the single event study. The figure shows a jump in inflation expectations around the election, representing the causal effect of the Georgia shock. The outcome variable is the expected increase in the price level over two years, which is calculated from the two year inflation swap, deducting the first value on January 5th. In the two weeks prior to January 5th (vertical dashed orange line), expected price level growth is fairly constant, meaning a small pre-trend if any. From January 5th to January 7th—as news about the Georgia election is released—the inflation swap jumps upwards. Afterwards, the inflation swap price is stable, suggesting that transitory factors such as market liquidity were not responsible for the jump.

The graph also contains the estimate of the causal effect. The green line is the estimate of what would have happened to inflation expectations absent the Georgia election, with the shading representing the 95% confidence interval. The estimate is generated from an ARIMA(1,1,2) estimated on the prior two weeks of data; the order is selected using the Bayesian Information Criterion, allowing for trends. The difference between the blue and green lines is the causal effect of the election on inflation expectations. Therefore in our baseline estimate the election

[18] Two factors suggest drift. First, Democrats' best poll was released after markets closed on January 4th, and after investment banks had released their pre-election reports. Given this news, betting markets moved towards Democrats on January 5th (Appendix Figure C.5), as did financial markets. Second, hedge funds often have advance information around political events, bought from exit polls. Consistent with advance information, we will see pre-announcement drift is present only in shorter durations where hedge funds are active (Bahaj et al. 2023).

[19] Consistent with this view, Bloomberg releases an intraday "data surprise" index, which releases information about whether an important macroeconomic news announcement surprised consensus forecasts. This index does not register surprises until January 8th (Appendix Figure C.6).

Figure 3: Expected Percentage Point Increase in the Price Level Over 2 Years



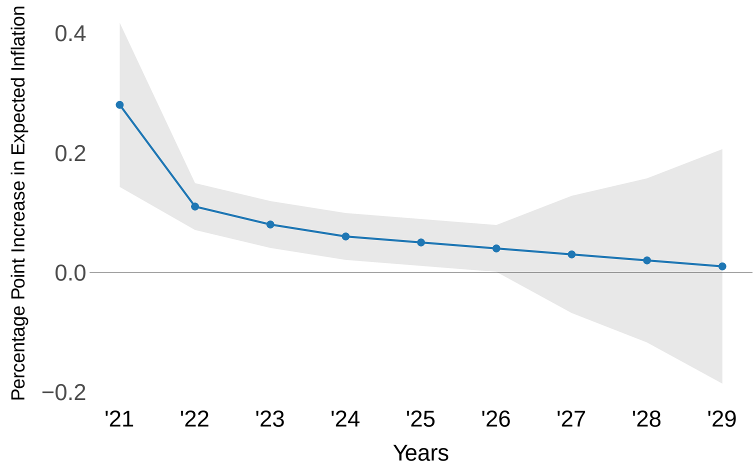
Notes: this plot is the intraday percentage point increase in price level over the next two years implied by the 2 year inflation swap, subtracting the first value on January 5th. Dashed lines are missing data from holidays and weekends. The green line is the forecast if the policy had not taken place, the gray shade is the 95% confidence interval.

causes an increase in expected price level growth over the next 2 years of 39 basis points. Excluding data after 2PM on January 6th leads to a qualitatively similar but smaller estimate of 19 basis points. The standard error of the baseline estimate is 0.05, meaning that the jump in expectations around the election is far outside the typical range. Appendix Figures C.7-C.9 show similar event plots for the 1 year, 5 year and 10 year expected increase in the price level. These figures have the same distinctive pattern, i.e. stable swaps prices prior to the election shock, followed by a jump around the election that continues to affect prices afterwards.[20]

Table 2 reports the estimates associated with the single event study. In the first column, we report the baseline estimate for the percentage point increase in prices over 1 year (first row) through 10 years (last row). The effect of deficits on prices is expected to grow over time: prices grow by 28 basis points in the first year and 77 basis points after 10 years. The other columns report robustness tests, with similar results to the baseline. In column 2 we end the event window at 2 PM on January 6th, before the Capitol Hill Riots. The result is always directionally similar, albeit smaller. In column 3 we drop missing data (the baseline ARIMA imputes missing data). Column 4 estimates the ARIMA over a longer, 6 week pre-period. Column 5 estimates the counterfactual for forecasts using a linear trend. Column 6 aggregates to hourly frequency. Column 7 calculates the causal effect more simply, as the difference in forecasts over the event window.

[20]Inflation swaps index to inflation with a lag. For instance, the 1 year inflation swap price measures expected inflation between months $t-3$ and $t+9$. We adjust swaps prices by a factor that converts them into annual units and accounts for the fact that inflation prior to time t is pre-determined with respect to the shock. For instance we adjust the 1 year swap price by a factor of (4/3), the 2 year swap price by a factor of (8/7) and so on. We apply this adjustment to swaps prices in all of the analysis that follows.

Figure 4: Single Event Study—Effect on Inflation by Horizon



Notes: the figure plots the causal effect of the Georgia shock on forward annual inflation rates, for 2021-29.

We can also measure dynamics—that is, how markets expect inflation will change in each year after the shock. To construct expected inflation in each year for swaps, we impute the forward yield curve for swaps following Cieslak, Morse & Vissing-Jorgensen (2019). Figure 4 reports the result. The figure shows that inflation is expected to increase significantly in 2021, but also is expected to persistently increase until 2026.[21]

Real outcomes. One question is whether the deficit shock behaved as a typical "demand shock", by increasing GDP. We study two pieces of information on real outcomes, from narrative reports and dividend futures. Both suggest that real growth increased after the Georgia shock.

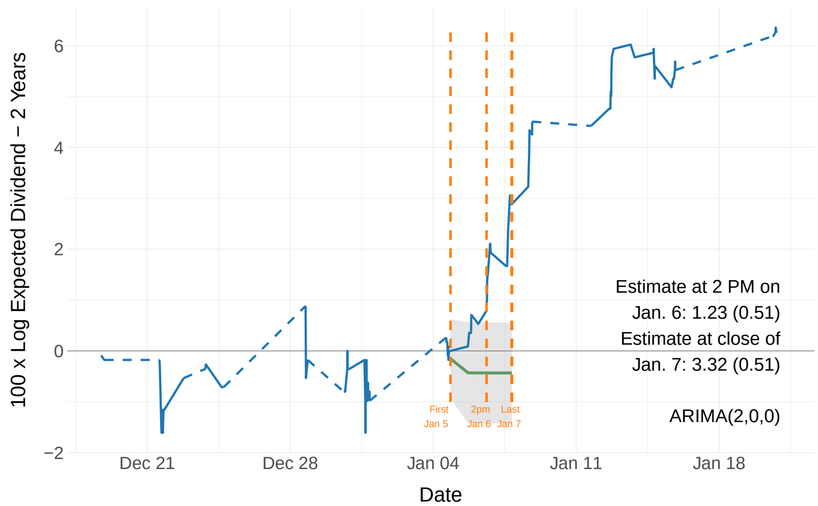
First, we study dividend futures. As we have discussed, the S&P500 n year ahead dividend future is a contract whose value is indexed to the value of nominal dividends paid by S&P 500 companies in year n. Existing evidence suggests that dividend futures are a good proxy for expected dividends (Gormsen et al. 2021). As such, movements in the 1 and 2 year ahead dividend measure how expected dividends change around the shock.

Figure 5 presents the single event study for 2022 dividends and shows that expected nominal dividends increased. The outcome variable is the percent increase in S&P500 dividends. The event study suggests that nominal dividends in 2022 grew by 3.32% due to the shock. Again, there is no pre-trend before the shock, and the price remains persistently high after the shock. Appendix Figure C.13 shows a similar graph for the 2021 dividend future.

Dividend futures are nominal and not real. However, their behavior suggests that expected real dividends increased over 2021-23 as well. To approximate this behavior, we subtract from the estimate of the effect of the shock on nominal dividends, the effect of the shock on the price

[21] Consistent with the inflationary shock, oil and food futures jump around the Georgia Shock (Appendix Figures C.10 and C.11). Consistent with markets' expectations, Appendix Figure C.12 shows that at quarterly frequency, professional forecasters' expectations of inflation jump after the passage of stimulus in 2021Q1.

Figure 5: Single Event Study—2022 Dividend Futures



Notes: this graph plots the intraday percent increase in dividends 2 years ahead, implied by the 2 year S&P 500 dividend future, subtracting the last value on January 4th. Dashed lines are missing data from holidays and weekends. The green line is the forecast if the policy had not taken place, the gray shade is the 95% confidence interval.

level at the same horizon from Table 2. Expected real dividends rose by 2.4% in 2021 and by 2.9% in 2022 due to the Georgia shock.

Under more speculative assumptions, one can use dividend futures to estimate how the shock affected expected real GDP growth. In particular, at quarterly frequency and using a long time series, Gormsen & Koijen (2020) show that a percent increase in dividends associates with a 0.67% increase in real GDP. If the same relationship holds at high frequency, then one can use the 0.67 factor to convert changes in dividend into changes in real GDP. This method suggests that markets expected real GDP to be 1.6% higher in 2021 and 1.9% higher in 2022 due to the Georgia shock. This method to infer real GDP from dividend futures should be treated with caution, since the relationship between dividends and GDP may change over time. Moreover, at intraday frequency dividend futures are traded less frequently than swaps.

A second way to gauge the effect of the Georgia shock on real outcomes is to use information on how investment banks revised their real GDP forecasts in response to the Georgia shock. 7 investment banks provided quantitative information on how they changed their growth forecasts after the Democrat victory in Georgia. The median bank states that over 2 years, real GDP is expected to grow by 1.8% more due to the Georgia shock (Appendix Table C.12). This estimate is similar to the estimates from dividend futures. Many other banks provide similar, qualitative information, but do not immediately update their quantitative growth forecast; banks do not update their quantitative forecasts of inflation at a high enough frequency to be useful.

Robustness and Capitol Hill Riots. The identification assumption of the single event study is that no other atypical events occurred during a narrow window around the election. As we have discussed, the main potential confounder is the Capitol Hill Riots. We have already seen three pieces of evidence suggesting that this potential confounder does not affect our estimates. First, results are qualitatively similar excluding the January 6th riots from the window. Second, the event study plots show that asset prices remain persistently different after the event, even when the Capitol Hill riots have subsided. Third, information on real variables suggests that expected real GDP growth increased around the Georgia election. If the riots were expected to be important, they presumably would have contracted real GDP.

We now present two further pieces of evidence suggesting that the Capitol Hill Riots do not confound our estimate. First, narrative evidence from news suggests that the Capitol Hill Riots did not affect asset prices. Appendix Figure C.14 is a collage of news articles, which summarize the prevailing view that the Capitol Hill Riots were not important. One quote, from Bloomberg Economics on January 19th, reads: "[t]he 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."

Second, Appendix Figure C.15 plots how credit default swaps on 5 year US government debt evolved around the Capitol Hill Riots. Credit default swaps measure the likelihood of default on US government debt. Presumably, if the Riots were perceived to be important, then extreme outcomes such as default on government debt would become more likely. In the event, credit default swaps fell slightly.

4.2 Additional Regression-Based Identification Strategy

Our first identification strategy is a simple event study. The drawback is that it relies on a single, high-powered observation. We therefore add a supplementary, regression-based identification strategy.

Our motivation is that between the presidential election of November, and the Georgia election in January, markets paid a great deal of attention to the likelihood of Democrat victory. As we have discussed, markets knew that if Democrats were to win, fiscal stimulus was likely. Moreover, the perceived probability that Democrats would win varied between the presidential election and the runoff election. Appendix Table C.13 illustrates these points, using information from a single investment bank, Barclays. Barclays discussed the likelihood of Democrats winning in Georgia 5 times between the November election and the runoff. Barclays' perceived probability varies significantly, from 0.2 after the presidential election, to 0.5 just before the runoff.

With this motivation, we use the daily probability of Democrat victory from betting markets as measure of news about deficits (see Appendix Figure C.5 for a plot of the daily probability). We run the regression

$$y_t = \alpha + \beta \text{probability}_t + \varepsilon_t. \tag{1}$$

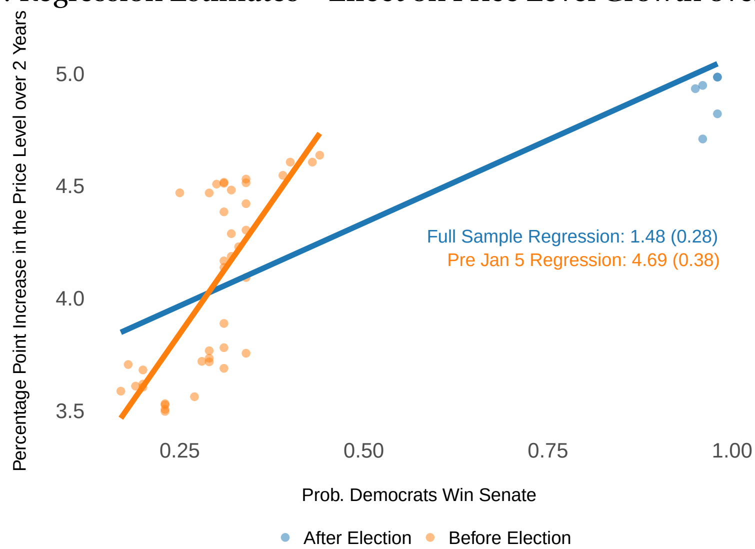
Here, y_t is an asset price such as an inflation swap, and probability_t is the end of day probability that Democrats would control the Senate after the Georgia elections, from PredictIt. β is the coefficient of interest—how changing news about Democrat victory affects inflation expectations. We expect β to be positive: a higher chance that Democrats would win in Georgia means fiscal stimulus is more likely, presumably leading to higher inflation. The sample is daily data, from one week after the November presidential election to one week after the Georgia election. The identification assumption is that changes in the probability of Democrat victory were not caused by macroeconomic factors, and that there were no other correlated shocks to both macroeconomic factors and to the probability of Democrat victory. The identification assumption is at least plausible: as we shall see, changes in the probability that Democrats would win was driven in part by factors such as better polls.

Figure 6 presents the results in a scatter plot, and finds that a higher probability of Democrat victory associates with more expected inflation. In the graph, the y axis variable is the expected percentage point increase in the price level over the subsequent two years. The x-axis is the end of day probability that Democrats would win the Senate after the Georgia election, from PredictIt. Each dot is the observation from a single day. One can see a strong positive relationship between the win probability and price level growth. The blue line, the regression line for the full sample, has a slope of 1.48 (standard error 0.28). Restricting to data before January 5th, i.e. before the election, leads to similar although larger results. Appendix Figures C.16-C.18 show similar figures for expected price level growth over 1, 5 and 10 years.[22]

Table 3 collects the regression results and provides robustness. In Panels A through D of the table we study the percentage point increase in prices over 1, 2, 5 and 10 years. In the first column we study the baseline specification. In the second column we restrict to before January 5th. In the third we drop outlier observations—i.e. the election days of the 6th and 7th, as well as days when news about December's Consolidated Appropriations Act was released. In the final

[22] One concern is data quality from PredictIt. In Appendix Figure C.19 we report similar plots for 2 year price level growth using data from an alternative online prediction market, BetFair, for Jon Ossoff's Senate election; and in Appendix Figures C.20 we report our estimate for PredictIt data, using the sample for which BetFair is available.

Figure 6: Regression Estimates—Effect on Price Level Growth over 2 Years



Notes: this graph plots the end-of-day expected percentage point increase in prices over two years, against end of day probability of Democrat victory (PredictIt). Standard errors, in brackets, are Newey-West with automatic lag length (Lazarus et al. 2018).

column we estimate the regression in weekly differences. For all specifications, the response of the price level grows with the horizon, i.e. prices respond by more over 10 years than 1 year. The estimates are larger restricting to before January 5th, and smaller in differences—though still significant except at short horizons.

We now consider additional robustness tests. The main identification concern is that other macro factors affected asset prices at the same time as news about the Democrat victory was released. To deal with this concern we adopt a strategy in two parts. First, we instrument for the likelihood of Democrat victory with daily polling data. Specifically, we use FiveThirtyEight.com's daily measure of polls for Jon Ossoff's campaign. Given that this measure is available only before the election, we restrict the sample to before January 5th. The idea behind this instrument is to isolate movements in Democrat victory likelihood that are only due to polling information. Secondly, we control for various other determinants of inflation expectations. We control for weekly lags of the 10 year US government bond, the Oil price, the S&P500 index value, and daily data from the Cleveland Fed of households expectations of the effect of Covid-19 on the economy. Since the regression only has 30 observations, we add each these controls in separate specifications. Appendix Table C.14 contains the results. The estimates are large and more imprecise, but qualitatively consistent with the baseline specification, and the robust first stage F statistic is always above 10. The main caveats are that after controlling for oil prices or S&P 500 prices, the effects are no longer significant at short horizons. The effect of deficit news on 5 and 10 year expectations is always large, positive and significant.

How do the magnitudes of the two identification strategies compare? The single event study measures the response of asset prices to a change in the probability of Democrat victory of 0.5. After halving the regression coefficients, the regression-based strategy also measures the response of asset prices to a change in the probability of 0.5. Comparing Tables 2 and 3, and halving the latter estimates, we can see that the regression-based effects are roughly 90% larger than the single event study. One reason why the regression estimates are bigger could be that the expected size of deficits, if Democrats won, may also have changed between November and January. Our estimates cannot account for such changes, because daily measures of the expected size of deficits are not available. In our quantitative estimates, we will target the smaller and easier-to-interpret numbers from the single event study.[23]

4.3 Mapping from Inflation Forecasts to Actual Inflation

The main evidence in this paper is about how the Georgia shock affected inflation forecasts from swaps. What are the implications for actual inflation, as opposed to forecasts? Studying actual inflation requires additional assumptions. We argue that the effect of the Georgia shock on inflation forecasts is likely to be a lower bound for the effect on actual inflation. The reason is that inflation expectations tend to underreact to shocks.

We formalize this argument in two steps. First, we document underreaction. We estimate a regression following Coibion & Gorodnichenko (2015),

$$\pi_{t,t+1} - F_t\pi_{t,t+1} = \alpha + \beta\left(F_t\pi_{t,t+1} - F_{t-1}\pi_{t,t+1}\right) + \varepsilon_t \tag{2}$$

where $\pi_{t,t+1}$ is consumer price index inflation over the next 12 months, $F_t\pi_{t,t+1}$ is the forecast of inflation over the next 12 months, and $F_{t-1}\pi_{t,t+1}$ is the forecast from a year ago. In the regression, if $\beta > 0$, then new information $F_t\pi_{t,t+1} - F_{t-1}\pi_{t,t+1}$ predicts forecast errors $\pi_{t,t+1} - F_t\pi_{t,t+1}$. If so, then inflation expectations under-react to new information.[24]

We estimate the regression over three periods: from 1983 to 2023, from 2004 to 2023 and from 2019 to 2023. Before 2004, we impute inflation swaps using the Cleveland Federel Reserve's measure. Restricting to 2019 onwards allows us to measure underreaction specifically during the post-Pandemic inflation. Appendix Table C.15 shows the results. Across all three sample periods there is underreaction, consistent with Coibion & Gorodnichenko (2015). Underreaction is particularly strong during the post-Pandemic Inflation, consistent with the fact that expectations rose and fell more slowly than inflation at the time (e.g. Hazell 2024).

[23] Appendix Figures C.21-C.22 show that the response of dividends is similar with the regression-based strategy.

[24] Unlike Coibion & Gorodnichenko (2015), we implement the using forecasts of inflation over the next 12 months instead of the next quarter, because swaps only provide 12 month forecasts of inflation.

In the second step, we formalize the sense in which the response of inflation forecasts to swaps is a lower bound for the response of actual inflation to swaps, if there is underreaction. To do so, we study the noisy information model of Coibion & Gorodnichenko (2015) (see Appendix Section A). Combining the two steps, the response of inflation expectations to the Georgia shock is likely a lower bound for the effect of the Georgia shock on actual inflation.

5 The Inflation Multiplier and the Effect of the 2021 Deficits

At this stage, we have both ingredients of our high frequency narrative approach: a shock, identified and sized from the narrative; and a response, measured at high frequency. We now combine the shock and response into an "inflation multiplier", which summarizes the causal effect on inflation of a 1% deficit-to-GDP shock. We then use this multiplier to calculate the total effect of the 2021 deficits on inflation, via a back of the envelope exercise.

We calculate the inflation multiplier by combining high frequency and narrative information as follows. The narrative evidence of Section 3 implies a shock to expected deficits worth 2.1% of GDP. The high frequency response of Section 4 implies a response of expected prices of 0.39% over 2 years. The inflation multiplier divides the response by the shock. Therefore for a 1% of GDP shock to deficits, expected prices grow by 0.19% over 2 years. As we have discussed, this inflation multiplier is likely a lower bound for the effect of deficits on actual inflation, given the underreaction of expectations.

The inflation multiplier summarizes the causal effect of a marginal 1% of GDP deficit shock on inflation during 2021. To calculate the causal effect of the whole 2021 deficits on inflation, one needs the product of the inflation multiplier and the total size of deficits. The 2021 deficits were 13% of 2020Q4 annualized GDP. Therefore with our estimate of the multiplier, total deficits caused at least 13% × 0.19 = 2.5% inflation, cumulatively over 2021-22.

This calculation implies that deficits were an important contributor to the subsequent inflation. Cumulatively, between the start of 2021 and the end of 2022, the price level increased by about 7.5% in excess of the normal rate.[25] Our calculations suggest that deficits accounted for around a third of the excess increase in headline prices over this period.

This calculation is only suggestive, because it involves an extrapolation. The calculation assumes that the marginal effect of deficits on inflation was the same for the Georgia runoff, as

[25]Typical annual inflation is 2% for PCE inflation and 2.4% for CPI inflation. Headline CPI prices grew by 14% over 2021-22, or 9.2% more than typical. Core CPI grew by 11.5%, or 6.7% more than typical. Headline PCE grew by 11.5%, or 7.5% more than typical. Core PCE grew by 10%, or 6% more than typical.

for the 2021 deficits as a whole. While this assumption is plausible, it is hard to test directly and may not be correct. For instance, the exercise assumes monetary policy should have responded similarly to the Georgia runoff as to the other deficit shocks, which may or may not have been true. Likewise, if the economy responds nonlinearly to larger shocks, then our back of the envelope estimate will be incorrect.[26]

Nevertheless, our calculation suggests that deficits were probably important for inflation after the Pandemic. However deficits were not the only cause—other factors must explain the remaining two thirds of the increase in inflation. For instance, energy shocks from the Russia-Ukraine war probably also mattered (Gagliardone & Gertler 2023).

The total contribution of deficits to the post-Pandemic Inflation could have been even higher. The March 2020 CARES Act was an additional stimulus worth 10.2% of GDP. Applying the same inflation multiplier to the CARES Act implies a further 1.9% increase in prices over 2 years. However, we caution that the inflation multiplier could have been different for the CARES Act.

This calculation highlights that deficits were a significant contributor to the post-Pandemic inflation in part because they were so large. The inflation multiplier, of 0.39 over 2 years, does not seem particularly big. But the size of the 2021 stimulus, at 13% of GDP, was big by recent standards. For instance the sum of the Economic Stimulus Act of 2008 and the American Recovery and Reinvestment Act of 2009, the stimulus in response to the Great Recession, was only 6.7% of 2008 GDP.

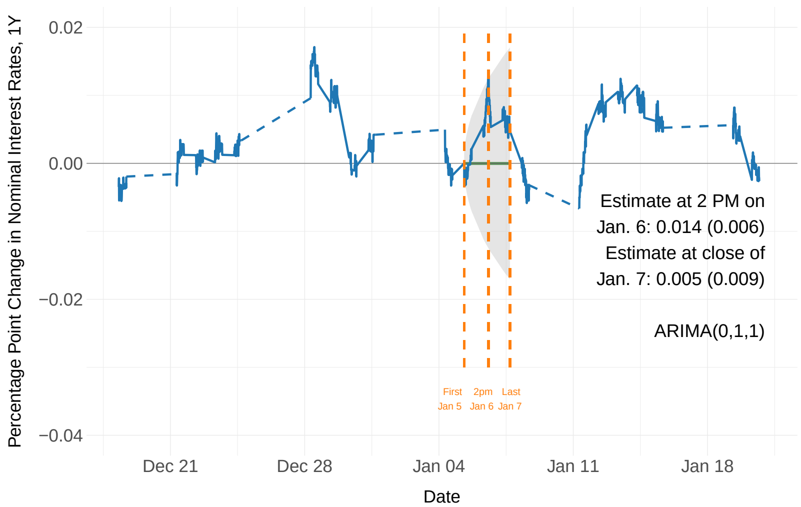
5.1 Inflation Multiplier: The Role of Loose Monetary Policy

In the coming section, we will ask whether standard models can quantitatively explain the inflation multiplier that we have estimated. However in order to interpret the inflation multiplier with a standard model, one additional piece of evidence is useful. In standard models, the inflation multiplier is partly determined by monetary policy. To gauge monetary policy, we estimate how interest rates responded to the Georgia shock.

Short term nominal interest rates did not change after the Georgia Shock, whereas long term interest rates rose. Figure 7 presents the single event study using intraday 1 year nominal interest rates on government bonds as the outcome variable. Clearly, one year nominal interest rates do not respond to the Georgia shock. Appendix Figure C.23 is the single event study for the 5 year forward 5 year nominal interest rate, which rises significantly—as originally discovered by

[26] One plausible source of nonlinearity arises because large output changes may have greater marginal effects on inflation (e.g. Blanco, Boar, Jones & Midrigan 2024). If true, then our back of the envelope exercise understates the total effect of the 2021 deficits on inflation.

Figure 7: Single Event Study—1 Year Nominal Interest



Notes: This plot shows the intraday increase in 1 year nominal interest rates, subtracting the first value on January 5th. Dashed lines indicate missing data from holidays and weekends. The green line is the forecast if the policy had not taken place, and the grey shade is the 95% confidence interval. The dashed orange lines mark the first observation on January 5th, 2 PM on January 6th, and the final observation on January 7th.

Mian et al. (2024).[27]

These moments will be crucial for the quantitative model of the next section. Since nominal interest rates did not change in the short term, and inflation expectations rose, real interest rates must have fallen—suggesting loose monetary policy in the short run. On the other hand, long term rates rose, consistent with an increase in the stock of government debt, as Mian et al. (2024) previously argued.

6 HANK Models and the Inflation Multiplier

To recap: in Section 5 we found that the 2021 caused a significant share of the post-Pandemic inflation. This episode is a test for the Heterogeneous Agent New Keynesian (HANK) model, the workhorse model for studying how deficits affect inflation. It is well known that in HANK models, deficit financed fiscal stimulus raises inflation—clearly the model can qualitatively match our finding. This section asks whether HANK models can pass a more powerful test: quantitatively matching the size and dynamics of the inflation multiplier. There is a range of HANK models in the literature. In the main text, we study a tractable version of the HANK model proposed by Wolf (2021) and Angeletos et al. (2024). In the Appendix we study additional versions

[27] Appendix Figures C.24-C.25 show similar results with the regression specification using daily data and the probability of Democrat victory. Appendix Figures C.26-C.29 show that Federal Funds rate futures, up to a year ahead, also did not change after the Georgia shock.

of the HANK model.[28]

6.1 A Tractable HANK Model

Time is discrete, with $t \in \{0,1,...\}$. We study linearized dynamics in response to a shock that is realized at date 0. The economy is at steady state prior to the shock, with X_{ss} denotes the steady state value of variable X_t before the shock.

Households. Following Wolf (2021) and Angeletos et al. (2023), there is a unit mass of households, comprising of two types: hand-to-mouth and overlapping generations (OLG) agents.

There is a mass $1-\mu$ of perpetual-youth, overlapping-generations households as in Blanchard (1985). Each period, households die with probability $1-\phi$, with $\phi \in (0,1]$. New households replace those that die, and deceased households do not value the utility of new born households. Given mortality risk, OLG household i in period t has expected utility

$$\mathbb{E}_t \sum_{s=0}^{\infty} (\beta\phi)^s \left[u\left(C_{i,t+s}\right) - v\left(N_{i,t+s}\right)\right]$$

where $C_{i,t+s}$ and $N_{i,t+s}$ denote the consumption and labor supply of OLG household i, given that they survive. Utility over consumption and labor supply take standard forms $u(C) = C^{1-\frac{1}{\sigma}} / \left(1-\frac{1}{\sigma}\right)$ and $v(N) = N^{1+\frac{1}{\varphi}} / \left(1+\frac{1}{\varphi}\right)$.

Households use a risk-free and actuarially fair nominal annuity in order to save and borrow. If households survive, they have a nominal rate of return $(1+I_{t-1})/\phi$, where I_{t-1} is the net nominal interest rate on government bonds. Additionally, households receive real labor income $W_{it}N_{it}$ net of labor income tax τ_y and given real wage W_{it}. OLG households also pay lump sum taxes T_t. A negative lump sum tax is equivalent to a transfer from the government such as a "stimulus check". Last, newborn households receive contributions from a "social fund" to which older households contribute.

As such, the budget constraint of household i at date t is

$$C_{it} + A_{it} = \frac{1}{\phi}\frac{1+I_{t-1}}{\Pi_t} A_{i,t-1} + \left(1-\tau_y\right) W_{it}N_{it} - T_t + Z_{it},$$

where A_{it} is the end of period real saving of agent i at date t; and Π_t is the gross inflation rate between periods t and $t-1$. Here, Z_{it} is the contribution towards, or transfer away from the

[28] Specifically, we study the one-asset HANK model and the bond-in-utility model of Auclert, Rognlie & Straub (2023), as well as versions with "sticky expectations" as in Auclert et al. (2020); appropriately calibrated, all models deliver similar results.

social fund. We have $Z_{it} = Z^{\text{new}} > 0$ for newborns and $Z_{it} = Z^{\text{old}} < 0$ for older households, with $(1-\phi)\, Z^{\text{new}} + \phi Z^{\text{old}} = 0$. We also set $Z^{\text{new}} = (1 + r_{ss}) A_{ss}$, where A_{ss} denotes the steady state level of assets held by savers and r_{ss} is the steady state real interest rate. As Angeletos et al. (2023) explain, the role of the social fund is to ensure that all generations have the same wealth and consumption in steady state.

The remaining mass μ of households are hand to mouth. These households do not participate in asset markets. The budget constraint of a hand to mouth household i is $C^H_{it} = (1-\tau_y) W_{it} N^H_{it} - T^H_t$, where C^H_{it} is the consumption of hand to mouth households, N^H_{it} is the labor supply, and T^H_t is their lump sum tax. The steady state lump sum taxes on OLG and hand to mouth households, T_{ss} and T^H_{ss}, ensure that steady consumption is the same for both types of households.

As in Wolf (2021) and Angeletos et al. (2023), a mix of OLG and hand to mouth households provides a tractable form of the HANK model. Mortality risk can be interpreted as the probability that a borrowing constraint might bind in the future. As a result, deficit financed transfers affect aggregate demand, and Ricardian Equivalence breaks. Relative to the canonical permanent income model, households have a larger marginal propensity to consume (MPC) in the short run, and discount future income more heavily. By adding a share μ of hand to mouth households, our model will be able to match "intertemporal marginal propensities to consume" and approximate the behavior of a richer HANK model (Auclert, Rognlie & Straub 2023).[29]

Firms. Firms operate in perfectly competitive goods markets, selling output at a flexible price P_t. Each firm has a production function that is linear in a single input, which is produced by a "labor packer" and sold to firms at a real price W_t. Aggregate output Y_t satisfies $Y_t = N_t$, where N_t is the aggregate output of the labor packer. Output is sold to either household consumption or the government. That is, we have $Y_t = C_t + G_t$, where G_t is government purchases and C_t is aggregate consumption across OLG and hand to mouth households.

Nominal Wage Rigidity. There is nominal wage rigidity, as in Erceg, Henderson & Levin (2000), and Auclert, Bardóczy & Rognlie (2023). Since the ingredients are standard, we discuss them only briefly. Appendix Section B.1.2 presents a detailed derivation of the Phillips Curve. There is a continuum of unions k, and each worker i belongs to a union. Within the union, all workers are of equal productivity, receive equal after-tax wages, and work the same number of hours. Each union is representative of the entire population. Unions have quadratic costs of adjusting wages as in Rotemberg (1982), and set the nominal wage in order to maximize the

[29] In Appendix B.4.3 we study additional models of consumption, including a bonds-in-utility model, a one-asset HANK model, and versions with sticky expectations.

equally weighted utility of their members, discounted by β. The labor packer then combines the labor from each union into aggregate employment, using a standard CES aggregator.

The Phillips Curve linking price inflation to real variables takes a familiar form. Since prices are flexible, wage and price inflation coincide absent shocks to total factor productivity. To first order around the zero inflation steady state, inflation satisfies

$$\pi_t = \kappa \left\{ y_t - \frac{\varphi}{\varphi + \sigma \frac{C_{ss}}{Y_{ss}}} g_t \right\} + \beta \pi_{t+1}, \tag{3}$$

where κ is the "slope" of the Phillips Curve defined in Appendix Section B.1.2, and $y_t = \frac{Y_t - Y_{ss}}{Y_{ss}}$ and $g_t = \frac{G_t - G_{ss}}{Y_{ss}}$ are deviations of output and government spending from their steady state values, normalized by steady state output. Equation (3) is the Phillips Curve, with the standard adjustment for how government spending alters wealth effects on labor supply.

Policy and Equilibrium. The government carries out two kinds of policy: fiscal policy, involving government spending, debt and taxes; and a monetary authority that sets nominal interest rates. Regarding monetary policy, the central bank sets the nominal interest rate I_t.

Regarding fiscal policy, the government issues nominal one period bonds B_t, spends G_t on final goods output, levies total lump sum taxes $\mu T_t^H + (1-\mu) T_t$ on hand to mouth and OLG households, and collects labor income taxes $\tau_y Y_t$. As a result, the government budget constraint is

$$B_t = \frac{1 + I_{t-1}}{\Pi_t} B_{t-1} - S_t, \tag{4}$$

where $S_t \equiv \left(\mu T_t^H + (1-\mu) T_t + \tau_y Y_t\right) - G_t$ is the primary budget surplus.

Given these elements, an equilibrium is (i) a sequence of consumption, employment, wages and savings for OLG and hand to mouth households; as well as prices, aggregate output, and government debt; which (ii) satisfies household optimality, the Phillips Curve, asset and goods market clearing and the government's budget constraint (as well as a no-Ponzi condition).

The equilibrium is conditional on the "policy block"—a sequence $\{I_t, T_t, T_t^H, G_t\}_{t=0}^{\infty}$ of nominal interest rates, lump sum taxes on OLG and hand to mouth households, and government spending. We will discuss how we treat the policy block momentarily. In Appendix Section B.2, we present the full set of linearized equations associated with the equilibrium of the model.

Calibration. We calibrate the model to parameters from before 2020. Most important are the parameters governing household spending and the slope of the Phillips Curve. As Auclert, Rognlie & Straub (2023) point out, intertemporal marginal propensities to consume should match in the model and data, in order to generate the correct consumption response to fiscal shocks. We calibrate the share of hand to mouth consumers μ, and the OLG mortality rate ϕ, in order to match the first and second year MPCs from Fagereng et al. (2021). We calibrate the slope of the Phillips Curve to the value of Hazell et al. (2022), with $\kappa = 0.055$.[30]

Additionally, we calibrate the discount factor, the intertemporal elasticity of substitution and the Frisch elasticity of labor supply to standard values: $\beta = 0.99$, $\sigma = 1$ and $\varphi = 1$; and also choose r_{ss} so that $\beta(1 + r_{ss}) = 1$. We calibrate the steady state debt-to-GDP ratio, the steady state government spending to GDP ratio, and the labor income tax rate to 2019 values from CBO (2019). We report our calibration in Table 5, which also contains parameters about fiscal policy to be discussed directly.

6.2 Modeling the 2021 Deficits

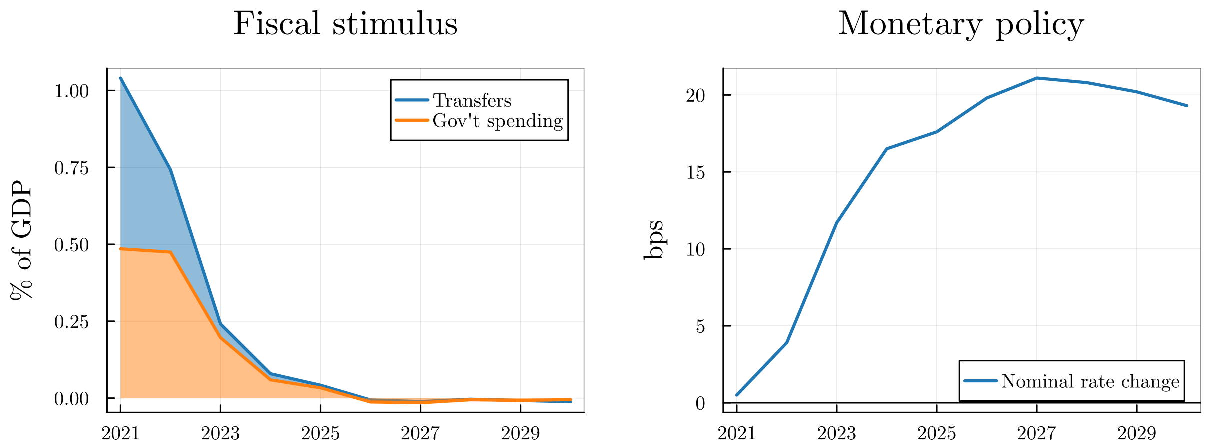
The main exercise will be to feed the shock to deficits from the Georgia election into the model. We will then ask whether the model, with its calibration to pre-2020 data, can replicate the inflation multiplier that we have estimated. The Georgia runoff is a reduced form shock, combining structural shocks to fiscal and monetary policy. We therefore discuss how we discipline shocks to fiscal and monetary policy, i.e. $\{I_t, T_t, T_t^H, G_t\}_{t=0}^{\infty}$, using our narrative and high frequency evidence as well as additional information sources.

Size of deficit shock. We take the size of the deficit shock, 2.1% of steady state output, from our reading of narrative information in Section 3.

Composition of deficit shock: spending vs. transfers. We now allocate the total deficit shock between transfers and government spending. The narrative reports provide information about the expected composition of deficits. From Appendix Table C.4, the median bank expects that the stimulus will be 70% transfers, with the remainder government spending, principally state and local aid. We opt for similar, but more precise information, based on the realized composition of spending and transfers from the American Rescue Plan (Edelberg & Sheiner 2021). The American Rescue Plan had four major components: (1) federal spending, state aid, and COVID-19 containment (40%) (2) direct aid to families (30%) (3) aid to financially vulnerable households (21%) and (4) aid to businesses (8%). We allocate (1) as government spending and (2)-(4) as transfer payments. Therefore, we assume that 60% of the shock to deficits around Georgia is transfers—similar to the expectations from the narrative reports. We assume that per capita transfers are the same for OLG and hand to mouth households, consistent with the lump sum behavior of "stimulus checks", and consider other forms of distribution in robustness.

[30] Hazell et al. (2022) report the slope of the Phillips Curve, at annual frequency and including housing, in Footnote 24 of the paper.

Figure 8: Fiscal and Monetary Shocks



Notes: the left panel shows innovations to government spending and total transfers, normalized by steady state output. The innovations are for 2021 onwards, expected after the Georgia shock, and measured from narrative information. The right panel shows the path of innovations to one-year interest rates, expected from 2021 onwards, in the aftermath of the Georgia shock. The shocks are inferred from single event studies applied to the one-year-ahead forward yield curve.

Timing of deficit shock. We now allocate when the components of the deficit shock are expected to be spent. The narrative reports do not provide information about how quickly they expect the shock to deficits around the Georgia election to be spent. Instead, we study the time path of how the overall American Rescue Plan was spent, and assume that the expected time path of deficits after the Georgia election was the same. CBO (2021*a*) (detailed Tables 1-11) projects how quickly various detailed components of the American Rescue Plan would be spent over the subsequent 10 years. We aggregate the detailed components into the broad categories of Edelberg & Sheiner (2021), which results in a projected spending path for government spending and transfers. The CBO provides the spending path of appropriations—that is, when spending would be allocated from the American Rescue Plan towards its intended purpose. However there is typically a lag between appropriations and realized government spending. Following Ramey (2021), we assume a "time to spend" delay between appropriations and realized spending of 1.5 years. We assume that spending on COVID-19 containment does not have this delay.

Together, our information on the size, composition and timing of the deficit shock defines the fiscal stimulus. We will denote fiscal stimulus—the sequence of innovations to taxes and government spending—by $\{\tilde{T}_t, \tilde{T}^H_t, \tilde{G}_t\}_{t=0}^{\infty}$. Fiscal stimulus is associated with an innovation that lowers the primary surplus $\varepsilon_t \equiv \tilde{G}_t - \left(\mu \tilde{T}^H_t + (1-\mu)\,\tilde{T}_t\right)$. Figure 8, left panel, plots the sequence of innovations to government spending and total transfers, normalized by steady state output. The figure contains innovations for 2021 onwards, expected after the Georgia shock.

Fiscal Rule and Path of Debt. We now specify the fiscal rule associated with our model, which describes how debt will be paid back as well as the initial stimulus. Our fiscal rule specifies the entire sequence of fiscal policy, $\{T_t, T_t^H, G_t\}_{t=0}^{\infty}$, as follows:

- **When t ≤ H:** government spending, and lump sum taxes on OLG households and hand to mouth households are determined entirely by fiscal stimulus. That is, we have that $\{T_t, T_t^H, G_t\}_{t=0}^{H} = \{T_{ss} + \tilde{T}_t, T_{ss}^H + \tilde{T}_t^H, G_{ss} + \tilde{G}_t\}_{t=0}^{H}$.
- **When t > H:** government spending and lump sum taxes on hand to mouth households continue to be determined by fiscal stimulus. Lump sum taxes on OLG households contain an additional component T_t^{repay}, set in order to pay back debt. That is, we have $\{T_t, T_t^H, G_t\}_{t=H+1}^{\infty} = \{T_{ss} + \tilde{T}_t + T_t^{\text{repay}}, T_{ss}^H + \tilde{T}_t^H, G_{ss} + \tilde{G}_t\}_{t=H+1}^{\infty}$, where T_t^{repay} is set so that primary surpluses satisfy

$$S_t = \tau_B \left(B_{t-1} - \bar{B}\right) + r_t B_{t-1} - \varepsilon_t. \tag{5}$$

This fiscal rule has various features that suit our setting. First, the fiscal rule has two phases. Before period H, there is a stimulus phase: lump sum taxes are set to provide stimulus transfers. After period H, there is a repayment phase: lump sum taxes are associated with an additional component in order to pay back debt. This feature, which is shared by the fiscal rule of Angeletos et al. (2023), matches the data. In Figure 8, left panel, stimulus transfers take place almost entirely within years 0, 1 and 2 (i.e. 2021-23). Meanwhile the CBO (2021*a*) (Summary Table 1) forecasts that increases in taxes to partially pay for the American Rescue Plan would start in year 3 (i.e. 2024). Given these features, it is natural to calibrate $H = 3$.

Second, during the repayment phase, the fiscal rule of equation (5) takes a sensible form. The fiscal rule is written in terms of primary surpluses (as in for instance Blanchard 2023). Taxes change, so that primary surpluses gradually move towards a level that is consistent with the steady state level of debt, $\bar{B}$. The speed of adjustment is parameterized by τ_B. We will allow the steady state level of debt after the shock, $\bar{B}$, to potentially be higher than the level of debt before the shock. This aspect of the fiscal rule is motivated by our finding that long term interest rates rise, which in HANK models is consistent with steady state debt increases (e.g. Campos, Fernández-Villaverde, Nuño & Paz 2024). With higher steady state debt, and higher accompanying interest rates, primary surpluses must also be higher in the new steady state. The penultimate term in equation (5) allows the fiscal rule to accommodate these extra interest costs. The final term is the continual impact of the fiscal stimulus on primary deficits.

Finally, we assume that the long term fiscal adjustment takes place entirely through lump sum taxes on OLG households. This assumption is appealing because consumption and output will be unchanged in the new steady state with higher debt, after the shock. According to the text of the legislation itself, the eventual tax rises associated with the American Rescue Plan would be taxes on high income individuals and corporations. We will consider fiscal adjustment via distortionary taxes and cuts in government spending in robustness exercises.

Overall, we calibrate the fiscal rule as follows (see the last three rows of Table 5). As discussed, we set $H = 3$. We calibrate $\bar{B}$, the increase in steady state debt after the shock, in order to match the increase in the 9 year ahead 1 year interest rate from the data. We calibrate τ_B to match the long-horizon persistence of debt forecasted by the CBO (2021*b*). We elaborate on this procedure in Appendix Section B.3, where we show how to identify τ_B from the CBO debt projections.

Monetary policy. Estimates from Section 4 pin down expectation of future short-term nominal interest rates up to 10 years. In Figure 8, right panel, we convert these estimates into 1 year forward rates, between 0 and 9 years after the shock. After 10 years we assume a determinate Taylor rule with a time-varying intercept that ensures convergence to steady state output and inflation.

Overall shock. The previous information is enough to describe the shock to the 2021 deficits, around the Georgia elections, summarized in the top panels of Figure 9. Specifically, the fiscal rule and the path of interest rates define the shock to the policy block $\{I_t, T_t, T_t^H, G_t\}_{t=0}^{\infty}$, which we will feed into the model.

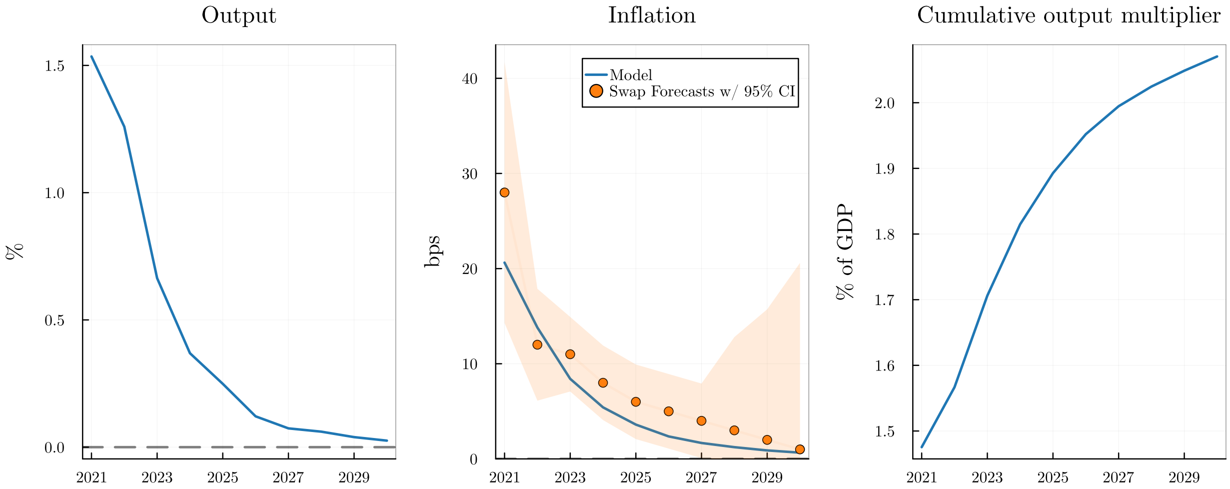
6.3 Matching the Inflation Multiplier in the Model

Figure 9 plots the impulse response of the economy to the shock after the Georgia election. The model fits the size and dynamics of the response of inflation well. This finding is in the middle panel. The orange circles are the response of inflation expectations after the Georgia runoff, as we estimated in Section 4. The blue line is predicted inflation from the model. The two series match closely, both in the initial and later stages of the stimulus, and the model prediction is always well within the confidence intervals of the estimates from data (shaded orange area).[31] As a result, the HANK model seems to quantitatively match the size and dynamics of the inflation multiplier.

In the standard model, inflation increases via the Phillips Curve: higher output raises marginal costs and therefore inflation. Consistent with this logic, output increases significantly and persistently in our calibration, as the left panel of Figure 9 shows. The right panel shows the cumu-

[31] Appendix Figure C.30 plots the same graph with price levels, and with similar results.

Figure 9: Impulse Response to Georgia Shock



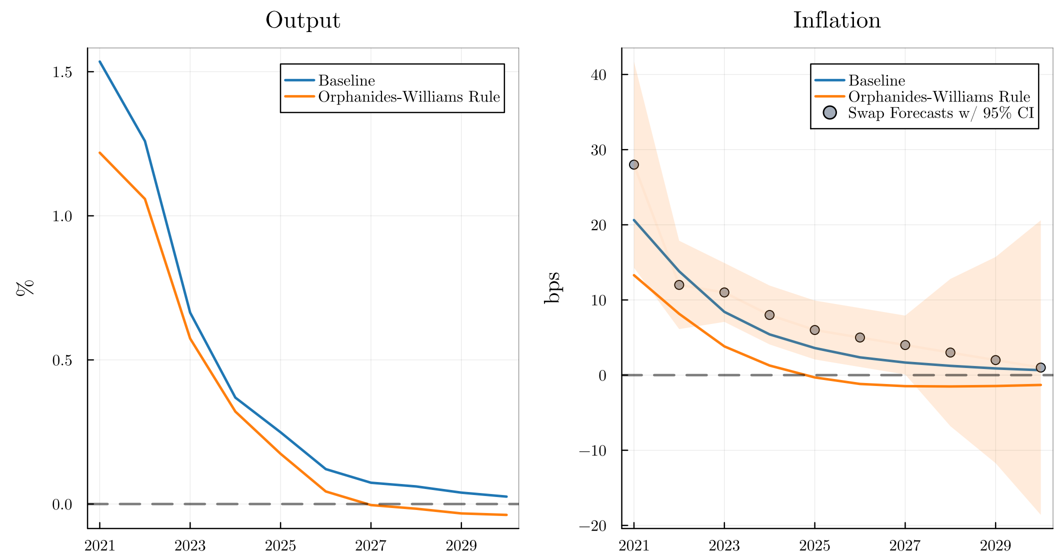
Notes: this graph plots impulse responses of output y_t in percentage deviation from steady state (left panel), and inflation π_t in basis point deviations from steady state (middle panel); as well as the cumulative output multiplier (right panel). All responses are to the shocks shown in Figure 8. Inflation forecast estimates from the data are shown with their 95% confidence intervals.

lative output multiplier. The cumulative output multiplier is defined as $\sum_{j=0}^{t}\beta^j y_{t+j}/\sum_{j=0}^{t}\beta^j\tilde{\varepsilon}_{t+j}$, where $\tilde{\varepsilon}_t \equiv \varepsilon_t/Y_{ss}$ is the sum of government spending and transfers normalized by steady state output, plotted in Figure 8. The cumulative output multiplier starts at a little below 1.5 and gradually rises with the horizon.

One question is whether the changes in output predicted by the model are reasonable. We draw on three pieces of evidence to argue that the output response is indeed plausible. First, in the spirit of Orchard et al. (2023), we consider how private sector forecasts of real GDP changed. As we discussed in Section 4, forecasters revised their forecasts of real GDP upwards after the Georgia election. The median forecaster predicted that 2022 output would be 1.8% higher due to the Georgia election. Second, consider dividend futures. We found in Section 4 that markets predicted real GDP in 2022 would be roughly 1.9% higher due to the Georgia shock. The model predicts that output would be 1.25% higher in 2022 due to the shock, which is similar albeit smaller than the narrative and dividend evidence. Third, contemporary accounts predicted a similar multiplier to what we have found. In particular Blanchard (2021) predicted a short run multiplier associated with the American Rescue Plan. His central tendency was a multiplier of 1.2, with high and low values of 2 and 0.4. The short run output multiplier predicted by the model is well within this range.

Our estimates are at least somewhat consistent with historical estimates of the multiplier. In her survey of empirical work, Ramey (2019) suggests that cumulative output multipliers with respect to government spending during periods of accommodative monetary policy could be

Figure 10: Impulse Response with Alternative Monetary Policy



Notes: the figure plots the impulse responses of output y_t and inflation π_t in the model with the interest rate path $\{I_t\}_{t\geq 0}$ estimated from US government bonds (blue), or under the assumption that the monetary authority follows a robust policy rule as in Orphanides & Williams (2002) (orange).

1.5 or higher. Our estimates are within this range within the first three years. However the 2021 stimulus comprises of various kinds of transfers as well as government spending, meaning the multiplier from our exercise is not directly comparable to pure government spending multipliers. Aggregate evidence on transfer multipliers is relatively scarce (Ramey 2019).

6.4 The Role of Monetary Policy

We now show that loose monetary policy partly explains why the model can match the inflation multiplier from the data. As we have discussed, monetary policy was expected to be loose in response to the 2021 deficits. Consider the behavior of interest rates in the right panel of Figure 8. 1 year nominal interest rates were unchanged, and rose by little in the short term, meaning real interest rates fell in the short term after the Georgia shock.

To quantitatively evaluate the role of relatively loose monetary policy, one must specify "normal" monetary policy. Our model of normal monetary policy is the Orphanides & Williams (2002) rule, recently popularized by Campos et al. (2024). By this rule, nominal interest rates are set according to $i_t = i_{t-1} + \phi_\pi \pi_t$, with $\phi_\pi = 1.5$. As Campos et al. (2024) explain, this rule is appealing because it allows nominal interest rates to respond to increases in inflation away from the central bank's target. However, the rule does not require information about the steady state level of real interest rates—which in our model changes with steady state increases in government debt.

We show that with the historical monetary policy rule, the response of inflation to the deficit shock would have fallen by roughly 40%. Figure 10 reports this result. In the blue line we plot the impulse response from the baseline model. In the orange line we plot the impulse response under the alternative, historical monetary policy rule. The right panel shows that the response of inflation would have been lower by 40% or more in each year of the stimulus. In the left panel the reason is evident. Tighter monetary policy under the historical rule leads to a smaller output boom, which dampens the rise in inflation.

As such, we conclude that one reason for the response of inflation to deficits observed in the data is relatively loose monetary policy. This message is shared by other work about the post-Pandemic inflation. For instance, using a vector autoregression and a structural model based approach, Gagliardone & Gertler (2023) finds that monetary policy was an important contributor to the post-Pandemic inflation. Narrative accounts also find that monetary policy was loose over this period (e.g. Cieslak et al. 2024); and estimates of the monetary policy reaction function are notably looser around this time (Bocola et al. 2024; Bauer et al. 2024).

6.5 Robustness and Discussion

The main takeaway is that a tractable version of the HANK model can match the size and dynamics of the inflation multiplier around the Georgia shock. We now consider various robustness exercises that support this message. We also emphasize an important caveat. If the HANK model is calibrated to match lower and more transitory intertemporal MPCs, in line with many estimates, then it can no longer match the inflation multiplier. Finally, we also discuss an alternative theory linking deficits and inflation—the fiscal theory of the price level.

Infrastructure investment. As we discussed in Section 3, a second component of the Democrat victory was the likelihood of greater infrastructure spending. So far, we have omitted infrastructure spending from our analysis. The reason is that, as we show in Appendix Section B.4.1, the effect of the infrastructure package on the economy is small according to the model. In the Appendix, we extend the model to include infrastructure, following a simplified version of the model of Ramey (2021), which in turn builds on Leeper et al. (2010). In this extended model, we look at the impulse response to the combined shock of the policy shocks from Figure 8 and the infrastructure spending shock discussed in Section 3. We pin down the path for infrastructure spending from detailed projections from Moody's Analytics about the spending path of the Inflation Reduction Act. According to the model, infrastructure increases the first year response of inflation by 6 basis points or less, depending on our calibration, and the first year response of output by 5 basis points or less.

As we discuss in the Appendix, the small effect of infrastructure is for three reasons. First, the infrastructure program was balanced budget, and the tax rises dampen the output multiplier. Second, the wealth effects induced by greater infrastructure spending dampen the effects on inflation and output. Third, following Ramey (2021), we incorporate a realistic "time to build" lag, meaning little of the infrastructure is spent in the first three years.

Alternative HANK models. Our baseline exercise studies a tractable version of the HANK model, with a mix OLG and hand to mouth households. In robustness, we explore four other HANK models. The first is a mix of hand to mouth and bond-in-utility households, following Auclert, Rognlie & Straub (2023). The second is three types of OLG households who differ in their mortality risk, following Wolf (2021) and Angeletos et al. (2024). The third is a one asset HANK economy with borrowing constrained households and idiosyncratic income risk. The fourth is sticky information as in Auclert et al. (2020), which has been shown to be important to produce hump shaped aggregate responses while being consistent with responses at the micro-level. Appendix Section B.4.3 describes these alternative possibilities and Figure B.4 shows that when these alternative models match the same intertemporal marginal propensities to consume, the implications for output and inflation are similar.

Taxes to pay back debt. In the baseline model, we assume that the taxes to pay back the debt are entirely levied as lump sum transfers on OLG households. Some plausible alternative assumptions are that the primary surplus is raised (i) by cutting government spending or (ii) via distortionary taxation on labor. Appendix Figure B.3 studies the impulse response of the economy under these alternative assumptions, and finds that the inflation response changes little.

Alternative allocations of transfers in the American Rescue Plan. In the baseline, we assume that transfers from the American Rescue Plan are allocated equally to OLG and hand to mouth households. Other assumptions are possible. For instance, unemployment insurance could have been received only by hand to mouth households. Similarly, aid to businesses potentially went to lower MPC households. With these alternative assumptions, the impulse response of inflation changes little, as Appendix Figure B.5 shows. The output response is more front loaded but less persistent. As the inflation response is based on the net present value of the output response these two effects roughly cancel.

Alternative monetary policy. Instead of assuming that monetary policy switches to a determinate Taylor Rule after 10 years, we also consider an alternative rule which implements steady state output and inflation after 10 years. Appendix Figure B.7 plots the impulse response under this alternative terminal condition, which changes little.

Calibrating to alternative intertemporal marginal propensities to consume. Our baseline model calibrates to the intertemporal marginal propensities to consume of Fagereng et al. (2021), following for instance Angeletos et al. (2023) and Auclert, Rognlie & Straub (2023). Fagereng et al. (2021) find a marginal propensity to consume of 0.51 after 1 year and 0.16 after two years. However, other work estimates a smaller and more transitory consumption response to transfers (e.g. Orchard et al. 2023; Boehm et al. 2023). Matching the alternative consumption response means that the HANK model can no longer match the inflation multiplier. For instance, Boehm et al. (2023) estimate a marginal propensity to consume of 0.23 in the first quarter, and zero afterwards. We calibrate the model to this alternative moment, and present the results in Appendix Section B.4.5. Figure B.6 shows that with the alternative calibration, the inflation response in the model is significantly lower than the data. This result is an important qualification to our finding that HANK models perform well during the post-Pandemic Inflation. One reason to prefer our baseline calibration is that it matches the fact that long horizon interest rates rise after the fiscal shock, given the increase in the long-run stock of government debt. As we discuss in the Appendix, the alternative calibration requires an implausibly low intertemporal elasticity of substitution in order to account for the long term behavior of interest rates.

Fiscal Theory of the Price Level. We now discuss how our results relate to the fiscal theory of the price level (FTPL). We have shown that a HANK model can match our estimates of the causal effects of deficits on inflation. One question is how a leading alternative model linking deficits to inflation fares, namely the FTPL. In Appendix Section B.4.7 we explore a simple FTPL model similar to Bianchi et al. (2023), with partly unfunded deficits, long term debt, and a Taylor Rule. The alternative model is also capable of matching our estimate of the size and response of inflation dynamics to the deficit shock. Our result echoes a message from Angeletos et al. (2024), that both HANK and FTPL models are capable of matching the response of inflation to deficits.

7 Conclusion

An important question in macroeconomics is whether deficits raise inflation, especially in the context of the recent, post-Pandemic inflation. This paper proposes a “high frequency narrative approach”, to measure the causal effect of the 2021 deficits on inflation. We identify an event that released news about the 2021 deficits—the Georgia Senate election runoff. We calculate the shock to expected deficits from the runoff, using new narrative data from investment banks.

We next measure the high frequency response of inflation forecasts, using inflation swaps. We combine the high frequency and narrative information to estimate an inflation multiplier of 0.18% over two years, implying the 2021 deficits caused around 30% of the excess inflation in 2021 and 2022. Last, we confront standard HANK models with our estimate of the inflation multiplier. With a calibration to pre-2020 data, HANK models successfully match the size and dynamics of the inflation response.

We believe our high frequency narrative approach could be fruitfully applied to estimate the causal effect of other single, episode specific shocks on the economy. This method is useful because certain episodes, such as the 1980s Disinflation or the Great Depression, are particularly influential to macroeconomists.

8 Tables

Table 1: Expected Stimulus after Democrat Victory

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."
08.01.2021	UBS	500	"We would expect a fiscal package of roughly $500bn following the inauguration."
08.01.2021	Barclays	1400	"We assume over $1.4trn in additional aid following the outcome of this week's Senate runoffs in Georgia."
10.01.2021	Moody's Analytics	750	"Fiscal support from the new Biden administration and Congress is expected to include an additional $750 billion to help the economy through to the end of the pandemic."
11.01.2021	Bank of America Corp	1000	"A Blue Wave increases the likelihood of an immediate $1 trillion Covid stimulus."
11.01.2021	Morgan Stanley	1000	"We expect an additional US$1 trillion for Covid-19 aid in the near term."

Median of Expected Stimulus after Democrat Victory: $900 bn

Notes: The number is taken from the reports of investment banks after elections. The sample is restricted to be from 6th of January until 13th of January. For cases where the range is given, the median of the range is taken.

Table 2: Single Event Study—Effect on Inflation Forecasts from Swaps

	Baseline	Ends Jan 6	Drop missing	6 weeks	Linear Trend	Hourly	Difference
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: Percentage point increase in the price level from inflation swaps over 1 year							
Change in Forecasts	0.28	0.18	0.28	0.28	0.27	0.25	0.24
	(0.07)	(0.05)	(0.12)	(0.12)	(0.008)	(0.03)	(0.06)
Observations	231	231	231	715	232	80	80
Panel B: Percentage point increase in the price level from inflation swaps over 2 years							
Change in Forecasts	0.39	0.19	0.38	0.32	0.39	0.39	0.41
	(0.05)	(0.04)	(0.08)	(0.09)	(0.01)	(0.05)	(0.13)
Observations	656	656	656	2032	657	139	139
Panel C: Percentage point increase in the price level from inflation swaps over 5 years							
Change in Forecasts	0.58	0.29	0.58	0.58	0.56	0.58	0.58
	(0.22)	(0.16)	(0.23)	(0.17)	(0.03)	(0.16)	(0.19)
Observations	1048	1048	1048	3064	1049	194	194
Panel D: Percentage point increase in the price level from inflation swaps over 10 years							
Change in Forecasts	0.77	0.44	0.75	0.75	0.72	0.75	0.74
	(0.18)	(0.14)	(0.49)	(0.28)	(0.06)	(0.25)	(0.38)
Observations	646	646	646	2060	647	145	145

Note: Each panel corresponds to the expected percentage point increase in the price level over a specific maturity. The data for forecasts comes from inflation swaps at 10-minute frequency. In all panels, we calculate the increase in inflation expectations compared to a counterfactual estimated on data from before January 5th. In Column (1), we fit an ARIMA model to the data from the start of December 18th, 2020 to the start of January 5th, and calculate the effect at the end of January 6th. Column (2) calculates the effect at 2 PM on January 6th. Column (3) drops missing values. Column (4) estimates the ARIMA over a 6 week period before January 5th. Column (5) estimates the counterfactual as a linear trend, and uses Newey-West standard errors with lag length from Lazarus et al. (2018). Column (6) aggregates to hourly frequency and estimates the ARIMA. Column (7) aggregates to hourly frequency and calculates the effect simply as the change over the event window. Here, the standard error is the standard error of price changes over the pre-period, scaled to the length of the event window and assuming that hourly price changes in the pre-period are uncorrelated.

Table 3: Regression Estimates—Effect on Inflation

	Panel A: Percentage point increase in the price level from inflation swaps over 1 year			
	Full Sample	Before Jan 5	Outliers Dropped	Diff
	(1)	(2)	(3)	(4)
Democrat Win Probability	0.96	3.28	1.03	0.1
	(0.20)	(0.26)	(0.25)	(0.06)
Observations	46	40	41	44
	Panel B: Percentage point increase in the price level from inflation swaps over 2 years			
Democrat Win Probability	1.48	4.69	1.57	0.16
	(0.28)	(0.38)	(0.34)	(0.11)
Observations	46	40	41	44
	Panel C: Percentage point increase in the price level from inflation swaps over 5 years			
Democrat Win Probability	2.2	6.87	2.35	0.46
	(0.41)	(0.61)	(0.48)	(0.15)
Observations	46	40	41	44
	Panel D: Percentage point increase in the price level from inflation swaps over 10 years			
Democrat Win Probability	3.05	10.9	3.27	0.49
	(0.69)	(1.14)	(0.81)	(0.2)
Observations	46	40	41	44

Note: Each panel in the table presents a different horizon for changes in the price level. In all panels, we adjust the price of the inflation swap to take into account the 3-month lag of the inflation index used in the contracts. For all panels, we regress the expected increase in the price level on the lagged probability of a Democratic win in the 2021 Georgia Senate election. We use Newey-West standard errors with automatic lag length selection from Lazarus et al. (2018). Our dataset is daily, sourcing expected increases in the price level from zero-coupon inflation swaps from Bloomberg, and probabilities of a Democratic victory from PredictIt's 2020 Senate election betting prices. The data spans November 9, 2020, to January 12, 2021. Column (1) analyzes the entire dataset. Column (2) considers only data gathered before January 5, 2021. Column (3) omits data from outliers, namely the 6th and 7th of January and the 2nd-4th December. Lastly, in Column (4), the analysis uses the differenced values of both dependent and independent variables with lag 5. Counts refer to the number of daily observations.

Table 4: Single Event Study—Effect on Nominal Interest Rates

	Baseline (1)	Ends Jan 6 (2)	Drop Missing (3)	4 weeks (4)	Linear Trend (5)	Hourly (6)	Difference (7)
Panel A: Percentage point increase in nominal interest rates over 1 year							
Jump in Interest Rate	0.005	0.014	0.005	0.005	0.004	0.007	0.007
	(0.009)	(0.006)	(0.015)	(0.009)	(0.003)	(0.006)	(0.01)
Observations	570	570	570	1311	571	100	100
Panel B: Percentage point increase in nominal interest rates over 5 years, after 5 years							
Jump in Interest Rate	0.202	0.161	0.202	0.202	0.202	0.218	0.199
	(0.08)	(0.059)	(0.106)	(0.098)	(0.006)	(0.019)	(0.069)
Observations	570	570	570	1311	571	101	100

Note: Each panel corresponds to the percentage point increase in the interest rate over a specific maturity. The data for interest rates come from the intraday prices of US government treasuries at 10-minute frequency, sourced from CME group. We calculate the zero-coupon yield of the treasuries using bootstrapping and interpolate using a cubic smoothing spline. In all panels, we calculate the increase in interest rates compared to the counterfactual scenario where the series would have continued to behave as before the beginning of January 5th, 2021, just before the announcement of the Georgia election results. In column (4) we force the algorithm to choose a stationary ARIMA model, in all other columns we let the algorithm to choose either a stationary or non-stationary ARIMA model, using the Bayesian Information Criterion. In Column (1), we fit a non-stationary ARIMA model to the data from the start of December 18th, 2020 to the start of January 5th. Column (2) sets the counterfactual at 2:00 PM on January 6th, 2021 and fits a non-stationary ARIMA model as well. drops all missing values and then fits the non-stationary ARIMA model. Column (3) drops all missing values and then fits the non-stationary ARIMA model. Column (4) estimates the ARIMA over a 4 week period before January 5th. Column (5) estimates the counterfactual as a linear trend, and uses Newey-West standard errors with lag length from Lazarus et al. (2018). Column (6) aggregates to hourly frequency and estimates the ARIMA. Column (7) aggregates to hourly frequency and calculates the effect simply as the change over the event window. Here, the standard error is the standard error of price changes over the pre-period, scaled to the length of the event window and assuming that hourly price changes in the pre-period are uncorrelated.

Table 5: **Calibration of Model**

Parameter	**Description**	**Value**	**Target**
Households			
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	Phillips Curve slope	0.055	Hazell et al. (2022)
Steady State Fiscal			
B_{ss}/Y_{ss}	Steady state Debt-to-GDP	0.8	OMB (2024)
τ_y	Marginal tax rate	0.27	CBO (2019)
G_{ss}/Y_{ss}	Gov't spending-to-GDP	0.2	BEA (2024)
Fiscal Rule			
τ_B	Response of surpluses to debt	0.189	Persistence of debt, CBO (2021*b*)
H	Period where debt repayment starts	3	CBO (2021*a*)
$\bar{B}/Y_{ss}$	Steady state Debt-to-GDP after shocks	80.6%	9 year ahead 1 year interest rate

Notes: this table reports each parameter and its source for the calibration. The intertemporal MPCs are from Fagereng et al. (2021). We discuss in Appendix Section B.3 how we calibrate τ_B to match the long horizon persistence of debt, after the American Rescue Plan, from CBO (2021*b*).

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Appendix (For Online Publication)

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A Response of Forecasts vs. Actual Inflation

This section shows that if inflation forecasts underreact to shocks, so that $\beta > 0$ in regression equation (2), then the response of inflation forecasts is a lower bound for the response of actual inflation. To make this point, we study the noisy information model of Coibion & Gorodnichenko (2015).

Suppose that inflation follows an AR(1) process

$$\pi_t = \rho \pi_{t-1} + \nu_t \tag{A.1}$$

where ν_t is an i.i.d. normally distributed innovation to inflation. A deficit shock could represent one such innovation. Agents cannot observe inflation directly but instead receive a signal

$$y_{it} = \pi_t + \omega_{it}$$

where ω_{it} is normally distributed mean-zero noise that is identically distributed across time and agents.

Coibion & Gorodnichenko (2015) show that agents forecast inflation h periods ahead, $F_{it}\pi_{t+h}$, according to

$$F_{it}\pi_t = G y_{it} + (1-G) F_{i,t-1}\pi_t \tag{A.2}$$

$$F_{it}\pi_{t+h} = \rho^h F_{it}\pi_t \tag{A.3}$$

where G is the Kalman gain representing the weight on new information relative to previous forecasts.

Averaging across agents and rearranging implies a relationship between ex post mean forecast errors and ex ante mean forecast revisions given by

$$\pi_{t+h} - F_t\pi_{t+h} = \frac{1-G}{G}\left(F_t\pi_{t+h} - F_{t-1}\pi_{t+h}\right) + \nu_{t+h,t}, \tag{A.4}$$

where $\nu_{t+h,t} = \sum_{j=1}^{h} \rho^{h-j} \nu_{t+j}$. Comparing this equation to regression equation (2) from the main text, we can see that $\beta = (1-G)/G$. That is, the regression coefficient is positive only if $G < 1$ so that there is underreaction.

We now show that if there is underreaction, then the reponse of the forecast is a lower bound for the response of the actual variable. It follows from the AR(1) process (A.1) that the actual response of inflation at $t+h$ to a unit impulse of the shock is ρ^h. From equation (A.2), the response of the current belief about inflation, $F_{it}\pi_t$, to the shock is G, since: $F_{i,t-1}\pi_t$ is predetermined with respect to the shock, ω_{it} is unaffected by the shock , and π_t responds by 1 unit. Therefore, using equation (A.3) the response of $F_{it}\pi_{t+h}$ to the shock is $G\rho^h$. Therefore the response of expectations to the shock, $G\rho^h$, is a lower bound for the response of the actual variable ρ^h, as long as $G < 1$ i.e. there is underreaction.

B Model Appendix

B.1 Additional Derivations

This subsection contains additional derivations for the consumption and wage setting blocks of the model. We will need these derivations in order to present the full set of log-linearized equations characterizing the equilibrium of the model, which we present in the next section.

B.1.1 Consumption Block

It will be convenient to index household i by the cohort j that they belong to. As age is the only source of heterogeneity amongst savers this can be done without loss of generality. A household in cohort j chooses the sequence of consumption and savings to maximize

$$\max_{\{C_{j+s,t+s},A_{j+1+s,t+s}\}} \sum_{s=0}^{+\infty} (\beta\phi)^s \frac{C_{j+s,t+s}^{1-\frac{1}{\sigma}} - 1}{1-\frac{1}{\sigma}} \tag{B.1}$$

subject to

$$C_{j,t} + A_{j+1,t} = \frac{1+R_t^p}{\phi} A_{j,t-1} + Y_t^d + Z_{jt}, \tag{B.2}$$

where $1+R_t^p = \frac{1+I_{t-1}}{\Pi_t}$ denotes the ex-post real return on the nominal asset, $Y_t^d = (1-\tau_y)Y_t - T_t$ denotes disposable income of OLG households, and $Z_{j,t}$ the cohort-specific social fund payments.

Optimality conditions. The first order condition of the household problem gives the standard Euler equation as annuity markets compensate households for the mortality risk

$$C_{j,t}^{-\frac{1}{\sigma}} = \beta\left(1+R_{t+1}^p\right) C_{j+1,t+1}^{-\frac{1}{\sigma}}. \tag{B.3}$$

Combining the Euler equation with the net present value budget constraint lets us characterize the consumption function for a household in cohort j as

$$C_{j,t} = \left[\sum_{s=0}^{+\infty} (\phi\beta^{\sigma})^{s} \mathscr{R}_{t,t+s}^{\sigma-1}\right]^{-1} \left(\frac{1+R_t^p}{\phi} A_{j\,t-1} + \Omega_{j,t}^h + \Omega_{j,t}^z\right), \tag{B.4}$$

where $\mathscr{R}_{t,t+s} = \prod_{k=1}^{s}(1+R_{t+k}^p)$ with the normalization $\mathscr{R}_{t,t} = 1$, and human wealth is defined recursively

$$\Omega_{j,t}^h = Y_t^d + \frac{\phi}{1+R_{t+1}^p} \Omega_{j+1,t+1}^h, \tag{B.5}$$

and the net present value of social fund payments is given by

$$\Omega_{j,t}^z = Z_{j,t} + \frac{\phi}{1+R_{t+1}^p} \Omega_{j+1,t+1}^z. \tag{B.6}$$

The budget constraint (B.2) completes the characterization of the individual cohort problem.

Aggregation. Next we aggregate individual policies across cohorts. As is well known, the constant survival probability gives rise to a geometric distribution across cohorts. Summing over households, let us define aggregates as

$$\begin{aligned}
C_t &= \sum_{j=0}^{+\infty} (1-\phi)\phi^j C_{j,t} \\
A_t &= \frac{1}{\phi} \sum_{j=1}^{+\infty} (1-\phi)\phi^j A_{j,t} \\
\Omega_t^h &= \sum_{j=0}^{+\infty} (1-\phi)\phi^j \Omega_{j,t}^h \\
\Omega_t^z &= \sum_{j=0}^{+\infty} (1-\phi)\phi^j \Omega_{j,t}^z
\end{aligned}$$

First, since assets are defined in terms of end of period and cohorts are born with zero assets, aggregation of assets starts at $j = 1$ and is pre-multiplied by $1/\phi$. Noting that the social fund payments net out on aggregate, the budget constraint aggregates to

$$C_t + A_t = (1+R_t^p) A_{t-1} + Y_t^d. \tag{B.7}$$

On aggregate current generations need to fund the social fund payments for future newborn generations. Specifically, the social fund must raise $(1-\phi)Z^{\text{new}}$ in the next period to fund transfers to the mass of $1-\phi$ newborn households. This must be financed by households that are currently alive. As households need to pay this cost only in the next period it is discounted by $\frac{1}{1+R^p_{t+1}}$. It follows that the dynamics of the net present value of the aggregate social fund payments of households currently alive is given by

$$\Omega^z_t = -\frac{1-\phi}{1+R^p_{t+1}} Z^{\text{new}} + \frac{\phi}{1+R^p_{t+1}} \Omega^z_{t+1}. \tag{B.8}$$

Given these elements and for a given sequence of disposable aggregate income and ex-post real rates $\{Y^d_t, R^p_t\}$, we can fully characterize the aggregate consumption function as

$$C_t = \left[\sum_{s=0}^{+\infty} (\phi\beta^\sigma)^s \mathscr{R}^{\sigma-1}_{t,t+s}\right]^{-1} \left((1+R^p_t)A_{t-1} + \Omega^h_t + \Omega^z_t\right), \tag{B.9}$$

where the net present value of human wealth is given by

$$\Omega^h_t = Y^d_t + \frac{\phi}{1+R^p_{t+1}} \Omega^h_{t+1}, \tag{B.10}$$

and the net present value of social fund payments Ω^z_t is given by (B.8). Finally, the aggregate budget constraint is given by (B.7).

Savings. Finally, we derive an expression for the steady state level of savings of households in the baseline overlapping generations model. From equations (B.10) and (B.8) we have $\Omega^h_{ss} = \frac{1}{1-\frac{\phi}{1+r_{ss}}} Y^d_{ss}$ and $\Omega^z_{ss} = -\frac{1}{1-\frac{\phi}{1+r_{ss}}} \frac{1-\phi}{1+r_{ss}} Z^{\text{new}}$. Plugging into the aggregate consumption function and using the fact that $Y^d_{ss} = C_{ss} - r_{ss}A_{ss}$ and $Z^{\text{new}} = (1+r_{ss})A_{ss}$ yields

$$A_{ss} = \frac{\frac{\phi}{1+r_{ss}}\left((\beta(1+r_{ss}))^\sigma - 1\right)}{(1-\phi)\left[1 - \frac{\phi}{1+r_{ss}}(\beta(1+r_{ss}))^\sigma\right]} C_{ss} + \frac{1}{1+r_{ss}} Z^{\text{new}}. \tag{B.11}$$

The elasticity of steady state savings with respect to the real rate is $\frac{\partial \log A}{\partial \log(1+r)} = \sigma \frac{\phi\beta}{(1-\phi)(1-\phi\beta)} \frac{C_{ss}}{A_{ss}} - 1$, which we use to pin down the new steady state value of government debt $\overline{B}$.

B.1.2 Wage Setting

We follow standard practice and assume that wages are sticky as in Erceg et al. (2000) and Auclert, Rognlie & Straub (2023). The exposition in this Appendix follows Auclert, Rognlie & Straub (2023). There is a continuum of unions k set nominal wages and uniform working hours for their members. Each worker i is part of a union k and there is no sorting of workers into unions. Workers are homogeneous and do not differ in their productivity. A competitive labor packer combines labor from each union into an aggregate input using the standard CES aggregator

$$N_t = \left(\int N_{kt}^{\frac{\varepsilon-1}{\varepsilon}} dk \right)^{\frac{\varepsilon}{\varepsilon-1}}. \tag{B.12}$$

These services are sold to firms at a nominal wage W_t^n.

Union maximizes the utility of their members by setting the nominal wage W_{kt}^n subject to a Rotemberg adjustment cost

$$\max_{\{W_{kt+s}^n\}_{s\geq 0}} \sum_{s\geq 0} \beta^s \left\{ \int \left[u(C_{i,t+s}) - v(N_{k,t+s}) \right] di - \frac{\psi}{2} \left(\frac{W_{k,t+s}^n}{W_{k,t+s-1}^n} - 1 \right)^2 \right\}, \tag{B.13}$$

subject to

$$N_{kt} = \left(\frac{W_{kt}^n}{W_t^n} \right)^{-\varepsilon} N_t \tag{B.14}$$

$$W_t^n = \left(\int (W_{kt}^n)^{1-\varepsilon} dk \right)^{\frac{1}{1-\varepsilon}} \tag{B.15}$$

and

$$C_{i,t} = \begin{cases} (1-\tau_{y,t}) \frac{W_{kt}^n}{P_t} N_{kt} - T_t^H & \text{if } i = H, \\ \frac{1}{\phi} \frac{1+I_{t-1}}{\Pi_t} A_{i,t-1} + \left[(1-\tau_y) \frac{W_{kt}^n}{P_t} N_{kt} - T_{i,t} + Z_{i,t} \right] - A_{i,t+1} & \text{if } i \subset \mathscr{S}. \end{cases} \tag{B.16}$$

where $\mathscr{S}$ denotes the indices of savers. For generality we include time-varying distortionary labor taxation.

By an application of the Envelope Theorem unions only consider the direct effect of wages on household utility and set a wage that satisfies the first order condition

$$\begin{aligned} \left(\int u'(c_{i,t+s}) di \right) \frac{1-\tau_{y,t+s}}{P_{t+s}} \frac{\partial [W_{kt+s}^n N_{kt+s}]}{\partial W_{kt+s}^n} - v'(N_{kt_s}) \frac{\partial N_{kt+s}}{\partial W_{kt_+s}^n} \\ - \psi \left(\frac{W_{kt+s}^n}{W_{kt+s-1}^n} - 1 \right) \frac{1}{W_{kt+s-1}^n} + \beta\psi \left(\frac{W_{kt+s+1}^n}{W_{kt+s}^n} - 1 \right) \frac{W_{k_{t+s+1}}^n}{(W_{kt+s}^n)^2} = 0 \end{aligned} \tag{B.17}$$

Next, we know from the labor demand that $\frac{\partial [W_{kt+s}^n N_{kt+s}]}{\partial W_{kt+s}^n} = (1-\varepsilon) N_{kt+s}$. Plugging back in, multiplying both sides by W_{kt+s}^n, using the fact that $\frac{W_{t+s}^n N_{t+s}}{P_{t+s}} = Y_{t+s}$, and focusing on a symmetric equilibrium we obtain the Wage New Keynesian Phillips Curve

$$\pi_t^w (1+\pi_t^w) = \frac{\varepsilon}{\psi} \left\{ N_t v'(N_t) - \frac{\varepsilon-1}{\varepsilon} (1-\tau_{y,t}) Y_t \left(\int u(c_{i,t}) di \right) \right\} + \beta \pi_{t+1}^w (1-\pi_{t+1}^w). \tag{B.18}$$

Linearizing around the zero inflation steady state $\pi^w = 0$, using the fact that all households have the consumption level in steady state and plugging in the functional forms for u and v

$$\pi_t^w = \kappa_W \left\{ \frac{1}{\varphi} \frac{dN_t}{N_t} + \frac{1}{\sigma} \frac{dC_t}{C} - \left(\frac{dY_t}{Y} - \frac{dN_t}{N} \right) + \frac{d\tau_{y,t}}{1-\tau_y} \right\} + \beta \pi_{t+1}^w, \tag{B.19}$$

where $\kappa_w = \frac{\varepsilon}{\psi} v'(N)N$ and $dX_t = X_t - X_{ss}$ denote deviations from steady state. Since prices are flexible, firms target a constant markup of one and $\pi_t = \pi_t^w$. In the baseline model, we abstract from distortionary taxation, changes in TFP, and assume constant returns to scale in aggregate labor

$$\pi_t^w = \kappa_w \left\{ \frac{1}{\varphi} \frac{dN_t}{N} + \frac{1}{\sigma} \frac{dC_t}{C} \right\} + \beta \pi_t^w. \tag{B.20}$$

Calibration. Let $y_t = dY_t / Y_{ss}$ and $g_t = dG_t / Y_{ss}$. From the aggregate resource constraint $c_t = y_t - g_t$. From the production function $y_t = n_t$. Then, we can rearrange equation (B.19) as

$$\pi_t = \kappa_w \left(\frac{1}{\varphi} + \frac{1}{\sigma} \frac{1}{C_{ss}/Y_{ss}} \right) \left(y_t - \frac{\varphi}{\varphi + \sigma \frac{C_{ss}}{Y_{ss}}} g_t \right) + \beta \pi_{t+1}. \tag{B.21}$$

We calibrate $\kappa = \kappa_w \left(\frac{1}{\varphi} + \frac{1}{\sigma} \frac{1}{C_{ss}/Y_{ss}} \right)$ to match the empirical estimate from Hazell et al. (2022) of $\kappa = 0.055$ and determine $\kappa_w = \frac{\varepsilon}{\psi} v'(N)N$ residually given our parametrization of φ, σ, and the steady state values for the consumption to output share. The disutility of labor is set to be consistent with a zero inflation steady state.

B.2 Model Summary

This subsection reports the linearized equations that characterize the equilibrium of the model. We linearize the model around the initial steady state. Quantity variables are expressed as deviations from the initial steady state normalized by steady state output and denoted by lower case letters, e.g. $x_t = \frac{X_t - X_{ss}}{Y_{ss}}$.

OLG household block. Given a sequence of disposable after-tax income $y_t^d = (1-\tau_y) y_t - t_t$ and ex-post real interest rates r_t^p aggregate consumption and asset dynamics are characterized by:

(i) *Aggregate consumption function.*

$$c_t = (1-\phi\beta) \left((1+r_{ss}) a_{t-1} + \frac{A_{ss}}{Y_{ss}} r_t^p + \omega_t^h + \omega_t^z \right) - (\sigma - 1) \phi\beta \left(\frac{C_{ss}}{Y_{ss}} \right) \sum_{s=0}^{+\infty} (\phi\beta)^s \frac{r_{t+s+1}^p}{1+r_{ss}}, \tag{B.22}$$

where the net present value of the aggregate human capital of households is given by

$$\omega_t^h = y_t^d - \frac{\beta\phi}{1-\beta\phi}\left(\frac{Y_{ss}^d}{Y_{ss}}\right)\frac{r_{t+1}^p}{1+r_{ss}} + \beta\phi\omega_{t+1}^h, \tag{B.23}$$

and the net present value of social fund payments is given by

$$\omega_t^z = \frac{1}{1-\phi\beta}\left(\frac{(1-\phi)A_{ss}}{Y_{ss}}\right)\frac{r_{t+1}^p}{1+r_{ss}} + \beta\phi\omega_{t+1}^z. \tag{B.24}$$

The aggregate consumption function is standard with the modification of the social fund. Households have a marginal propensity to consume $1-\phi\beta$ out of the total of their financial wealth: $(1+r_{ss})a_{t-1}+\frac{A_{ss}}{Y_{ss}}r_t^p$, their human wealth ω_t^h and the net present value of social fund payments ω_t^z. Larger interest rates increase the net present value of social fund payments as future contributions to the fund are discounted more strongly. The last term in (B.22) reflects the standard income and substitution effects of changes in the interest rate.

(ii) *Aggregate budget constraint.* As social fund payments net out on aggregate, the aggregate budget constraint is given by

$$c_t + a_t = (1+r_{ss})a_{t-1} + \left(\frac{A_{ss}}{Y_{ss}}\right)r_t^p + y_t^d. \tag{B.25}$$

Further details of the consumption and saving policies of cohorts are shown in Appendix B.1.1.

New Keynesian Phillips Curve. As shown in Appendix B.1.2 the New Keynesian Phillips Curve is

$$\pi_t = \kappa\left(y_t - \frac{\varphi}{\varphi+\sigma\frac{C_{ss}}{Y_{ss}}}g_t\right) + \beta\pi_{t+1}. \tag{B.26}$$

Fiscal Policy. The linearized dynamics of government debt are

$$b_t = (1+r_{ss})b_{t-1} + \frac{B_{ss}}{Y_{ss}}r_t^p - s_t. \tag{B.27}$$

As described in the main text, surpluses are set according to:

(i) *Stimulus phase.* No additional taxes are levied and the government provides stimulus $\{\tilde{t}_t, \tilde{t}_t^H, \tilde{g}_t\}$, with $\tilde{t}_t, \tilde{t}_t^H < 0$ and $\tilde{g}_t >$. The primary surplus therefore is

$$s_t = \mu\tilde{t}_t^H + (1-\mu)\tilde{t}_t - \tilde{g}_t. \tag{B.28}$$

(ii) *Repayment phase.* The government levies additional taxes $\hat{t}_t$ on OLG households to stabilize debt dynamics. Specifically, $\hat{t}_t$ is set such that

$$s_t = r_{ss} b_{t-1} + \frac{B_{ss}}{Y_{ss}} r_t^p + \tau_B \left(b_{t-1} - \Delta b\right) - \left[\mu \tilde{t}_t^H + (1-\mu)\tilde{t}_t - \tilde{g}_t\right], \tag{B.29}$$

where $\Delta b := \frac{\overline{B} - B_{ss}}{Y_{ss}}$ denotes the change in the target debt-to-output ratio.

Fisher equation. The ex-post real rate is given by the Fisher equation

$$\frac{r_t^p}{1 + r_{ss}} = \frac{i_t}{1 + I_{ss}} - \frac{\pi_t}{\Pi_{ss}}. \tag{B.30}$$

Market clearing. The supply of nominal government bonds is absorbed by the OLG households. That is,

$$b_t = (1-\mu) a_t. \tag{B.31}$$

By Walras' Law, the good's market clearing condition $\mu(1-\tau_y) y_t + (1-\mu) c_t + g_t = y_t$ is redundant.

B.3 Mapping CBO Projections to Fiscal Rule

We elaborate on how we use the CBO projections on the time path of debt to calibrate τ_B in the fiscal rule (5). We present the derivations for the case in which real rates are known ex-ante since in our analysis we consider a time zero MIT shock and $H > 0$. For $t > H$, the fiscal rule is

$$S_t = r_t B_{t-1} + \tau_B (B_{t-1} - \overline{B}) - \varepsilon_t. \tag{B.32}$$

Combining the fiscal rule with the government budget constraint (5) gives

$$\begin{aligned} B_t &= (1 + r_t) B_{t-1} - \left[\tau_B (B_{t-1} - \overline{B}) + r_t B_{t-1} - \varepsilon_t\right] \\ &= \tau_B \overline{B} + (1 - \tau_B) B_{t-1} + \varepsilon_t. \end{aligned} \tag{B.33}$$

Subtracting the initial steady state value from both sides and dividing by the initial steady state level of output Y_{ss} implies

$$\frac{B_t - B_{ss}}{Y_{ss}} = \tau_B \frac{\overline{B} - B_{ss}}{Y_{ss}} + (1 - \tau_B) \frac{B_{t-1} - B_{ss}}{Y_{ss}} - \frac{\varepsilon_t}{Y_{ss}}. \tag{B.34}$$

CBO (2021*b*) (Table 1) implies a time series for the increase in the debt per GDP ratio $\left\{\frac{B_t - B_{ss}}{Y_{ss}}\right\}$ under the assumption of constant output, due to the American Rescue Plan, between 2021 and

2031. CBO (2021*a*) provides an estimate of ε_t, the change in primary deficits due the American Rescue Plan. We estimate the persistence of debt $1-\tau_B$ via a time series regression of $\frac{B_t - B_{ss}}{Y_{ss}}$ on its first lag using projections from 2024 onward, consistent with our selection of H.

The CBO forecast holds fixed output and therefore ignores effects from an expansion from the tax base. We restrict estimation to 2024 onwards, at which point according to our model changes in output due to the American Rescue Plan are relatively small.

B.4 Robustness and Extensions

B.4.1 Effects of Infrastructure Spending

In this Section, we extend the baseline model to introduce infrastructure spending. As discussed in Section 3, Democrat victory increased expectations of infrastructure spending by an upper bound of \$1 trillion. However this bound is loose, because markets expected Republicans to also enact some infrastructure spending if they were to win. To tighten the bound, we size the portion of infrastructure spending that would have taken place even under a Republican victory using the realized bipartisan share of infrastructure spending during 2021-2022 of 38%.[32] Combined with the 50% chance of a Democrat victory we take the shock to the expectation of infrastructure spending as $0.5 \times (1-0.38) \times \$1\text{trillion} = \$310$ billion. We take the time path of infrastructure spending from from detailed projections of Moody's Analytics, which is part of our narrative evidence. A distinctive feature is that infrastructure spending was expected to be delayed with most of the spending not expected until after 4 years. The total fiscal stimulus shock is shown in Figure B.1.

As is standard (e.g. Leeper et al. 2010, Ramey 2021), we model infrastructure spending as productive government investment that increases public capital which, due to its non-rivalrous nature, increases total factor productivity (TFP) of firms. We also include time to build delays which have been found to be both empirically relevant and important for model dynamics (Ramey 2021).

Denote government investment by G_t^I, public capital K_t^G, and let public capital be accumulated via

$$K_{t+1}^G = \Phi(L) G_t^I + (1-\delta) K_t^G,$$

where the operator $\Phi(L) = \sum_{k=0}^{+\infty} \omega_k L^k$ captures "time to build" and L denotes the standard

[32]The two major realized infrastructure bills were a bipartisan bill of \$550 billion dollars in November 2021 and the Inflation Reduction Act of \$900 billion dollars, which was opposed by Republicans. Therefore the bipartisan share of spending is 38%. To be conservative, we not include the \$280 billion CHIPS Act, which was also bipartisan, but arguably a national security bill rather than an infrastructure bill.

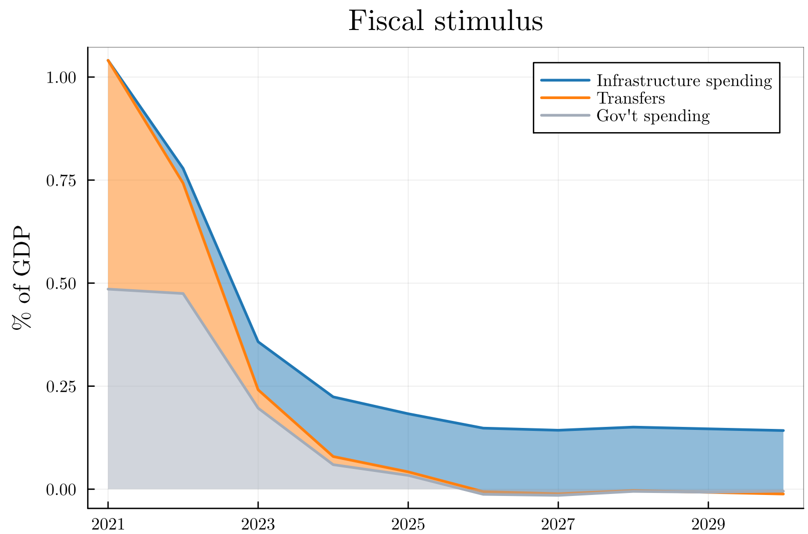


Figure B.1: Total fiscal stimulus including infrastructure spending.

Notes: Total combined fiscal news from American Rescue Plan Act (ARPA) and the infrastructure spending. Section 3 details how we size the shocks. Section 6 details how we pin down the time path for the fiscal news from ARPA while we take the time path for the infrastructure spending from detailed projections by Moody's Analytics.

lag operator. In our calibration, we set $\omega_0 = \omega_1 = 1/2$ with $\omega_k = 0$ for $k > 1$ such that $\Phi(L) = (1/2)(I + L)$ to target a time to build of 1.5 years (Ramey 2021). Total factor productivity (TFP), denoted by Θ_t, has two components: (i) a constant scaling factor $\overline{\Theta}$ and (ii) a term capturing the contributions of public capital K_t^G. That is, $\Theta_t = \overline{\Theta}(K_t^G)^\gamma$, where γ denotes the elasticity of output with respect to public capital and is found to be small but positive (Ramey 2021). Then, to first order, government investment and TFP are related via

$$\hat{\Theta}_t = \frac{\gamma}{K_{ss}^G / Y_{ss}} \sum_{s=0}^{+\infty} (1-\delta)^s \Phi(L) g_{t-1-s}^I,$$

where $\hat{\Theta}_t = \frac{\Theta_t - \Theta_{ss}}{\Theta_{ss}}$ and $g_t^I = \frac{G_t^I - G_{ss}^I}{Y_{ss}}$. Since in reasonable calibrations γ is small and K_{ss}^G / Y_{ss} around 3.5 the total effect of infrastructure spending on TFP is dampened but persistent. Final output is linear in labor but now includes a TFP term—$Y_t = \Theta_t N_t = \overline{\Theta}(K_t^G)^\gamma N_t$.

The Phillips curve for final goods prices changes in two ways: (i) as firms target a constant markup the relationship between final goods inflation, π_t, and wage inflation, π_t^w, is $\pi_t = \pi_t^w - (\hat{\Theta}_t - \hat{\Theta}_{t-1})$ and (ii) the wage New Keynesian Phillips curve includes additional terms capturing the fact that employment and output no longer perfectly comove. Specifically, the extended

Table B.1: Calibration of additional parameters with infrastructure

Parameter	Description	Value	Target
γ	Elasticity of output to public capital	0.05	Ramey (2021)
δ	Depreciation of public capital	0.04	Ramey (2021)
G^I_{ss}/Y_{ss}	Ratio of gov't investment of GDP	0.035	Ramey (2021)

wage Phillips curve is

$$\pi_t^w = \kappa \left\{ y_t - \frac{\varphi}{\varphi + \sigma \frac{C_{ss}}{Y_{ss}}}(g_t + g_t^I) - \frac{(1+\varphi)\sigma \frac{C_{ss}}{Y_{ss}}}{\varphi + \sigma \frac{C_{ss}}{Y_{ss}}} \hat{\Theta}_t \right\} + \beta \pi_{t+1}^w. \tag{B.35}$$

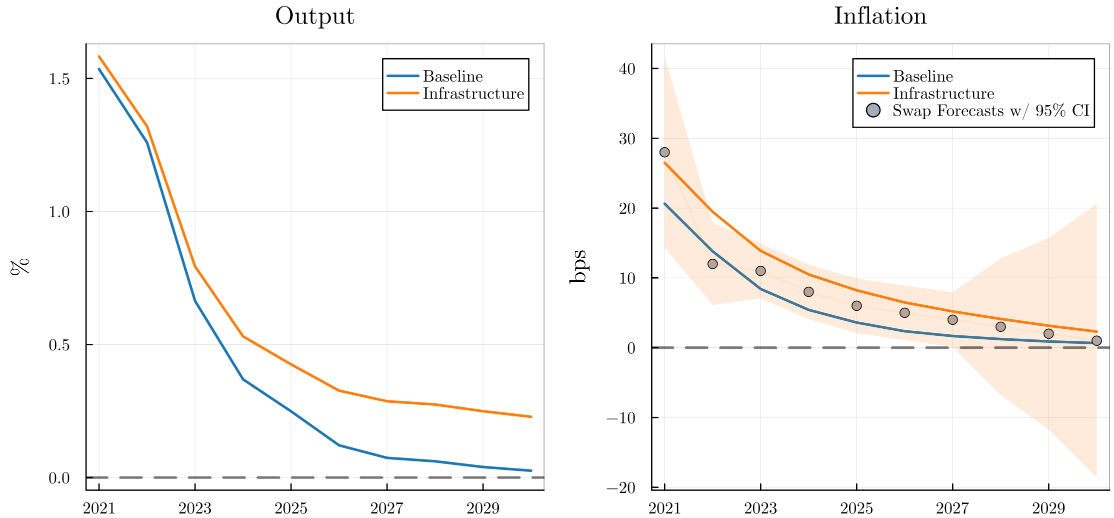
This expression shows that there are three channels through which infrastructure spending affects inflation dynamics: (i) through the output multiplier via changes in y_t (ii) standard wealth effects mediated by g_t^I and (iii) direct deflationary effects from productivity increases $\hat{\Theta}_t$.

The remaining model is unchanged from the baseline version in the main text.

Calibration. As discussed, we size the infrastructure spending shock as \$310 billion and take the time path of infrastructure spending from the narrative reports. We assume that 83% of the infrastructure spending was tax financed and the remaining 17% deficit financed. This share equals the realized financing of the Inflation Reduction Act. We use the realized financing share because our narrative information on the financing of infrastructure, contained in Appendix Table C.8, does not contain precise information on financing. We then calibrate the additional model parameters to standard values from Ramey (2021). We report our calibration in Table B.1.

Discussion. Figure B.2 reports the impulse response of output and inflation to the fiscal shock, including infrastructure. We find that despite the fact that the expected infrastructure was large, the effect on inflation is considerably smaller. The negligible effects of infrastructure spending on output in the short-run and large effects in the long-run are in line with Ramey (2021). Overall, the small effect of infrastructure spending on inflation is for three reasons. First, the infrastructure program was close to balanced budget (i.e. only 17% deficit financed), and the tax rises dampen the output multiplier. Second, the wealth effects induced by greater infrastructure spending dampen the effects on inflation and output. Third, following Ramey (2021), we incorporate a realistic "time to build" lag, meaning little of the infrastructure is spent in the

Figure B.2: Impulse response to Georgia shock including infrastructure



Notes: responses to output y_t and inflation π_t in the baseline two-agent OLG model. The blue line shows the impulse response in the baseline model from the main text. The orange line adds the news about expected infrastructure spending.

first three years. This lag further lowers the output multiplier.

B.4.2 Alternative Financing of Stimulus

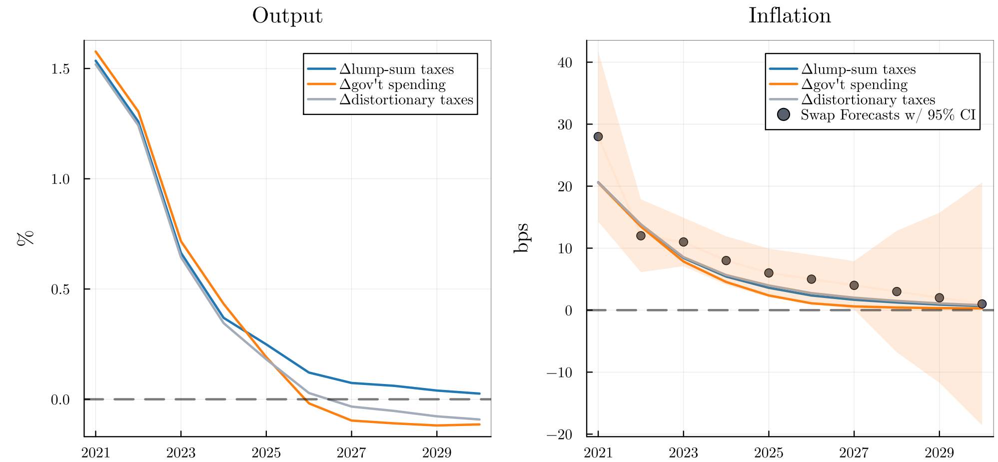
In the baseline model we assume that the fiscal authority raises lump sum taxes on OLG households to stabilize debt dynamics during the refinancing phase. In this Section, we consider alternative financing mechanisms. Figure B.3 shows that inflation and output dynamics are largely unaffected if instead the required primary surplus is raised by either (i) distortionary taxes on labor or (ii) lowering government consumption. To isolate the role of the source of financing the new debt target $\overline{B}$ is kept the same across specifications.

B.4.3 Alternative Consumption Models

We now consider alternative models of consumption, instead of baseline model of the main text. We consider the following models: (i) two agent overlapping generations (OLG), the baseline model of the main text; (ii) two agent bond-in-utility; (iii) three agent OLG and (iv) the canonical one asset incomplete markets model. For each model we also consider a modification of sticky information as in Auclert et al. (2020). We sketch these alternative model variants and the calibration below.

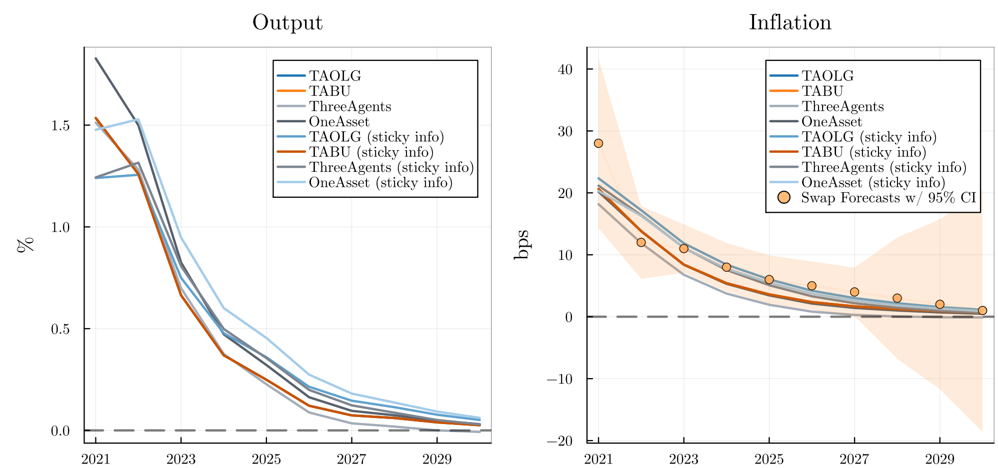
We report the impulse responses of these models in Appendix Figure B.4. Sticky information responses are generally larger and feature more persistent output responses. On the one hand, sticky information lowers the general equilibrium effect through future income increases. On

Figure B.3: Impulse responses to Georgia shock under different financing assumptions.



Notes: impulse responses to output y_t and inflation π_t to the Goergia deficit news under three assumptions of paying back the debt: (i) adjusting lump-sum taxes on savers (blue) (ii) adjusting government consumption (orange) and raising primary surpluses through distortionary taxes (gray).

Figure B.4: Impulse responses to Georgia shock under different consumption models.



Notes: impulse responses of output y_t and inflation π_t to Georgia shock for a variety of consumption models. All models are calibrated to the same iMPCs (Fagereng et al. 2021).

the other hand, households are less attentive to future tax increases and rising real interest rates. In our calibration the latter effect dominates.

Two agent Bond in Utility. As in the baseline model there is a mass μ of hand to mouth households and a mass $1-\mu$ of savers. Savers receive a direct utility benefit $\chi(A) = \zeta \frac{A^{1-1/\eta}-1}{1-1/\eta}$ from holding government bonds, which acts as a reduced form way to capture liquidity benefits or convenience yields (Auclert, Rognlie & Straub 2023, Mian et al. 2024). Household i in period t has expected utility

$$\mathbb{E}_t \sum_{s=0}^{+\infty} \left[u(C_{i,t+s}) - v(N_{i,t+s}) + \chi(A_{i,t+1+s}) \right]$$

subject to

$$C_{it} + A_{it} = \frac{1 + I_{t-1}}{\Pi_t} A_{it-1} + (1 - \tau_y) W_{it} N_{it} - T_t.$$

We calibrate the curvature of the utility over wealth η to match the same intertemporal MPC target from Fagereng et al. (2021) as in the baseline model. The scaling parameter ζ is calibrated to match our steady state target for government debt. Due to the presence of additional utility benefits of savings we choose a lower discount factor $\beta = 0.96$ such that $\beta(1 + r) < 1$.[33] The remaining modeling blocks and calibration is the same as in the baseline model. The remaining model blocks are as in the baseline model.

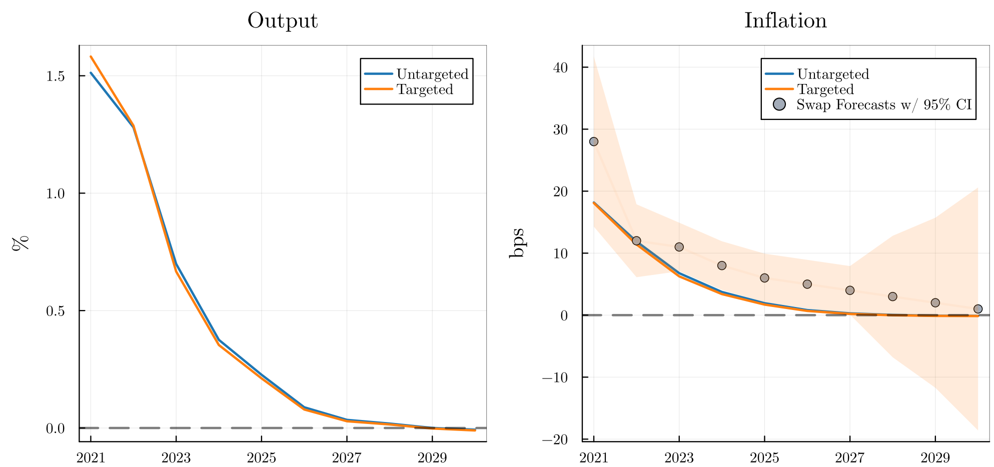
Three Agent OLG model. There is a mass μ_1 of OLG households facing death risk ϕ_1 and a mass μ_2 of OLG households facing death risk ϕ_2. The mass of hand to mouth households is residually $1 - \mu_1 - \mu_2$. Annuity markets and social funds are perfectly segmented between OLG types. This allows aggregation of each OLG block separately. We calibrate OLG parameters and the distribution over fixed types to match the intertemporal MPCs from Fagereng et al. (2021). We calibrate the wealth share of the near permanent income households to be 60% as in Angeletos et al. (2024). We also set the intertemporal elasticity of substitution to $\sigma = 0.5$.

One-asset HA model. There is a continuum of households $i \in [0, 1]$. Each household decides how much to consume and to invest in nominal public government bonds. Households are subject to idiosyncratic income risk stemming from stochastic labor productivity. Markets are incomplete and households face a borrowing constraint $A' \geq 0$. households receive labor income $W_{it} N_{it}$ subject to a marginal tax rate τ_y and pay lump-sum taxes proportional to their income state T_t. Stimulus checks will be captured by the unconditional transfer $\mathcal{T}_t$. Household i in period t maximizes their expected utility

$$\max_{\{C_{it+s}, A_{it+s}\}_{s \geq 0}} \mathbb{E}_t \sum_{s=0}^{+\infty} \left[u(C_{i,t+s}) - v(N_{i,t+s}) \right]$$

[33] Additional saving incentives imply that under $\beta(1 + r) = 1$ households savings would grow unboundedly.

Figure B.5: Impulse responses to targeted stimulus.



Notes: impulse responses of output y_t and inflation π_t to Georgia shock under different distributions of transfer payments: (i) equal distribution as in the baseline version (blue) and (ii) targeted spending towards financially vulnerable households as well as targeted spending towards low MPC business owners (orange).

subject to

$$C_{it} + A_{it} = \frac{1 + I_{t-1}}{\Pi_t} A_{it-1} + e_{it}\left((1-\tau_y)W_{it}N_{it} - T_t\right) + \mathscr{T}_t$$
$$A_{it+1} \geq 0.$$

The idiosyncratic income process is taken from Kaplan et al. (2018). The discount factor β is chosen to clear the asset markets while the total supply of government bonds is calibrated to match the intertemporal MPCs from the baseline model. We set steady state unconditional transfers $\mathscr{T}_{ss}$ to zero and determine steady state lump-sum taxes residually, $T_{ss} = rA_{ss} + G_{ss} - \tau_y Y_{ss}$.

B.4.4 Targeted Stimulus

In the baseline model of the main text, we assume that transfers are distributed equally to all types of agents. In this Section, we consider an extension of the 3-type OLG model in which fiscal stimulus is targeted as follows. Using the classification of Edelberg & Sheiner (2021), we allocate (i) *direct aid to families* (e.g. stimulus checks) to all households equally (ii) *direct aid to financially vulnerable households* (e.g. UI) to hand-to-mouth households only and (iii) *aid to businesses* to the low MPC OLG households only. Figure B.5 shows that the effects of the stimulus are largely unchanged.

B.4.5 Calibrating to Alternative Intertemporal MPCs

In this Section, we consider a version of the baseline OLG model with lower contemporaneous MPCs, which decay rapidly with the horizon. These estimates of the MPC are in line with several empirical studies (e.g. Orchard et al. 2023; Boehm et al. 2023). We find that calibrated to these MPCs, the model can no longer match the inflation multiplier from the data. However for the model to be consistent with the empirical evidence on interest rates, the intertemporal elasticity of substitution (IES) must be very small.

Why does the model with transitory MPCs need a low IES? In order to fit transitory MPCs, the calibration of the model requires a spender and a permanent income household. This model has an infinite elasticity of savings with respect to the real rate. This is at odds with a change in the long-run nominal rate after the fiscal stimulus, as we documented in Section 5.

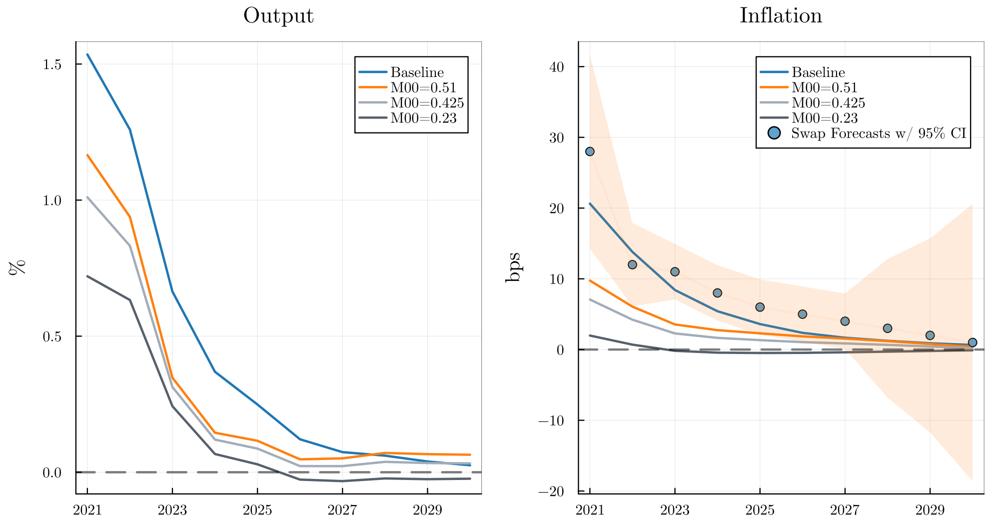
For our calibration to transitory MPCs, we consider the case in which OLG households are essentially permanent income consumers (i.e. $\phi = 0.99$). The share of hand to mouth consumers is then chosen to target the contemporaneous MPC. We use the expression for the elasticity of household savings, equation (B.11), to calibrate the IES to match the new steady state level of debt in the baseline model. The calibrated value for the IES is $\sigma = 0.0012$—much smaller than typical macro estimates.

Figure B.6 plots the effect on output and inflation of the fiscal stimulus, in the models that are calibrated to transitory MPCs. The specifications in the figure all share fast decaying iMPCs in line with the estimates of Boehm et al. (2023). Each targets a different intertemporal MPC, of between $M00 = 0.51$ and $M00 = 0.23$. These specifications can no longer fit the response of inflation, as we see in the right panel; because the output response is now smaller (left panel).

B.4.6 Alternative Monetary Policy at End of Horizon

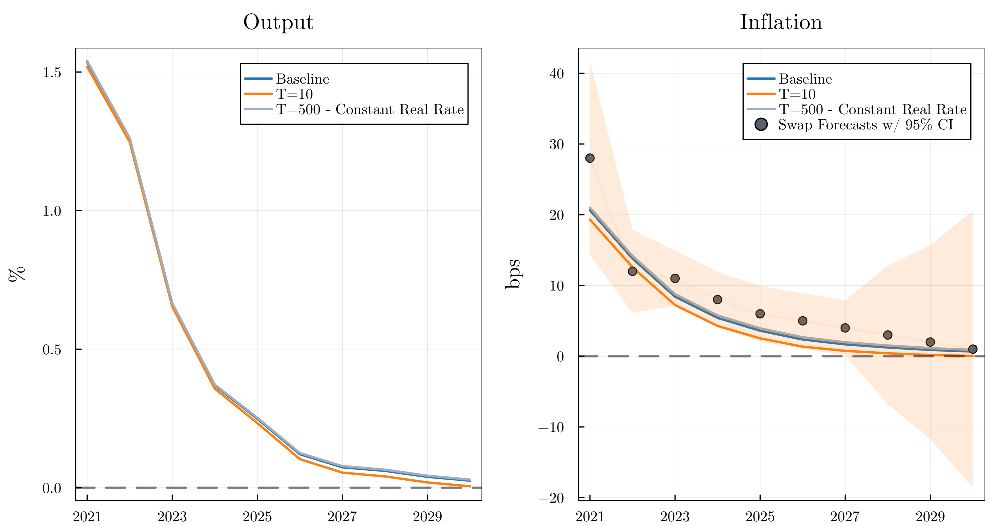
In the baseline model we assume that after $T = 10$ the monetary authority switches to a determinate Taylor rule. In this Section, we consider two alternatives; one in which the central bank switches to a constant real rate policy after $T = 10$ and a joint monetary and fiscal policy that implements steady state output and inflation. Figure B.7 shows that the effects of the stimulus on inflation and output are similar—though the inflation response is minimally smaller in the model with the alternative terminal condition. Output is not fully back to steady state after 10 years and since the Phillips curve is a net present value formulation, these future output gaps beyond the 10 year horizon contribute to higher inflation at shorter horizons.

Figure B.6: Impulse responses to Georgia shock under different iMPC assumptions.



Notes: impulse responses of output y_t and inflation π_t to Georgia shock under different calibrations of intertemporal marginal propensities to consume. When changing iMPCs the intertemporal elasticity of substitution is re-calibrated – making sense of the empirical observation that long-run interest rates rose after the Georgia shock. M00 is the impact MPC, and each line other than the baseline model refers to a model calibrated to a different impact MPC.

Figure B.7: Impulse Responses with Different Assumptions About Terminal Condition



Notes: impulse responses of output y_t and inflation π_t to the Georgia shock under two different assumptions about the terminal condition: (i) assume monetary authority switches to an active monetary policy after ten years and setting $T = 500$ (orange) (ii) impose steady state after ten years ($T = 10$, orange) and (iii) assume monetary policy switches to a constant real rate policy after ten years (gray).

B.4.7 Fiscal Theory of the Price Level

In this Section, we explore whether a simple FTPL model calibrated to the 2021 stimulus can match our estimate for the inflation multiplier. We consider two economies and follow Bianchi et al. (2023). The first features flexible prices, long-term debt with an average maturity of 6 years, and a monetary authority that follows a Taylor rule with coefficient $\phi = 0.8$. This admits an analytical characterization of the inflation response. The second features nominal rigidities, a representative household, and assumes a fully passive monetary policy, i.e. $\phi = 0$.

The model exposition is standard. Outstanding nominal government debt is linked to real primary surpluses S_t via

$$\sum_{j=1}^{+\infty} Q_t^{(t+j)} B_t^{(t+j)} = \sum_{j=0}^{+\infty} Q_t^{(t+j)} B_{t-1}^{(t+j)} - P_t S_t, \tag{B.36}$$

where $Q_t^{(t+j)}$ denotes the price of a nominal bond with outstanding maturity j and $B_t^{(t+j)}$ nominal bond holdings. The real market value of debt relative to trend output $\overline{Y}_t = (1+g)^t Y_0$ is denoted as

$$V_t = \left(\sum_{j=1}^{+\infty} Q_t^{(t+j)} B_t^{(t+j)} \right) / (P_t \overline{Y}_t).$$

Assuming a geometric maturity structure ω and denoting primary surpluses relative to trend output by $\tilde{S}_t$ simplifies the expression to

$$V_t = \frac{1+\omega Q_t}{Q_{t-1}} \frac{1}{1+\pi_t} \frac{1}{1+g} V_{t-1} - \tilde{S}_t. \tag{B.37}$$

In a flexible price economy, equation (B.37) together with a passive monetary policy rule, $i_t = \phi \pi_t$ and $|\phi| < 1$, is enough to characterize the inflation response. In the nominal rigidity economy we supplement the equation with the standard Euler equation for a representative household and the standard New-Keynesian Phillips curve.

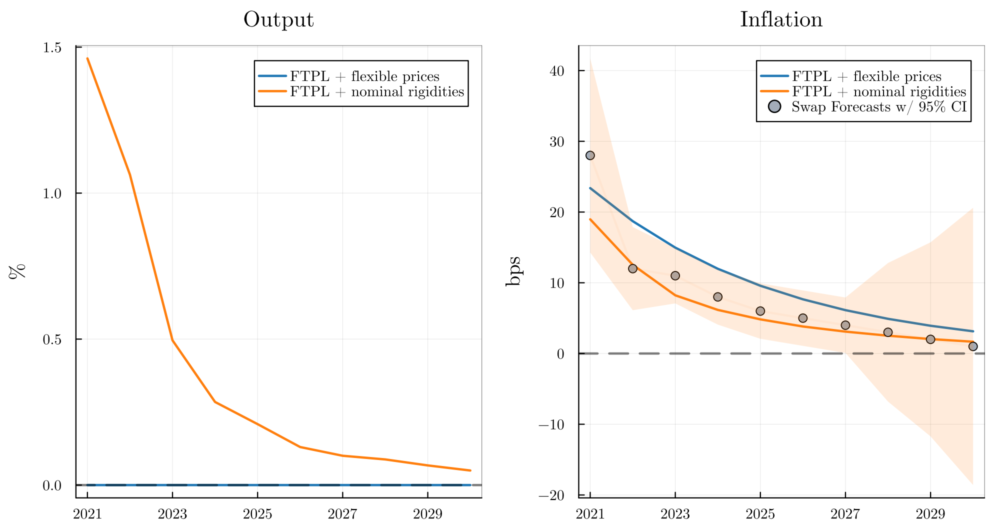
Quantification. We size the fraction of unfunded stimulus as 50%–taken from Bianchi et al. (2023)—which amounts to a total unfunded stimulus surprise of 1.05% of GDP due to the Georgia shock. We calibrate to an average maturity of 6 years and therefore set $\frac{\omega}{1+i_{ss}} = 5/6$. Next, we consider the case in which $r_{ss} \approx g$ and take the gross market value of total outstanding debt to GDP from the Federal Reserve Bank of Dallas (FRBD (2024)) to be $V_{ss} = 1.49$.[34]

The inflation responses are shown in Figure B.8. The key point is that either version of the FTPL model does a good job of fitting the inflation response,.

Flexible price model derivations. The response of inflation in the flexible price model can be characterized analytically. We now present these results. Denote by $1 + r_t^n := (1+\omega Q_t)/Q_{t-1}$

[34] There are several notions of government debt. Arguably, for the FTPL the most natural is the gross market value of debt rather than simply the value of privately held debt.

Figure B.8: Inflation Response In A Simple FTPL Model



the ex-post nominal return on the portfolio of government debt. To first order, $d\log(1+r_t^n) = \frac{\omega}{1+i_{ss}} d\log Q_t - d\log Q_{t-1}$ where we have used the fact that $1+r_{ss}^n = 1+i_{ss} = \omega + 1/Q_{ss}$. Iterating on the equation and using the fact that by no arbitrage $\mathbb{E}_t d\log(1+r_{t+j}^n) = \mathbb{E}_t\left[d\log(1+r_{t+j}) + d\log(1+\pi_{t+j})\right]$ links the revaluation effect to future inflation and real rates (e.g. Cochrane 2023) as

$$\Delta\mathbb{E}_t d\log(1+r_t^n) = -\sum_{j=1}^{+\infty}\left(\frac{\omega}{1+i_{ss}}\right)^j \Delta\mathbb{E}_t\left[d\log(1+r_{t+j}) + d\log(1+\pi_{t+j})\right], \tag{B.38}$$

where the operator $\Delta\mathbb{E}_t = \mathbb{E}_t - \mathbb{E}_{t-1}$ denotes the expectation surprise in period t.

Linearizing and iterating forward the budget constraint (B.37) we obtain

$$\Delta\mathbb{E}_t d\log(1+\pi_t) - \Delta\mathbb{E}_t d\log(1+r_t^n) = \Delta\mathbb{E}_t \sum_{j\geq 1}\left(\frac{1+g}{1+r_{ss}}\right)^j d\log(1+r_{t+j}) - \Delta\mathbb{E}_t \sum_{j\geq 0}\left(\frac{1+g}{1+r_{ss}}\right)^j \left[\frac{1+g}{1+r_{ss}}\frac{1}{V_{ss}}\right] d\tilde{S}_{t+j}. \tag{B.39}$$

In the flexible price economy the real rate does not change. Next, as Bianchi et al. (2023) explain—with constant real rates—the Taylor coefficient pins down the persistence of inflation via the Fisher equation. That is, $\Delta\mathbb{E}_t d\log(1+\pi_{t+j}) = \phi^j \Delta\mathbb{E}_t d\log(1+\pi_t)$. Combining all these elements together with the expression for the ex-post nominal rate, we can characterize the response of inflation in the simple FTPL model:

1. The response of inflation on *impact* is given by

$$\Delta\mathbb{E}_t d\log(1+\pi_t) = -\left(1-\frac{\omega\phi}{1+i_{ss}}\right)\sum_{j=0}^{+\infty}\left(\frac{1+g}{1+r_{ss}}\right)^j \left[\frac{1+g}{1+r_{ss}}\frac{1}{V_{ss}}\right] \Delta\mathbb{E}_t d\tilde{S}_{t+j}. \tag{B.40}$$

2. The *persistence* of the inflation response is given by $\Delta\mathbb{E}_t d\log(1+\pi_{t+j}) = \phi^j \Delta\mathbb{E}_t d\log(1+\pi_t)$ for $j \geq 1$.

Using the calibration discussed above, the initial inflation surprise evaluates to $\Delta\mathbb{E}_t d\log(1+\pi_t) = -\left(1 - 0.8 \times \frac{5}{6}\right) \times \frac{1}{1.49} \times (-1.05)\% = 0.234\%$ which aligns well with our empirical estimate of 0.28%. The geometric persistence at the rate ϕ also qualitatively mimics the persistence of the empirical estimates – though the data features less persistence.

C Additional Empirics

C.1 Tables

Table C.1: Expected Stimulus with Democratic Senate Majority in Week 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**."

Median of Expected Stimulus with Democratic Senate Majority: $700 bn

Notes: The number is taken from the reports of investment banks. The window is restricted to 1st-5th of January 2021. The number on 6th of January 2021 is already considered to be the number after the elections because the information about the results already started to appear. For cases where a range is given, the median of the range is taken.

Table C.2: Expected Stimulus with Republican Senate Majority in Week Before Elections

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."
05.01.2021	Rabobank	0	“we should not expect”	“In contrast, if the Republicans manage to hold on to at least one of these two Georgia seats, they will keep their majority in the Senate (either 51-49 or 52-48). In this case, the Senate Republicans are likely to shoot down the ambitious spending plans of the Democrats. This means that **we should not expect major fiscal policy measures, at least until the 2022 midterms**."
05.01.2021	Barclays	1000	“remains viable... we think”	“If Republicans keep control of the Senate, moderate virus-related relief and possible infrastructure spending may be the only areas of bipartisan agreement in Congress, in our view. **If the GOP retains control of the Senate and the Biden administration faces a divided Congress, we still a Q1 virus-related stimulus package—potentially around $1trn—remains viable** ... [w]e think moderate virus-related relief and possible infrastructure spending may be the only areas of bipartisan agreement in Congress."
05.01.2021	Bloomberg	225	“we expect”	“If Republicans hold the chamber by retaining at least one of the two seats, **we expect only must-have Covid relief in the vicinity of $150 billion to $300 billion by sometime in 2Q, at most**."

Median of Expected Stimulus with Republican Majority: $0 bn

Notes: The number is taken from the reports of investment banks. The window is restricted to 1st-5th of January 2021. For cases where a range is given, the median of the range is taken.

Table C.3: Probability of Democratic Senate Majority in Week Before Elections

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-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."
05.01.2021	Rabobank	0.5	"[A]fter the Georgia bifurcation point we enter one of two regimes that will be very different in political dynamics, fiscal policy outcomes and pressure on the various Fed policies. If we look at recent polls **the probabilities of the two regimes are close to fifty-fifty**, although there appears to be a slight advantage for both Democratic candidates."

Median of Expected Probability of Democratic Senate Majority: 0.5

Notes: the probability is taken from the investment bank reports before the election date. We take the closest probability to election date, for each investment bank, from the window of 1st of January - 5th of January. The window is chosen before 6th of January 2021 because on 6th of January visible information about Democrat win started to appear.

Table C.4: Composition of Stimulus Package

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%**
06.01.2021 (after)	BNP Paribas	$1000bn	stimulus checks: - $350bn - 35% **Total: $350bn** **Total Share: 35%**	state and local fiscal aid: - $300bn - 30% **Total: $300bn** **Total Share: 30%**	other non-COVID related fiscal support: - $350bn - 35% **Total: $350bn** **Total Share: 35%**

Date	Bank	Initial Number	Transfers	Government Spending	Other Spending
07.01.2021 (after)	JP Morgan Wealth Management	$750bn	stimulus checks: - $250bn - 33.3% UI: - $150bn - 20% paycheck protection program (PPP): - $150bn - 20% **Total: $550bn** **Total Share: 73.3%**	state and local fiscal aid: - $150bn - 20% health/COVID related: - $50bn - 6.7% **Total: $200bn** **Total Share: 26.7%**	
08.01.2021 (after)	Barclays	$1425bn	UI: - $125bn - 8.77% economic impact payments: - $300bn - 21.05% hazard pay for essential workers: - $190bn - 13.33% cover 100% COBRA costs: - $100bn - 7.02% expand emergency medical leave: - $10bn - 0.70% **Total: $725bn** **Total Share: 50.87%**	state and local fiscal aid: - $500bn - 35.09% Federal Medicaid funding: - $50bn - 3.51% Testing, tracing, vaccine distribution: - $100bn - 7.02% **Total: $650bn** **Total Share: 45.62%**	other: - $50bn - 3.51% **Total: $50bn** **Total Share: 3.51%**

Median Share of Transfers: 0.69

Notes: The numbers for composition are taken from the reports of investment banks both before and after elections. When a range is given, the median is taken. The share of transfers is calculated as transfers/(transfers + government spending), which assumes that “other spending” has the same composition of transfers vs. government spending as the rest of the stimulus. We classify certain items (e.g. unemployment insurance and stimulus checks) as transfers and other components (e.g. stage and local fiscal aid or vaccine distribution) as government spending, as in the table.

Table C.5: Stimulus Package Financing

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.**"
10.01.2021	Moody's Analytics	Deficit Financed	"Fiscal support from the new Biden administration and Congress is expected to include an additional $750 billion to help the economy through to the end of the pandemic. **This will be entirely deficit-financed**, passed into law in February, and largely take effect in March."
14.01.2021	Goldman Sachs	Deficit Financed	"The new stimulus programs should also translate into higher deficits and larger net issuance."
14.01.2021	Barclays	At least some deficit financing implied	"Taken together, we estimate that the FY21 fiscal deficit increases by about $1trn relative to our prior forecast, to $3.1trn (14.0% of GDP), and the FY22 fiscal deficit increases to $1.9trn (8.0% of GDP) vs. 6.0% of GDP previously."

Notes: discussion about financing of stimulus is taken from the reports of investment banks both before and after elections.

Table C.6: Infrastructure Discussion Before Elections

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."
05.01.2021	Barclays	**Dem win:** possible significant spending on infrastructure; **Rep win:** possible moderate infrastructure spending	"If the Democrats control the Senate, their first priority would likely be a stimulus package, with a sizable portion dedicated to state and local governments, and it might even get expanded to include significant spending for infrastructure and clean energy initiatives ... **If Republicans keep control of the Senate, moderate virus-related relief and possible infrastructure spending may be the only areas of bipartisan agreement in Congress**, in our view."

Notes: The discussion of infrastructure is taken from the reports of investment banks before the Georgia Senate election.

Table C.7: Expected Infrastructure Package 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."
11.01.2021	Goldman Sachs	550	infrastructure and green stimulus	“Our US economists see ... an **ongoing 0.25% of GDP in new annual spending financed by tax increases, which helps fund infrastructure and green initiatives.**"
11.01.2021	Bank of America Corp	3000	infrastructure	“A Blue Wave increases the likelihood of an immediate $1 trillion Covid stimulus and **$2 trillion to $4 trillion infrastructure spending package later in 2021**"

Median of Expected Infrastructure Package: $1000 bn

Notes: The number is taken from the reports of investment banks after elections. For cases where the range is given, the median of the range is taken. In Goldman Sachs report 0.25% of GDP for 10 years would equal approximately $550bn.

Table C.8: Infrastructure Package 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."
11.01.2021	Goldman Sachs	Fully tax financed	“Congress is likely to spend whatever tax revenue it raises on infrastructure and social benefit spending. At the moment, infrastructure appears to be the top priority."
14.01.2021	Barclays	Financed by taxes	“[I]nfrastructure spending advanced under budget reconciliation would likely include revenue increases since it must score deficit neutral outside of the 10-year budget window. This would put the focus on Democrats agreeing on pay-fors, such as an increase in the corporate tax rate and/or changes to the taxation of capital gains.

Notes: discussion about financing of infrastructure is taken from the reports of investment banks both before and after elections.

Table C.9: Types of Tax Change for Infrastructure Financing

Date	**Bank**	**Taxes**
22.10.2020	UBS	Personal tax: - Dem win: increase to 0.396 - Rep win: taxes remain unchanged Capital gains taxes: - Dem win: capital gains taxed at higher rates at higher income levels - Rep win: taxes remain unchanged Corporate tax: - Dem win: increase to 0.28 - Rep win: taxes remain unchanged Alternative min tax on book income: - Dem win: increase to 0.15 - Rep win: taxes remain unchanged
06.01.2021	Cornerstone Research	Personal tax: - Increase to 0.396 Capital gains taxes: - Increase to 0.265 Corporate tax: - Increase to 0.25 Social Security Tax and Payroll Tax: - no change Dividend rates: - Increase to 0.265 Deductions and restorations: - no TCJA extensions - possible partial SALT deduction restoration

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

Notes: This table shows the changes in various tax categories as predicted by different banks and research institutions.

Table C.10: Policy Outcomes After Democratic Victory—Example from Barclays

Date	**Bank**	**Outcome**	**Probability**	**Exact Phrasing**
06.01.2021	Barclays	aggressive progressive policy agenda	unlikely	We believe ... the probability of an 'aggressive 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
08.01.2021	Barclays	overturn some of the Trump administration's de-regulatory efforts	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, and overturn some of the Trump administration's de-regulatory efforts
08.01.2021	Barclays	filibuster elimination	unlikely	Issues such as eliminating the legislative filibuster or expanding the Supreme Court are very unlikely to gain traction
08.01.2021	Barclays	Supreme Court expansion	unlikely	Issues such as eliminating the legislative filibuster or expanding the Supreme Court are very unlikely to gain traction
14.01.2021	Barclays	severe gas and oil regulatory policy changes	unlikely	Regulatory risk. Even with the Georgia Senate results, our view is that near-term policy changes are likely to be less punitive to oil & gas than initially feared

Notes: this table an illustrative example for one of the banks, Barclays. Here, we show how we use the text of Barclays reports to discuss what policy outcomes are associated with the Democratic victory, and what is their likelihood. In the main text, Figure 2 uses information of this kind for all banks, not just Barclays, in order to create the word cloud.

Table C.11: Major Events News Summary from Bloomberg

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.	
5th Jan	German joblessness unexpectedly declined in December	German joblessness unexpectedly declined in December, though companies were heavily dependent on government subsidies to keep workers employed through the latest lockdowns. A decrease of 37,000 left the total number of unemployed people at 2.776 million and the rate unchanged at 6.1%, according to the Federal Labor Agency.	
5th Jan	The cost of moving freight from France to the U.K. surged to more than four times the usual level last week	The cost of moving freight from France to the U.K. surged to more than four times the usual level last week after Brexit and a virulent new strain of the coronavirus complicated supply chains. The spot rate for last-minute shipments across the English Channel reached more than 6 euros per kilometer ($4.56 a mile) for a full truckload in the final week of 2020.	

5th Jan	Chancellor of the Exchequer Rishi Sunak rolled out 4.6 billion pounds ($6.2 billion) of new support to help U.K. businesses forced to close during the pandemic	Chancellor of the Exchequer Rishi Sunak rolled out 4.6 billion pounds ($6.2 billion) of new support to help U.K. businesses forced to close during the pandemic, as the country enters its third lockdown. Retail, hospitality, and leisure businesses will be entitled to one-off top-up grants of as much as 9,000 pounds to tide them over until the spring, the Treasury said in a statement.	
6th Jan	Benchmark Treasury yields touched 1% for the first time since March and technology stock futures tumbled as investors speculated over the outcomes of the U.S. Senate races in Georgia.	Benchmark Treasury yields touched 1% for the first time since March and technology stock futures tumbled as investors speculated over the outcomes of the U.S. Senate races in Georgia. Markets started pricing in the possibility of a Democrat-controlled Congress after Raphael Warnock ousted Republican Kelly Loeffler.	✓
6th Jan	The New York Stock Exchange is considering reversing course a second time to delist three major Chinese telecommunications firms.	The New York Stock Exchange is considering reversing course a second time to delist three major Chinese telecommunications firms after conferring further with senior authorities on how to interpret an executive order Trump issued Nov. 12, according to people familiar with the matter. Lawyers said the drama, whipsawing markets in recent days, is exposing the ambiguities of the government's instructions.	✓
6th Jan	President Donald Trump signed an order banning U.S. transactions with eight Chinese apps.	President Donald Trump signed an order banning U.S. transactions with eight Chinese apps including Ant Group's Alipay and Tencent Holdings' digital wallets, riling Beijing days before he's slated to leave office. The order is the outgoing administration's latest bid to use national security powers against China's largest companies, but it will be up to President-elect Joe Biden to decide whether to enforce the policy.	✓
6th Jan	Hong Kong arrested dozens of opposition figures under a controversial national security law.	Hong Kong arrested dozens of opposition figures under a controversial national security law, an unprecedented crackdown that included an American lawyer, as authorities work to quash any dissent that remains in the former British colony. Police said they swept up 53 people in the operation and that around 1,000 officers had been dispatched to carry out the detentions.	
6th Jan	The euro-area economy showed signs of improvement at the end of last year that now risk being derailed by longer pandemic lockdowns	The euro-area economy showed signs of improvement at the end of last year that now risk being derailed by longer pandemic lockdowns and discontent over the pace of vaccinations against the coronavirus.	
6th Jan	Chancellor Angela Merkel called an emergency meeting to speed up Germany's Covid-19 vaccine program	Chancellor Angela Merkel called an emergency meeting to speed up Germany's Covid-19 vaccine program in an effort to quell tensions within her government over claims the rollout has been too slow.	
6th Jan	Indonesia sold a record amount of local-currency government bonds and issued overseas debt	Indonesia sold a record amount of local-currency government bonds and issued overseas debt as it rushes to fund a fight against the worst Covid-19 pandemic in Southeast Asia. In the first auction of the year, the finance ministry took advantage of the lowest credit costs in a decade to sell 37.55 trillion rupiah ($2.7 billion) of debt excluding bills, its biggest offering since at least 2002.	

7th Jan	Global markets are showing resilience after a day of violence rocked the U.S. Capitol.	Global markets are showing resilience after a day of violence rocked the U.S. Capitol, with investors firmly focused on the prospect for more economic stimulus and the likelihood that calm will prevail as Joe Biden takes the presidency. S&P 500 futures were up 0.5% and stock benchmarks across Asia and Europe were in the green. Treasury yields stayed above 1% and the yen weakened.	✓
7th Jan	Joe Biden was formally recognized by Congress as the next U.S. president.	Joe Biden was formally recognized by Congress as the next U.S. president, ending two months of failed challenges by his predecessor, Donald Trump, that exploded into violence at the U.S. Capitol as lawmakers met to ratify the election result. The Democratic president-elect's victory was sealed after House and Senate members fended off a final round of objections to the Nov. 3 election outcome raised by a handful of Republicans on Trump's behalf.	✓
7th Jan	President Donald Trump... [p]ledged "an orderly transition."	President Donald Trump, minutes after Congress certified President-elect Joe Biden's Electoral College Victory and hours after Trump supporters broke into the Capitol, pledged "an orderly transition." "Even though I totally disagree with the outcome of the election, and the facts bear me out, nevertheless there will be an orderly transition on January 20th," Trump said in a statement posted on Twitter by his aide Dan Scavino.	✓
7th Jan	Euro-area headline inflation remained unchanged at -0.3% in December	Euro-area headline inflation remained unchanged at -0.3% in December, with the core inflation rate steady at a record low 0.2%. Downward pressure from energy prices eased slightly on the month, but the impact on headline prices was offset by a decline in food prices.	
7th Jan	Japanese PM Yoshihide Suga declared a state of emergency for Tokyo and adjacent areas	Japanese PM Yoshihide Suga declared a state of emergency for Tokyo and adjacent areas, trying to stem Covid-19 infections that hit a daily record in the capital. The declaration covers the capital and the surrounding prefectures of Kanagawa, Saitama, and Chiba, Suga said.	
7th Jan	Senior officials from Japan's finance ministry, central bank, and financial regulator met today	Senior officials from Japan's finance ministry, central bank, and financial regulator met today in a show of vigilance over a strong yen and as the government announced a state of emergency in Tokyo over the coronavirus.	
7th Jan	Japanese wages fell in November for an eighth straight month	Japanese wages fell in November for an eighth straight month, dropping at more than double the pace expected by economists, as employers continued to be cautious about the profit outlook amid a global resurgence of the coronavirus. Labor cash earnings slid 2.2% from a year earlier, as year-end bonus payments plunged, labor ministry data showed. Economists had predicted an overall 0.9% decline.	
7th Jan	Europe's top auto markets posted their biggest annual sales declines in decades.	Europe's top auto markets posted their biggest annual sales declines in decades, with ongoing coronavirus restrictions expected to crimp a recovery early this year.	

Notes: This table provides news which are listed in daily reports from Bloomberg as a list of important events for the day.

Table C.12: Conditional Forecast Table

Source	**Date**	**Real GDP Increase**	**Real GDP Phrasing**
Goldman Sachs	06.01.2021	0.8% increase over 2 years	"We have revised our forecasts to reflect the results of the Georgia elections. With control of the Senate by a narrow margin, Democrats are likely to pass further fiscal stimulus. We now forecast ... 2021 GDP growth of +6.4% on a full-year basis (vs. +5.9% previously and +3.9% consensus) and +6.6% on a Q4/Q4 basis (vs. +5.6% previously and +3.3% consensus)... Our 2022 GDP growth forecast is now +4% on a full-year basis (vs. +3.7% previously) and +2.4% on a Q4/Q4 basis (vs. +2.7% previously)."
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%."
Moody's Analytics	10.01.2021	1.5% increase over 2 years	"The additional fiscal support will quickly boost the economy, pushing real GDP growth to ... more than 5% for all of 2021. This is a percentage point more growth than we expected in last month's forecast, which was based on the incorrect assumption the Senate would remain in Republican control. Real GDP should post another 5% gain in 2022, about 0.5 percentage point more than previously forecast."
Deutsche Bank	07.01.2021	1.8% 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 response, we have lifted our growth forecast for 2021 by about 2 percentage points to 6.3% (Q4/Q4) ... Beyond this year, we have modestly downgraded 2022 growth expectations given a pull forward of activity into the next few quarters."
JP Morgan	07.01.2021	1.9% increase over 2 years	"Democrats are now set to control the White House and to hold slim majorities in both chambers of Congress. This could set the stage for a dramatic increase in federal spending and fiscal transfers to households ... If realized this would boost GDP growth this year by about 1.5%-points to 5.3% (Q4/Q4), and 0.5%-point next year to 2.6%."
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 ...[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%."

Median of the real GDP increase is 1.8%.

Notes: This table shows the change in forecasts of real GDP growth in the week after the Georgia election, by various investment banks.

Table C.13: Changing of Probability of Democratic Senate Majority over Time (Barclays)

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.** '

Notes: The probabilities are taken for Barclays as an illustrative example of change of assumed probabilities over time. They are taken from after the presidential election up to the date of the Georgia senate runoff.

Table C.14: Polling Instrument Specification, With and Without Controls

Controls	1 Year	2 Years	5 Years	10 Years
1. No Control	3.32	5.27	9.32	15.05
	(1.21)	(1.74)	(2.38)	(4.00)
Observations	30	30	30	30
2. 10-year Bonds	3.16	5.08	9.22	15.07
	(1.34)	(1.98)	(2.63)	(4.25)
Observations	30	30	30	30
3. Oil Price	-0.13	0.15	3.54	7.82
	(0.61)	(1.18)	(1.03)	(3.00)
Observations	30	30	30	30
4. S&P 500	0.73	1.58	5.6	10.7
	(0.83)	(1.41)	(2.17)	(4.65)
Observations	30	30	30	30
5. COVID Effect	2.74	4.43	8.01	13.13
	(0.96)	(1.45)	(1.77)	(3.19)
Observations	30	30	30	30

Note: Each panel in the table represents a different control variable added to the baseline IV specification. In all panels, we adjust the price of the inflation swap to take into account the 3-month lag of the inflation index used in the contracts. For all panels, we regress the expected increase in the price level on the probability of a Democratic win in the 2021 Georgia Senate election, instrumented by polling data for the Georgia Senate election from FiveThirtyEight.com. We use Newey-West standard errors. Our dataset is daily, sourcing expected increases in the price level from zero-coupon inflation swaps from Bloomberg, and probabilities of a Democratic victory from Predictit's 2020 Senate election betting prices. The data spans from Nov 16, 2020, to Jan 4, 2021 (the post-Presidential election dates with polling information). The first panel does not have any controls. All controls are lagged 8 days. The 2nd panel controls for the zero-coupon yield of 10-year US government bonds from Bloomberg. Panel 3 controls for the price of Brent crude oil from FRED. Panel 4 controls for the S&P 500 index from Bloomberg. The last panel uses data from the Cleveland Fed. The robust first stage F-statistics are 10.7, 14.79, 20.6, 17.9, and 10.76 respectively.

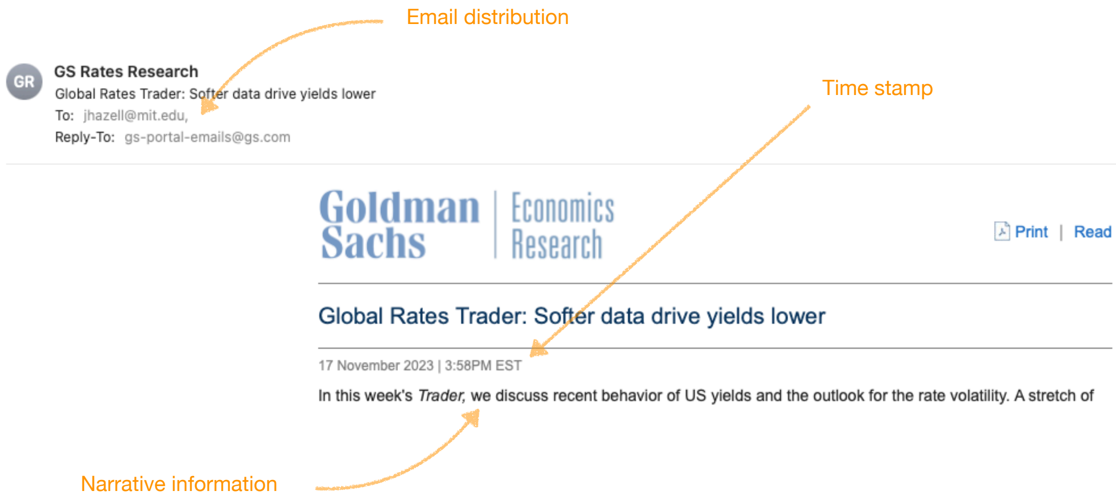
Table C.15: Coibion-Gorodnichenko Regression for Different Sample Periods

Sample:	Full Sample	July 2004 Onwards	Jan 2019 Onwards
Response of forecast errors to news about inflation	0.41	0.50	1.26
	(0.53)	(0.61)	(0.45)
Observations	458	201	42

Notes: The table reports coefficient estimates with Newey-West standard errors with automatic lag length (Lazarus et al. 2018) in parentheses, implementing the regression of Coibion & Gorodnichenko (2015) outlined in equation (2) from the main text, which regresses inflation forecast errors on news about inflation. Following Diercks et al. (2023), we drop observations during periods of financial distress. The first column uses the full sample from 1983 to 2023, the second uses data from July 2004 onwards, and the last from January 2019 onwards. Data from before July 2004 are imputed using the series for inflation expectations in financial markets calculated by the Cleveland Federal Reserve.

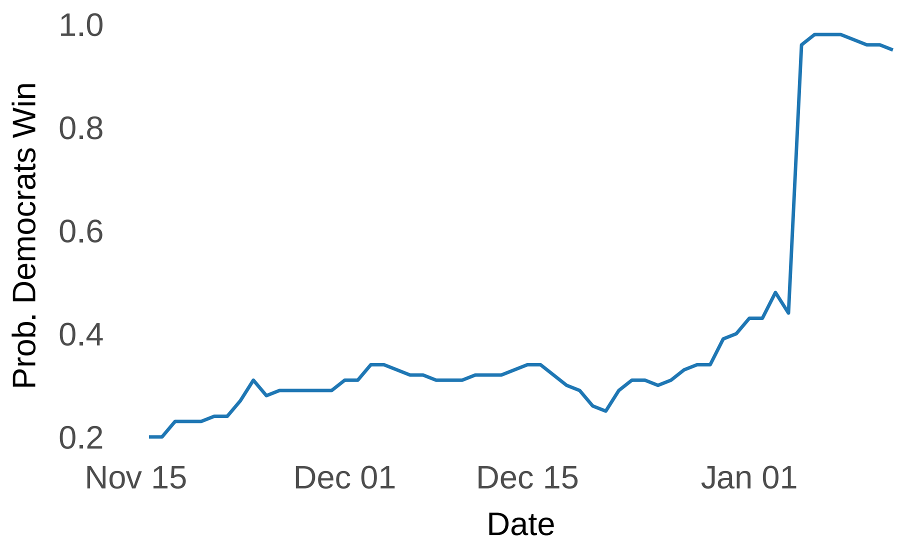
C.2 Figures

Figure C.1: Example of Report from Goldman Sachs



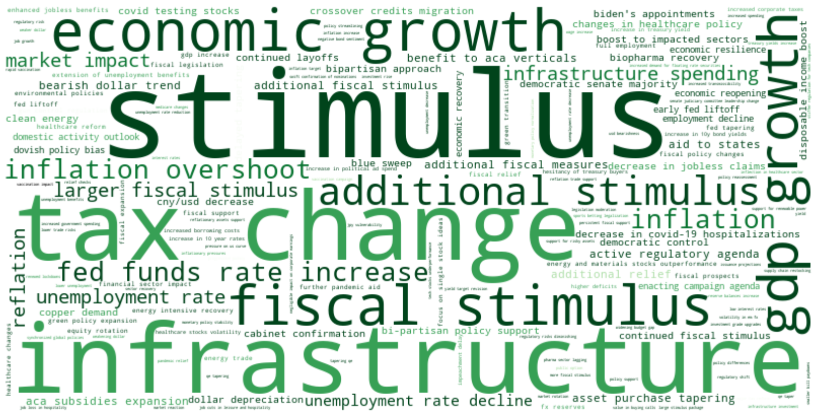
Notes: this figure contains a snapshot of a representative report from Goldman Sachs.

Figure C.2: Daily Probability of Democrat Majority in Senate



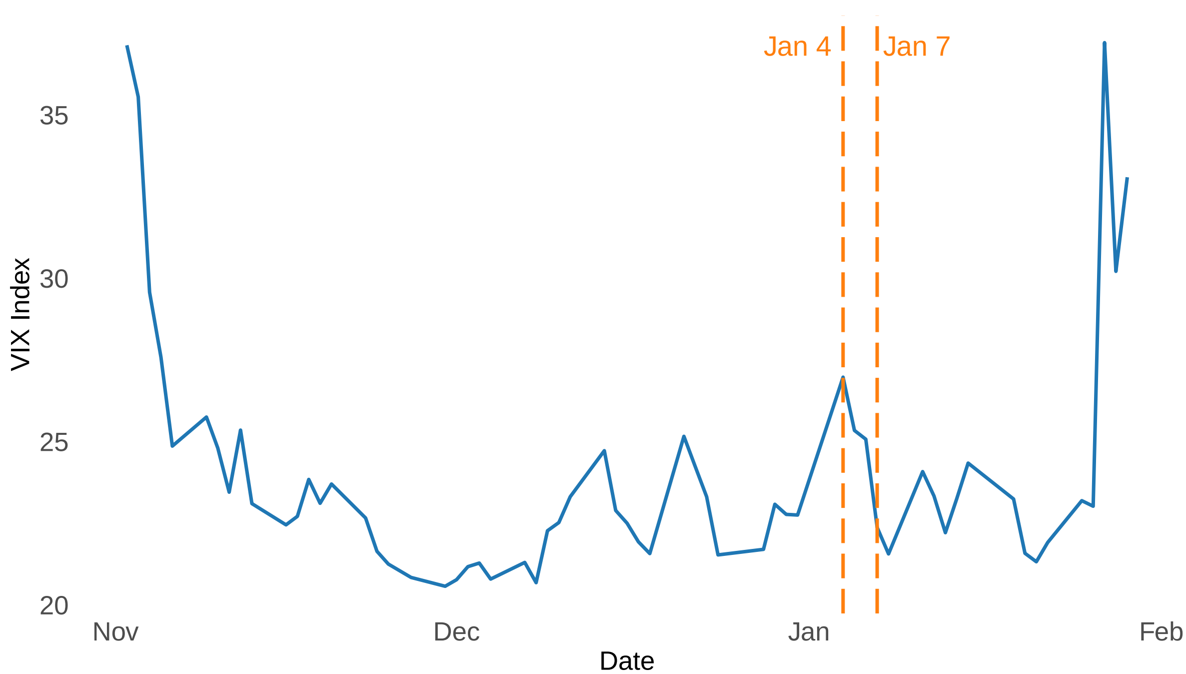
Notes: this graph plots the daily probability that Democrats would win both Georgia Senate seats and hence take a majority in the Senate, using end-of-day probabilities from PredictIt.

Figure C.3: Outcomes after the Democrat Victory—GPT Reading



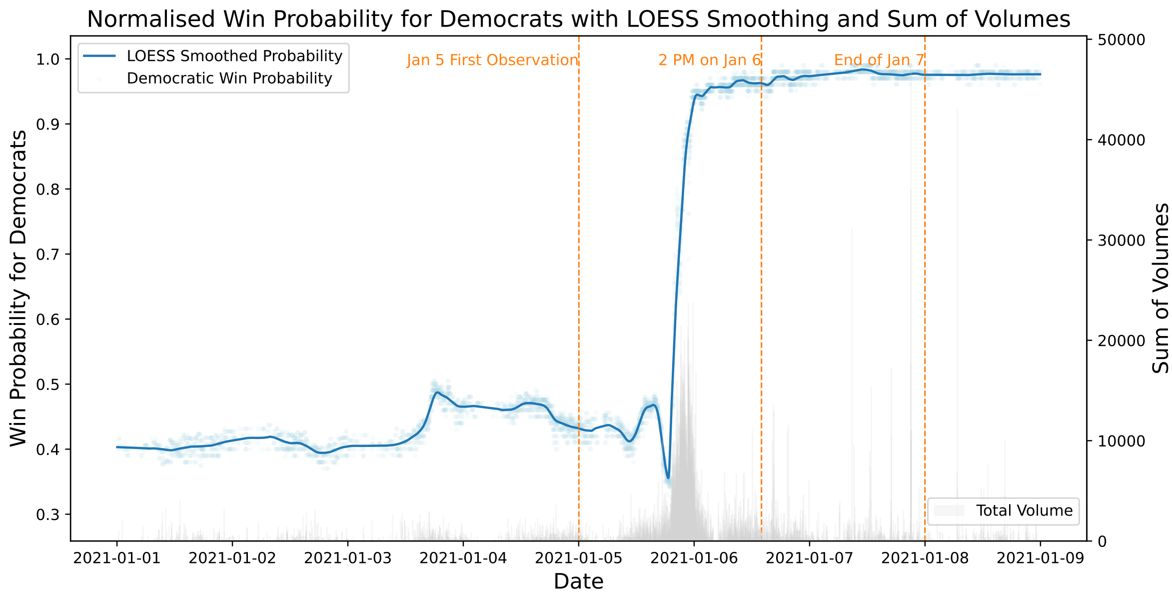
Notes: this figure contains a ChatGPT-read word cloud of outcomes of the Democrat victory discussed by investment banks in the week after the election. In the cloud, an outcome is larger if more banks discuss it, and darker if banks on average assess that it is more likely.

Figure C.4: CBOE Volatility Index (VIX)



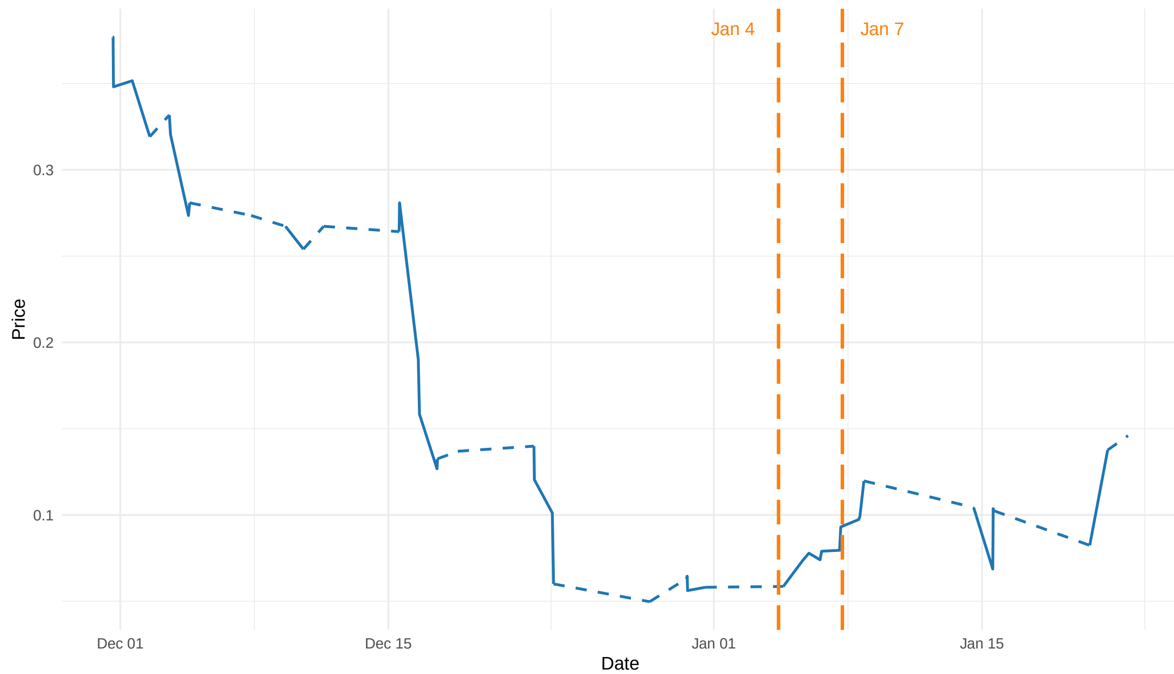
Notes: this figure contains a plot of CBOE Volatility Index (VIX) Index at daily frequency around Georgia runoff elections.

Figure C.5: High Frequency Betting Data around Georgia Runoff



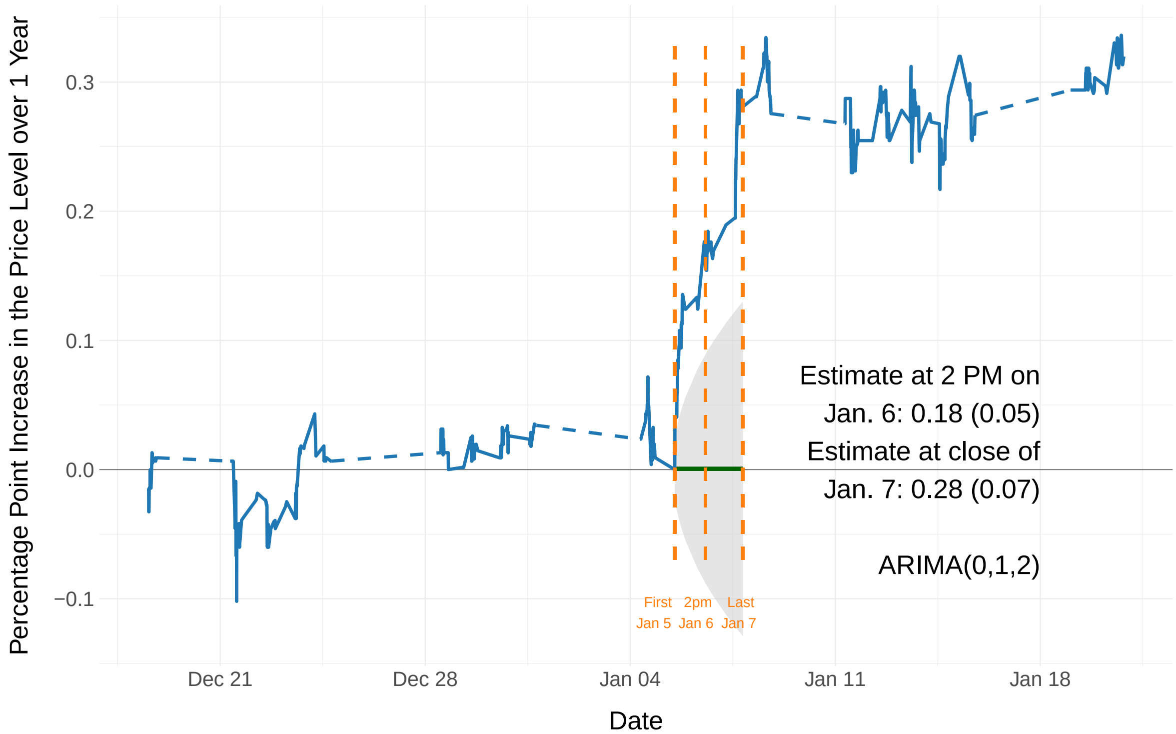
Notes: this figure contains tick by tick data on the probability that Democrats would control the 2020 Senate, based on trades from PredictIt. We add a LOESS smoothed line to the figure. In shaded gray is the total trade volume at a given point in time.

Figure C.6: Bloomberg Surprise Index Around Georgia Runoff



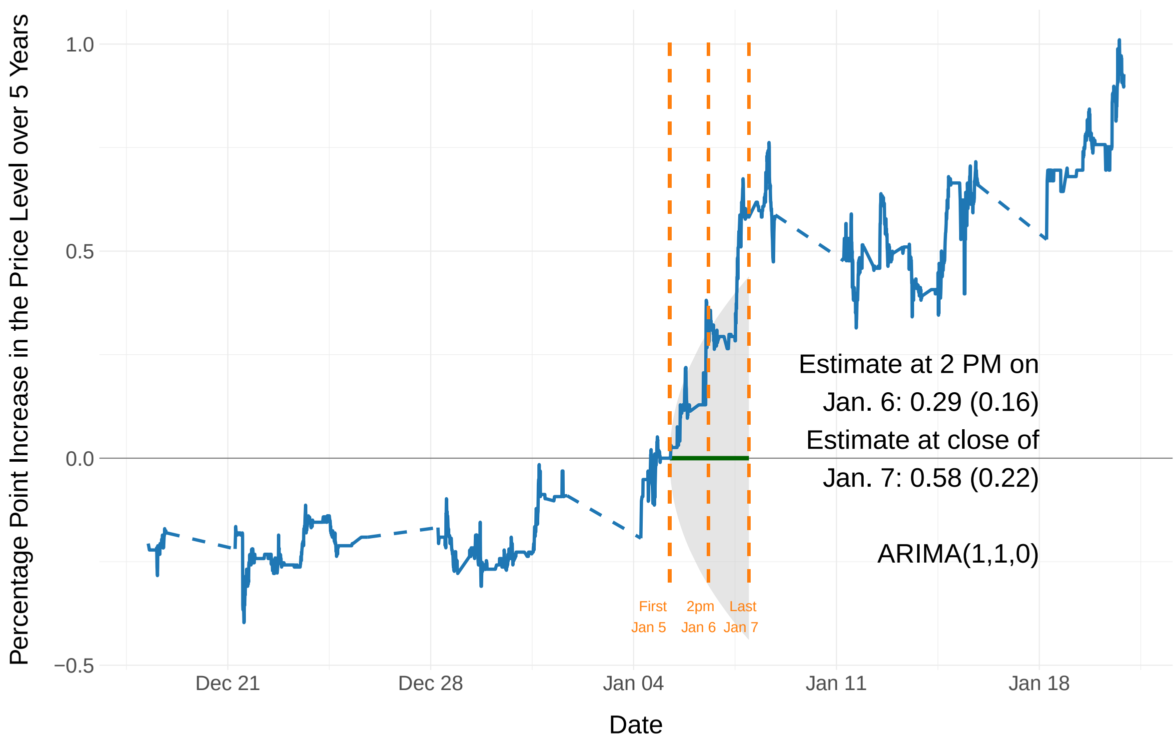
Notes: this figure contains the square of Bloomberg's intradaily "Surprise Index", which measures the surprise from data releases.

Figure C.7: Expected Percentage Point Increase in the Price Level Over 1 Year



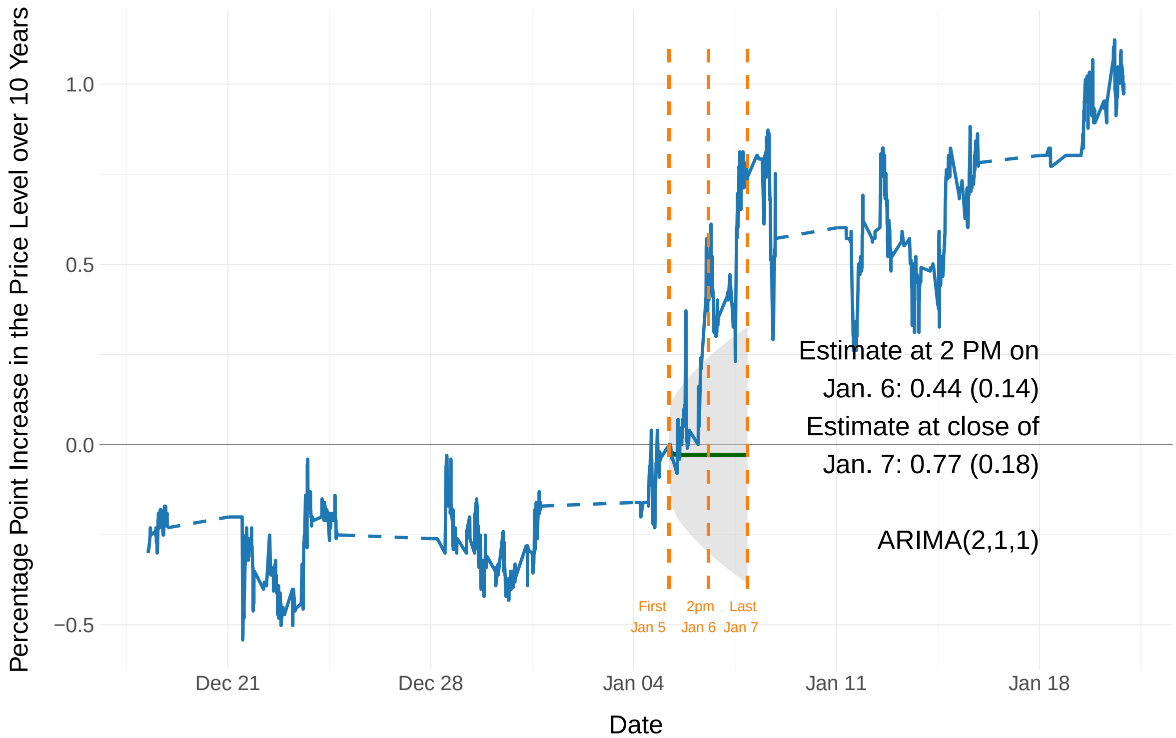
Notes: this graph plots the intraday percentage point increase in the price level 1 year ahead, implied by the 1 year inflation swap, subtracting the first value on January 5th. Dashed lines are missing data from holidays and weekends. The green line is the forecast if the policy had not taken place, the gray shade is the 95% confidence interval.

Figure C.8: Expected Percentage Point Increase in the Price Level Over 5 Years



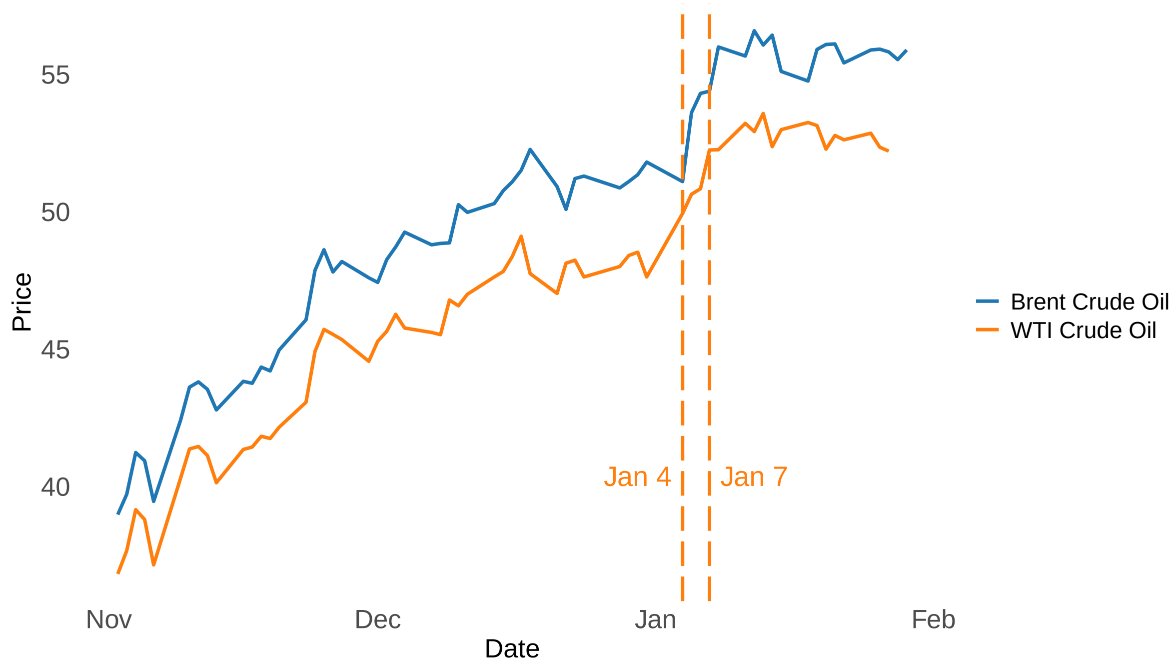
Notes: this graph plots the intraday percentage point increase in the price level 5 years ahead, implied by the 5 year inflation swap, subtracting the first value on January 5th. Dashed lines are missing data from holidays and weekends. The green line is the forecast if the policy had not taken place, the gray shade is the 95% confidence interval.

Figure C.9: Expected Percentage Point Increase in the Price Level Over 10 Years



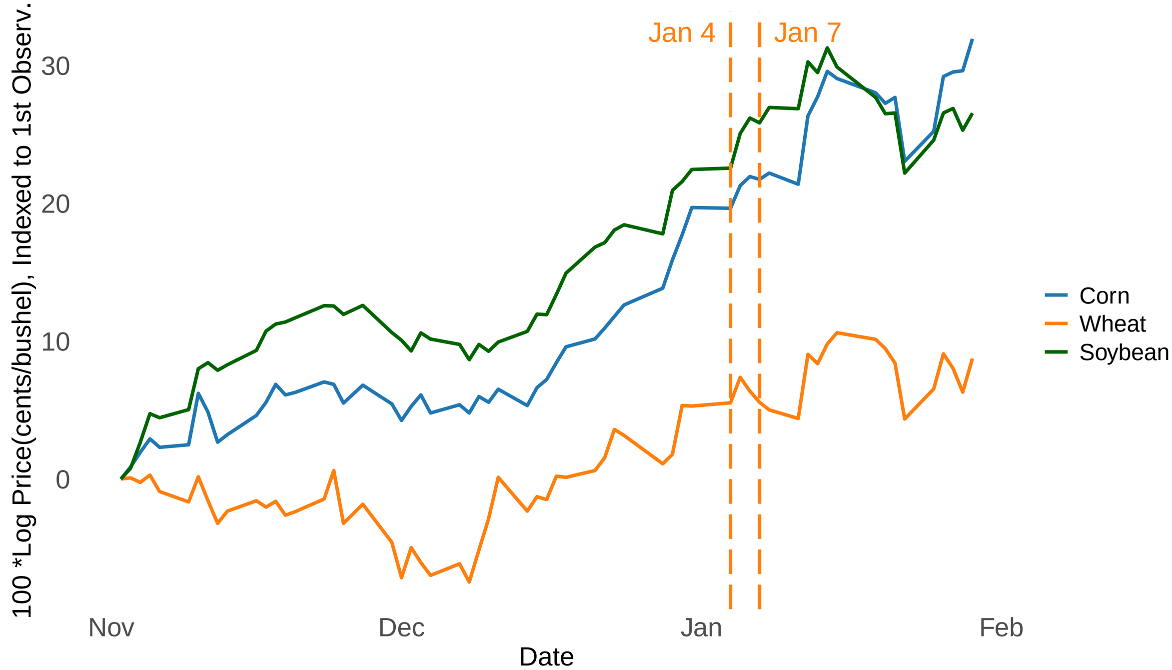
Notes: this graph plots the intraday percentage point increase in the price level 10 years ahead, implied by the 10 year inflation swap, subtracting the first value on January 5th. Dashed lines are missing data from holidays and weekends. The green line is the forecast if the policy had not taken place, the gray shade is the 95% confidence interval.

Figure C.10: Oil Futures



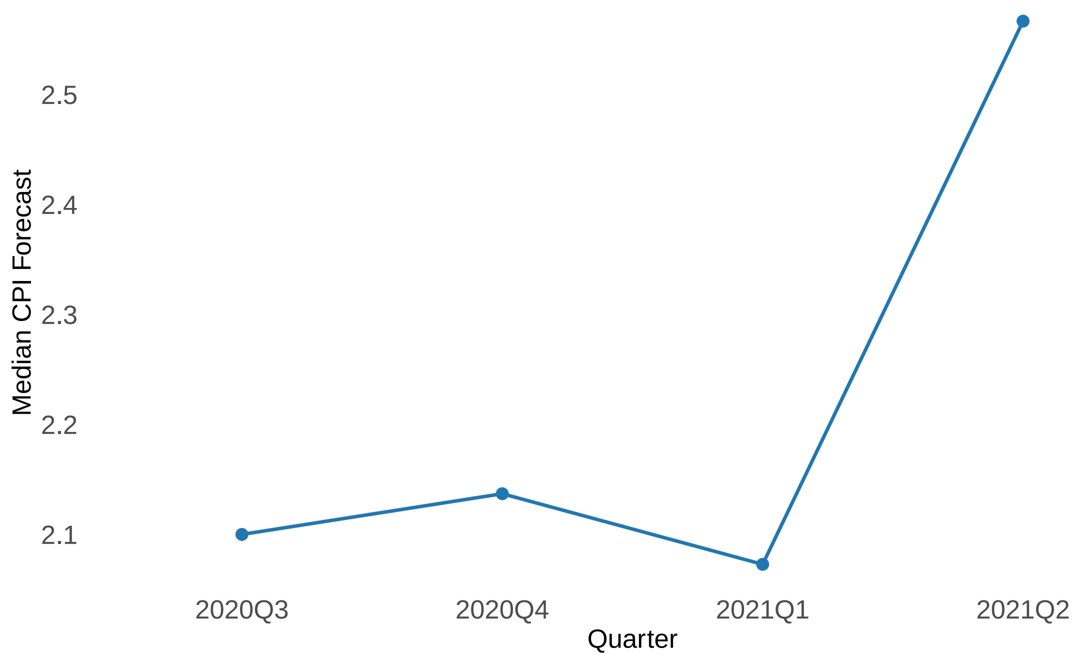
Notes: this figure contains a plot of price of Brent crude oil and WTI crude oil futures.

Figure C.11: Food Futures



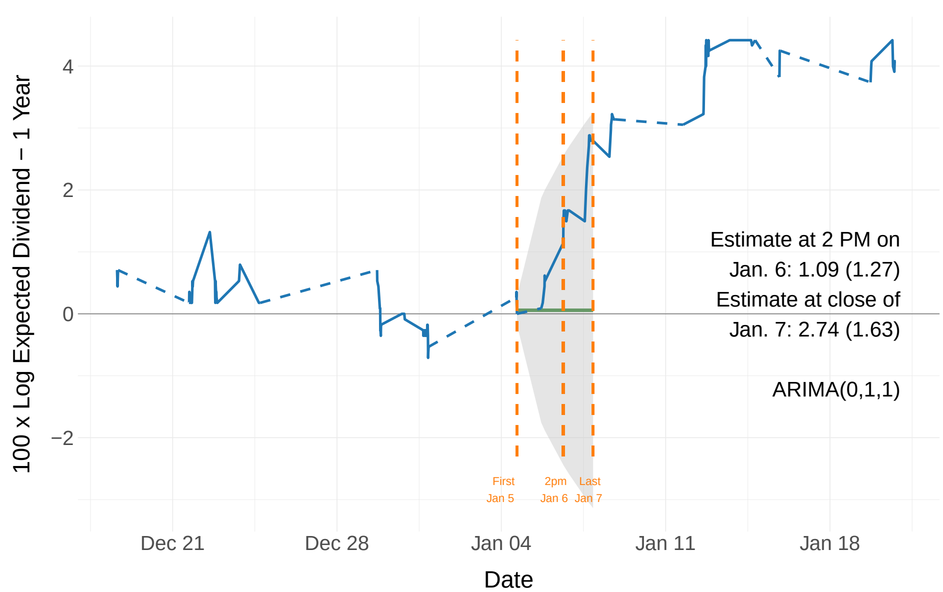
Notes: this figure contains a plot of 100*Log(Price) for food futures. Price is cents per bushel. Futures plotted are corn, wheat and soybean. The observations are indexed to the first available value for comparison.

Figure C.12: Professional Forecasts for Quarterly Inflation in 2021Q3



Notes: this figure contains a plot of forecasts of quarterly inflation (CPI) for 2021 Q3 from the Survey of Professional Forecasters (SPF) for both financial and non-financial firms (those unclassified are excluded).

Figure C.13: Single Event Study—2021 Dividend Futures



Notes: this graph plots the intraday percent increase in dividends 1 year ahead, implied by the 1 year S&P 500 dividend future, subtracting the last value on January 4th. Dashed lines are missing data from holidays and weekends. The green line is the forecast if the policy had not taken place, the gray shade is the 95% confidence interval.

Figure C.14: Capitol Hill Riots—Mentions in Media

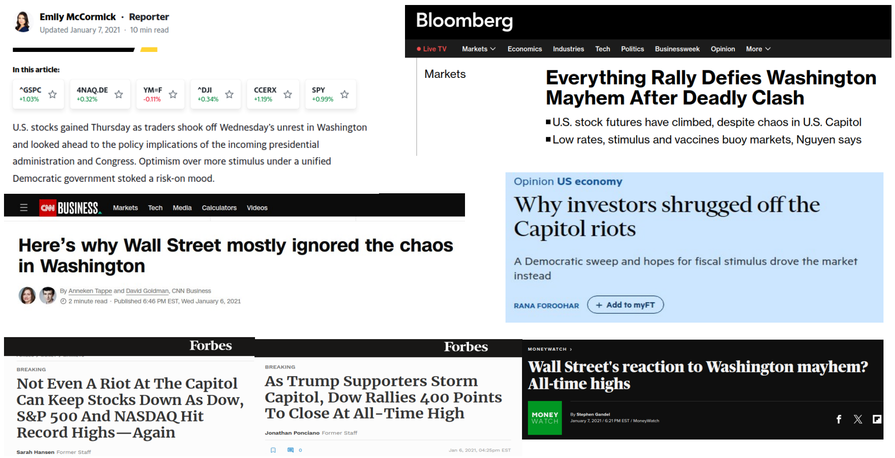
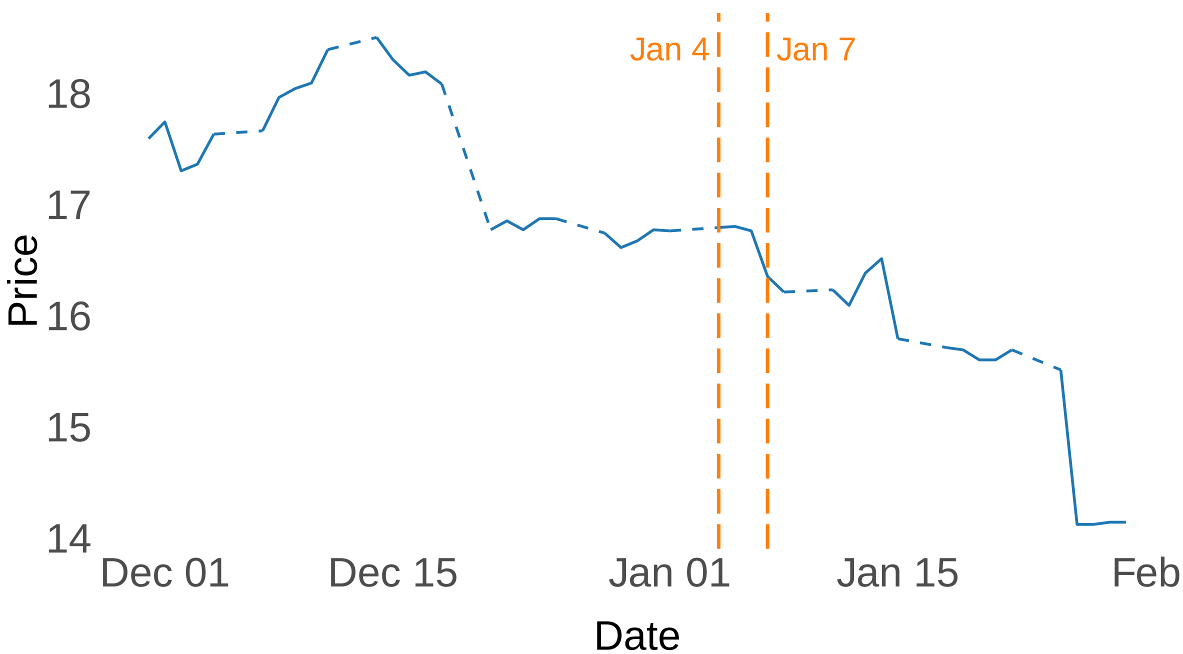
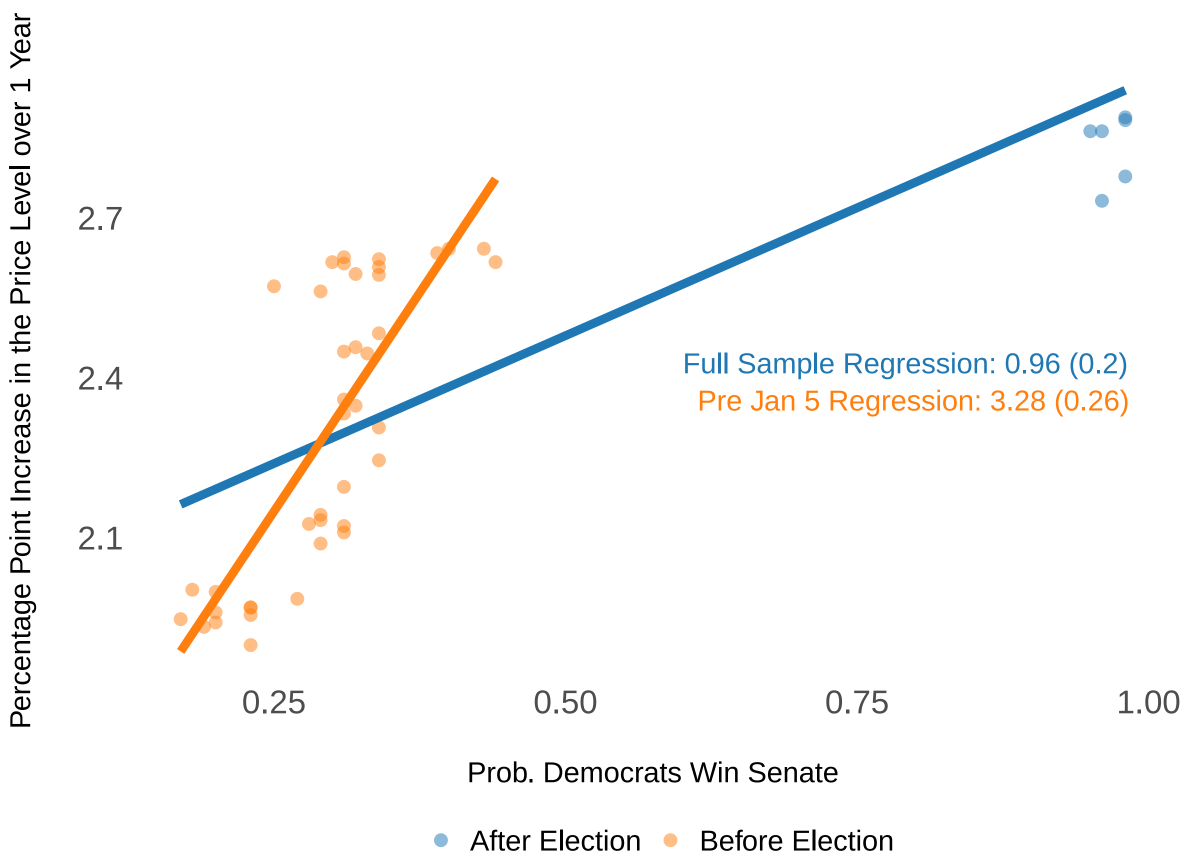


Figure C.15: Credit Default Swaps around Georgia Runoff



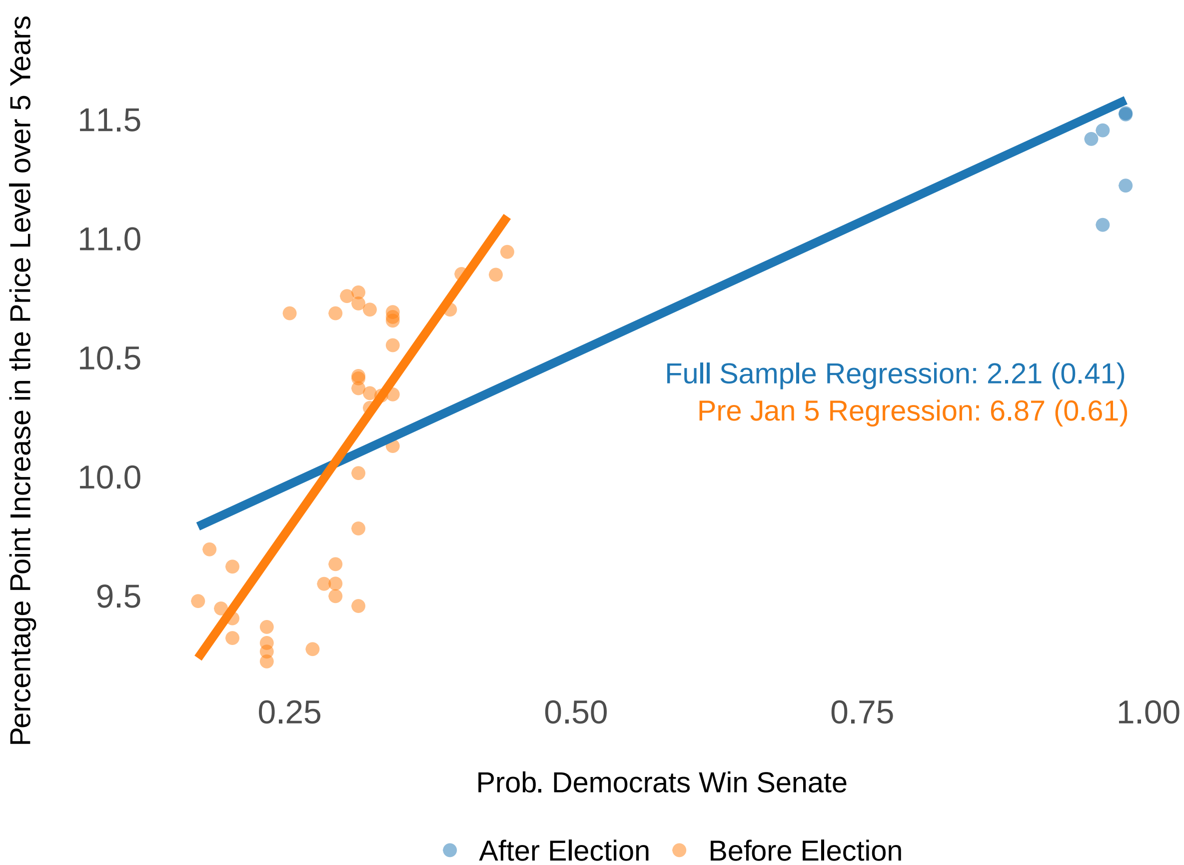
Notes: this figure plots end-of-day Credit Default Swaps Prices on 5 year US government debt in a month interval around the Georgia Senate Runoff.

Figure C.16: Regression Specification—1 Year Swaps



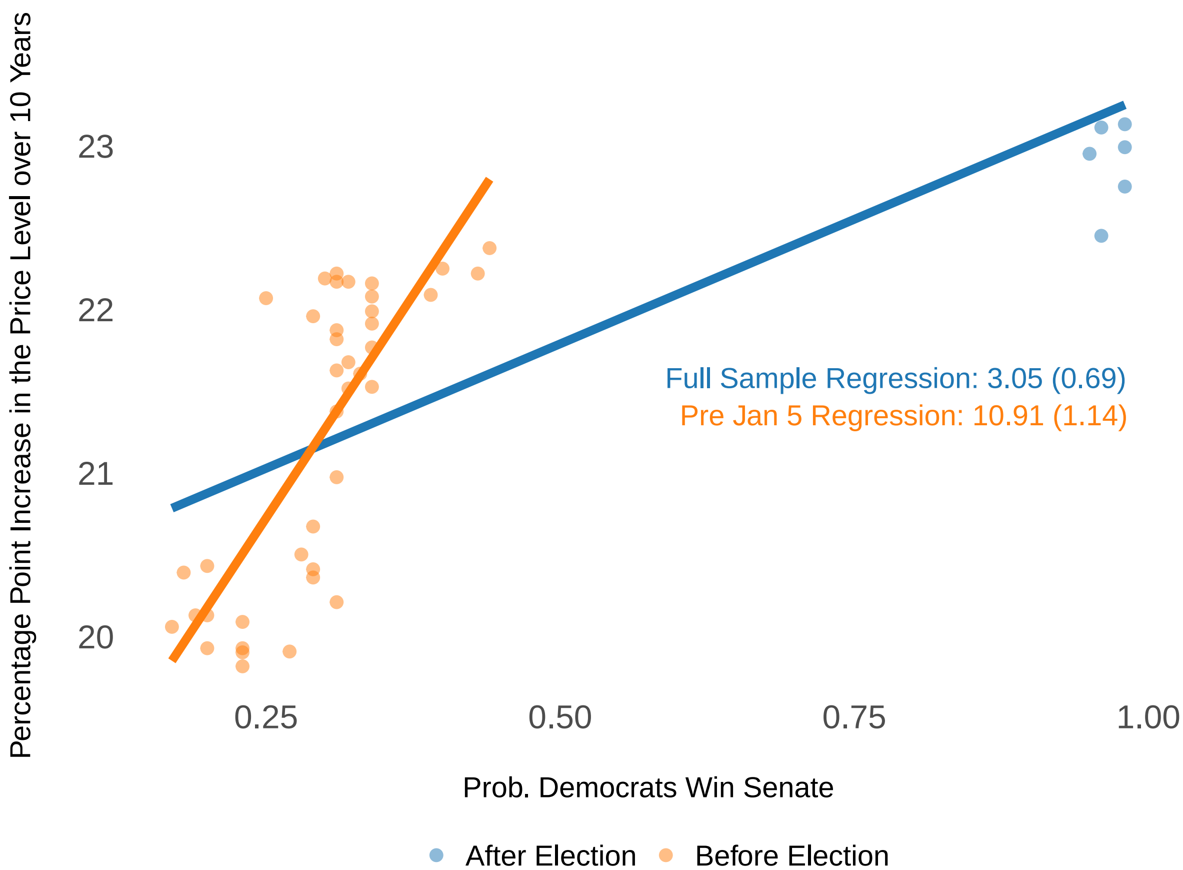
Notes: this graph plots the end-of-day expected percentage point increase in prices over 1 years, implied by the 1 year inflation swap, against end of day probability of Democrat victory from PredictIt. Standard errors, in brackets, are Newey-West with automatic lag length (Lazarus et al. 2018).

Figure C.17: Regression Specification—5 Year Swaps



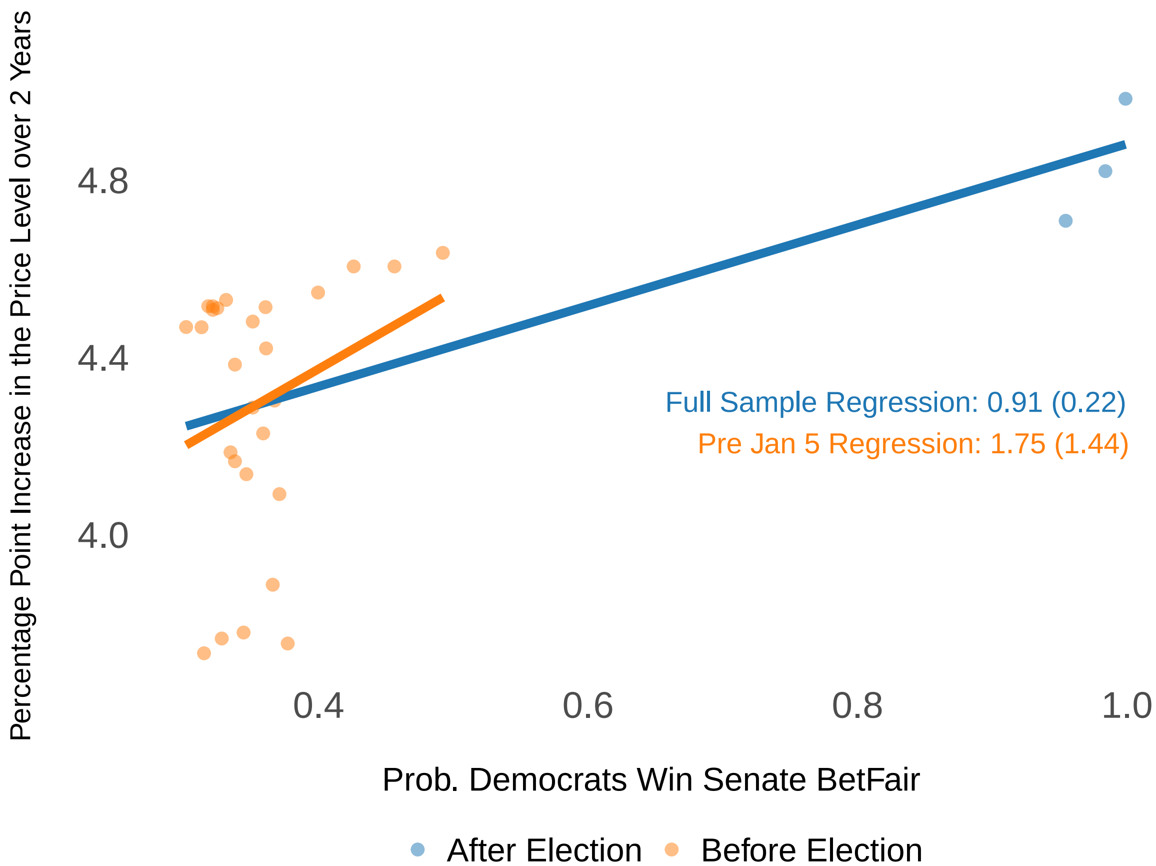
Notes: this graph plots the end-of-day expected percentage point increase in prices over 5 years, implied by the 5 year inflation swap, against end of day probability of Democrat victory from PredictIt. Standard errors, in brackets, are Newey-West with automatic lag length (Lazarus et al. 2018).

Figure C.18: Regression Specification—10 Year Swaps



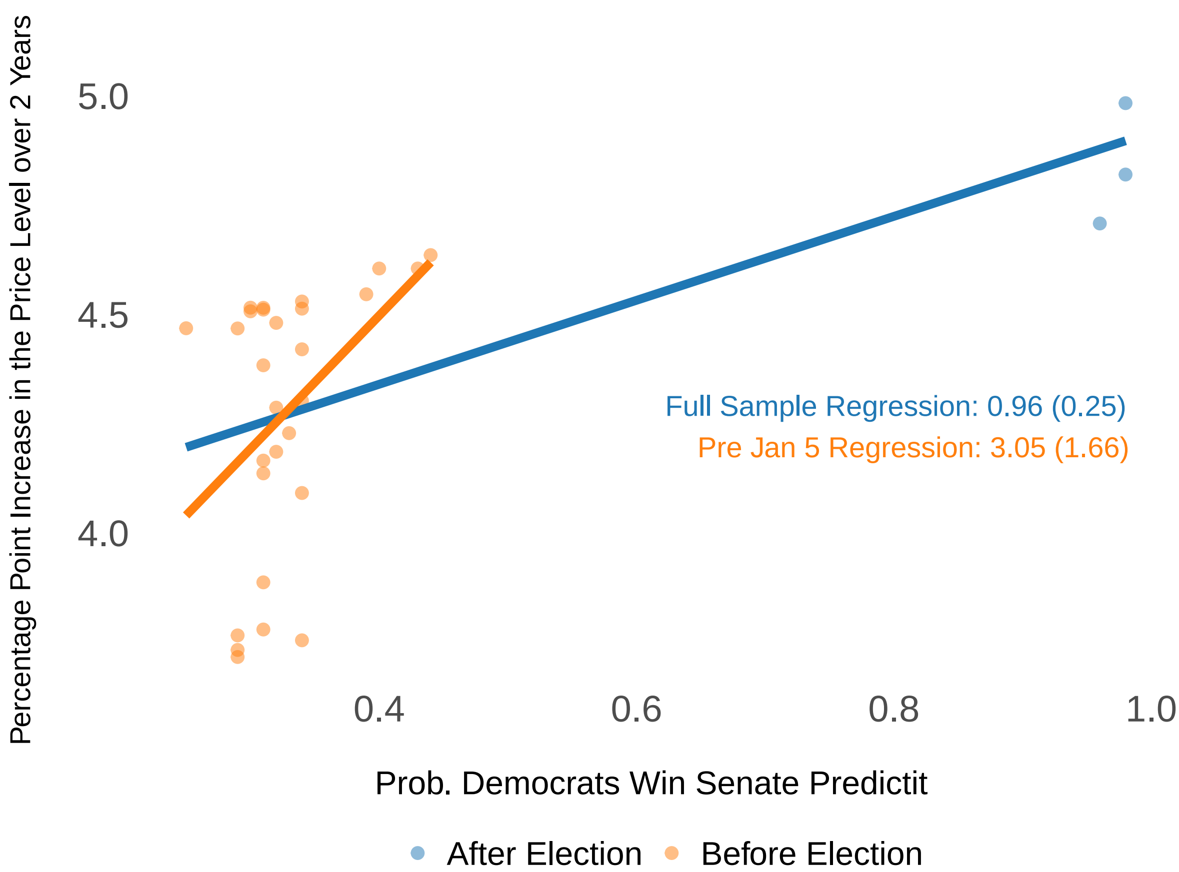
Notes: this graph plots the end-of-day expected percentage point increase in prices over 10 years, implied by the 10 year inflation swap, against end of day probability of Democrat victory from PredictIt.Standard errors, in brackets, are Newey-West with automatic lag length (Lazarus et al. 2018).

Figure C.19: Regression Specification—BetFair, Ossoff Election, 2 Year Swaps



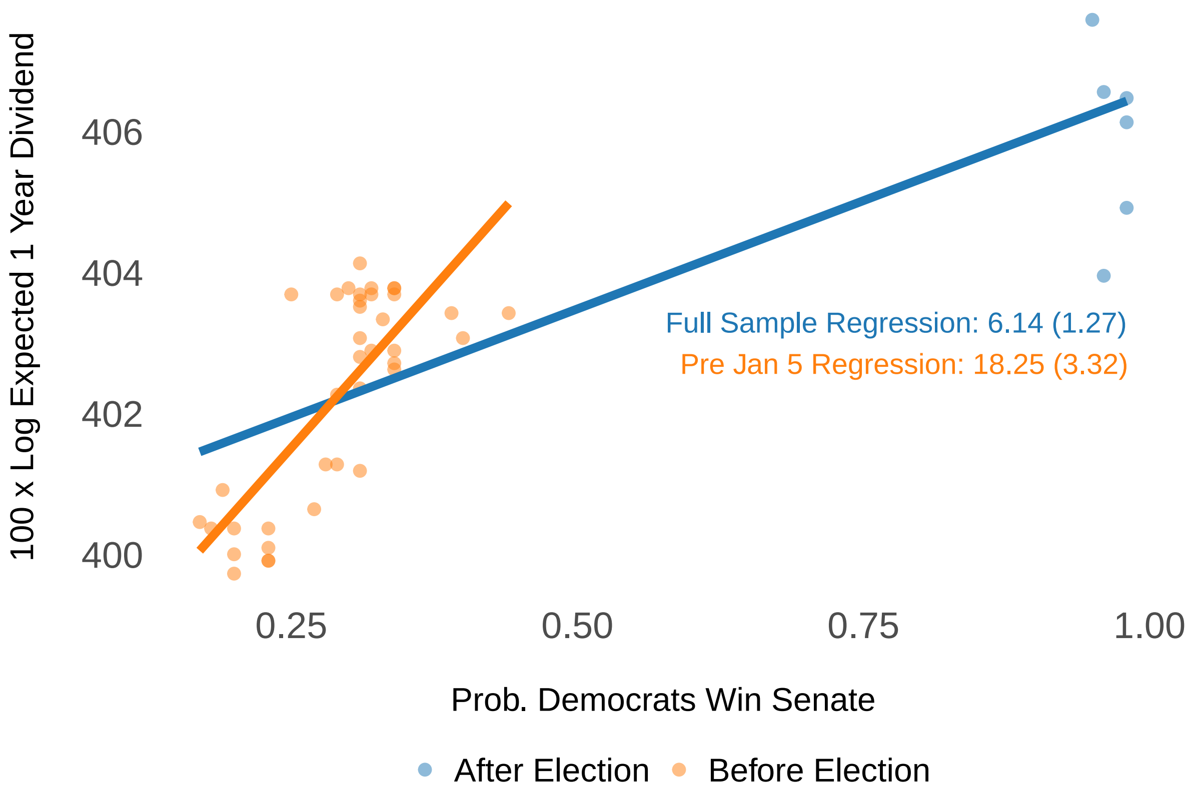
Notes: this graph plots the end-of-day expected percentage point increase in prices over 2 years, implied by the 2 year inflation swap, against end of day probability of Jon Ossof's victory in the regular Senate Election, from Betfair. Standard errors, in brackets, are Newey-West with automatic lag length (Lazarus et al. 2018).

Figure C.20: Regression Specification—PredictIt, 2 Year Swaps (same sample as BetFair)



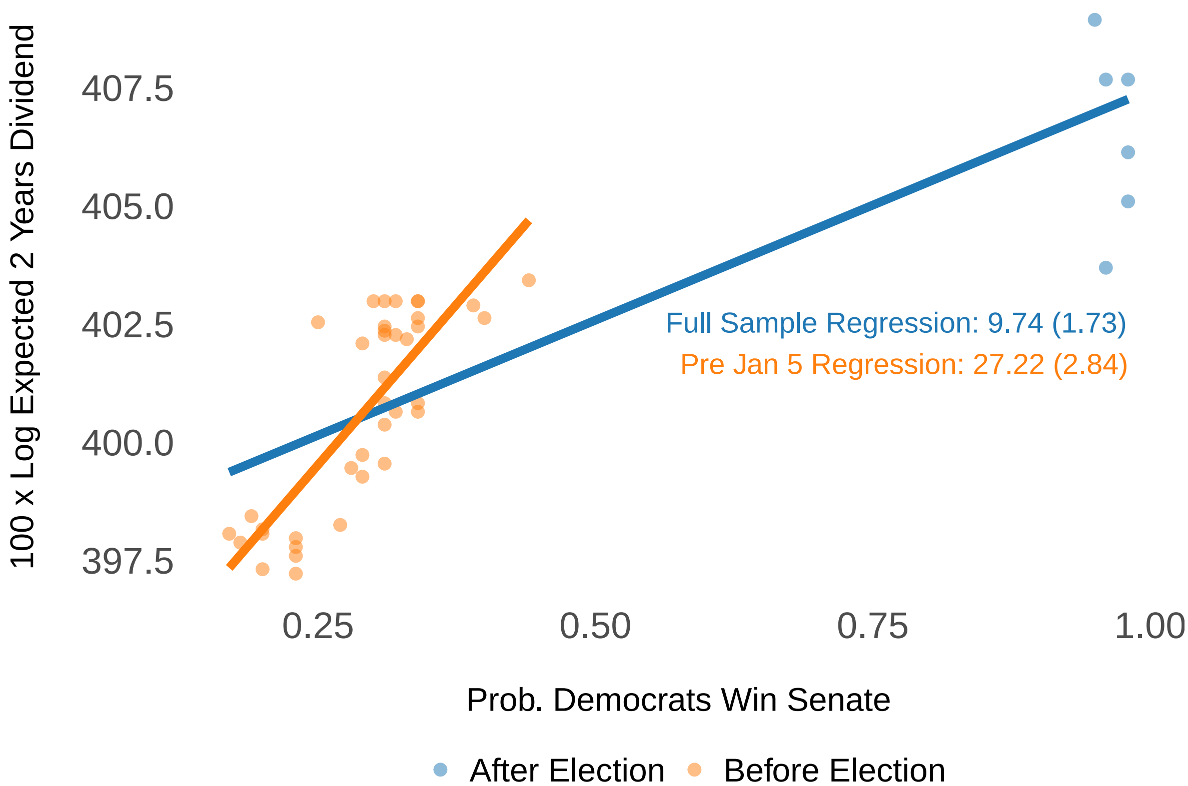
Notes: this graph plots the end-of-day expected percentage point increase in prices over 2 years, implied by the 2 year inflation swap, against end of day probability of Democrat victory from PredictIt, on the sample for which BetFair data are available. Standard errors, in brackets, are Newey-West with automatic lag length (Lazarus et al. 2018).

Figure C.21: Regression Specification—2021 Dividends



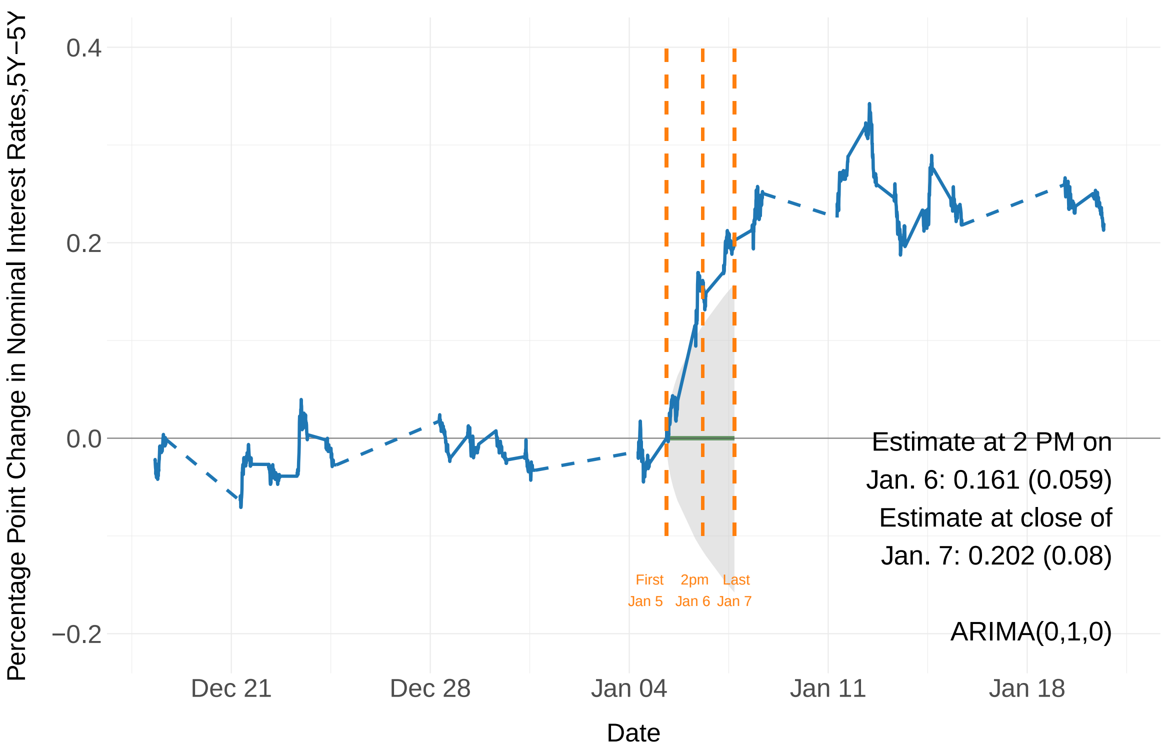
Notes: this graph plots the end-of-day log dividend future for the S&P500 1 year ahead, against end of day probability of Democrat victory from PredictIt. Standard errors, in brackets, are Newey-West with automatic lag length (Lazarus et al. 2018).

Figure C.22: Regression Specification—2022 Dividends



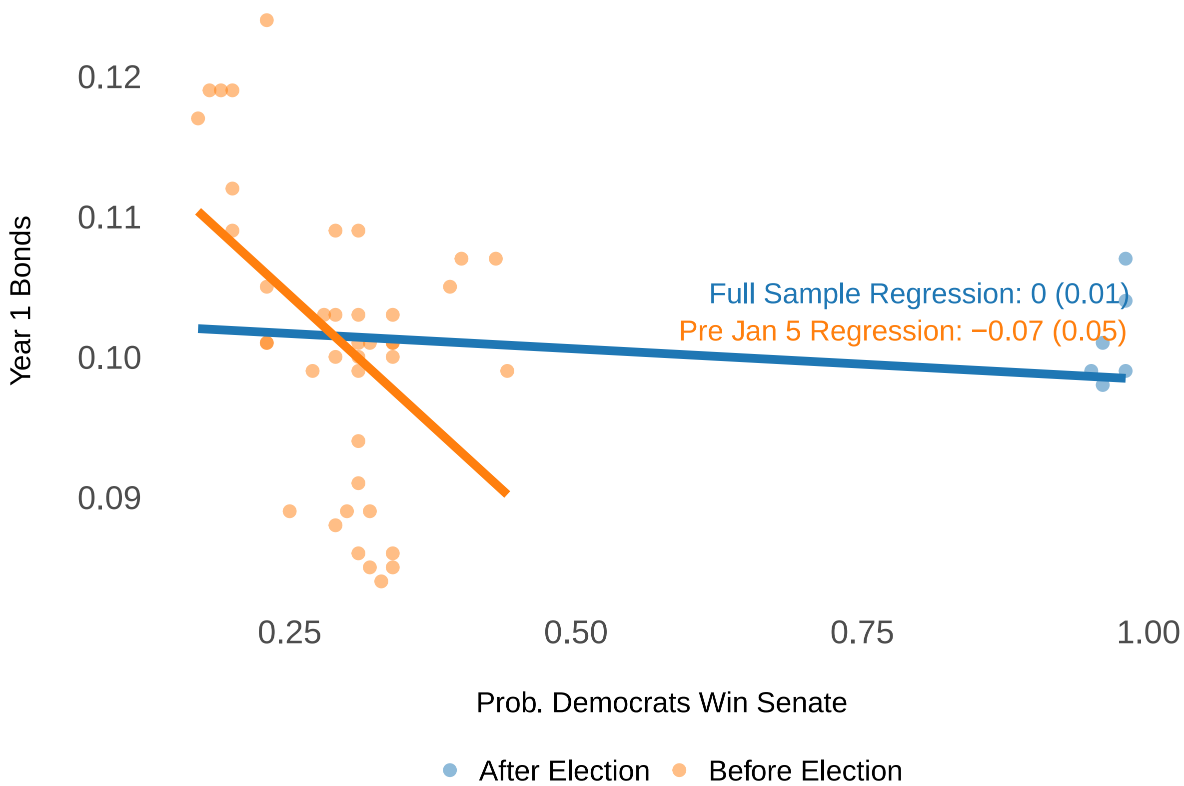
Notes: this graph plots the end-of-day log dividend future for the S&P500 2 years ahead, against end of day probability of Democrat victory from PredictIt. Standard errors, in brackets, are Newey-West with automatic lag length (Lazarus et al. 2018).

Figure C.23: 5 Year Nominal Interest Rate After 5 Years



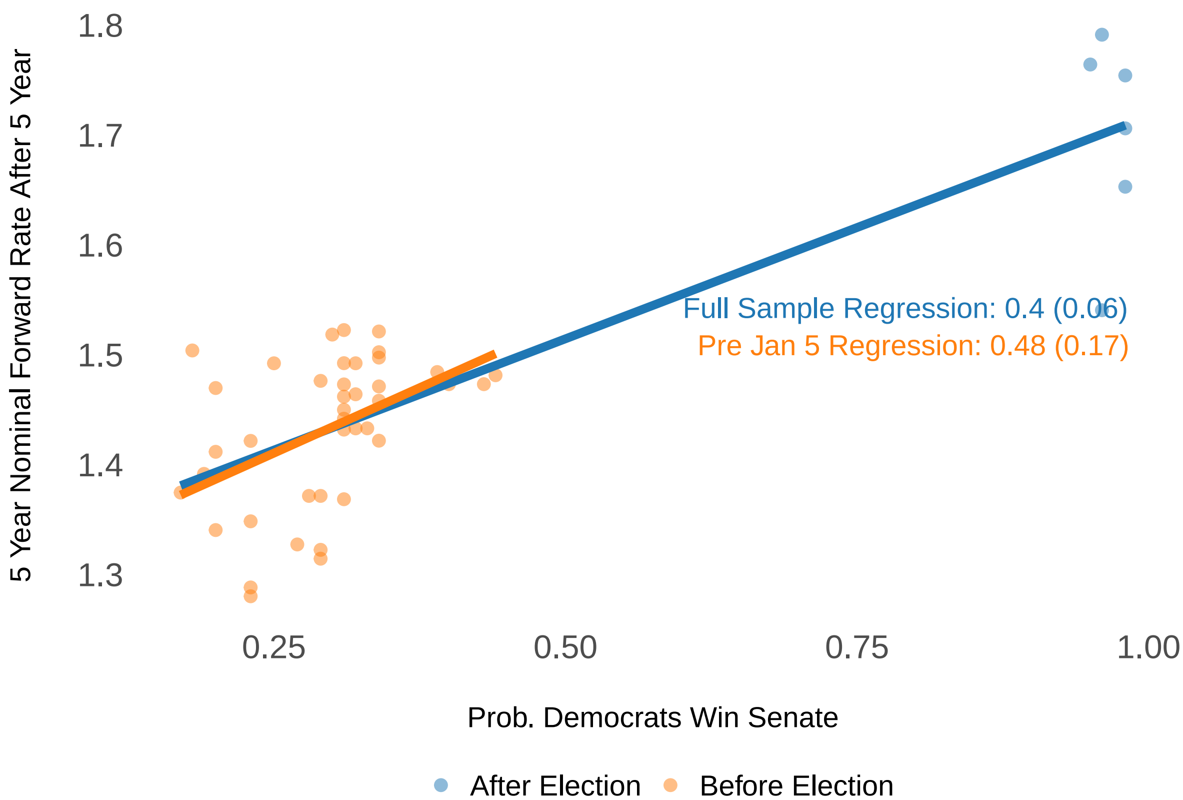
Notes: This plot shows the 5 year-5 year forward interest rate. Dashed lines indicate missing data from holidays and weekends. The green line is the forecast if the policy had not taken place, and the gray shade is the 95% confidence interval. The dashed orange lines mark the first observation on January 5th, 2 PM on January 6th, and the final observation on January 7th.

Figure C.24: Regression Specification—Year 1 Bonds



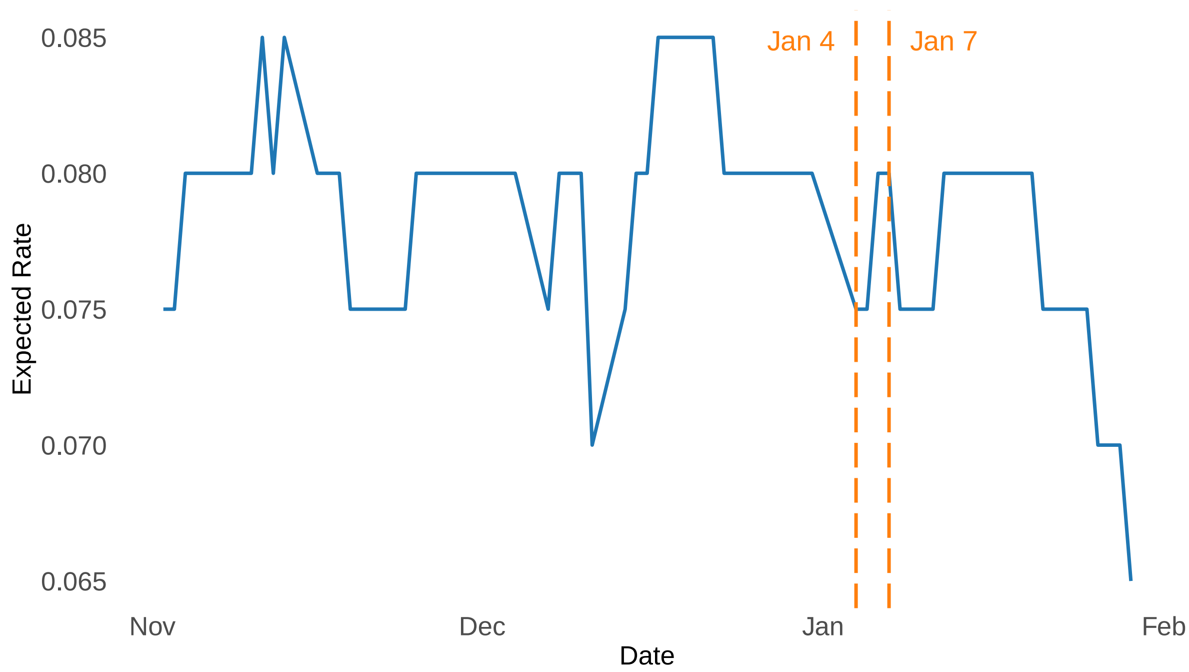
Notes: this graph plots the end-of-day 1 year nominal interest rate on government bonds; against end of day probability of Democrat victory from PredictIt. Standard errors, in brackets, are Newey-West with automatic lag length (Lazarus et al. 2018).

Figure C.25: Regression Specification—5 Year Nominal Forward Rater After 5 Years



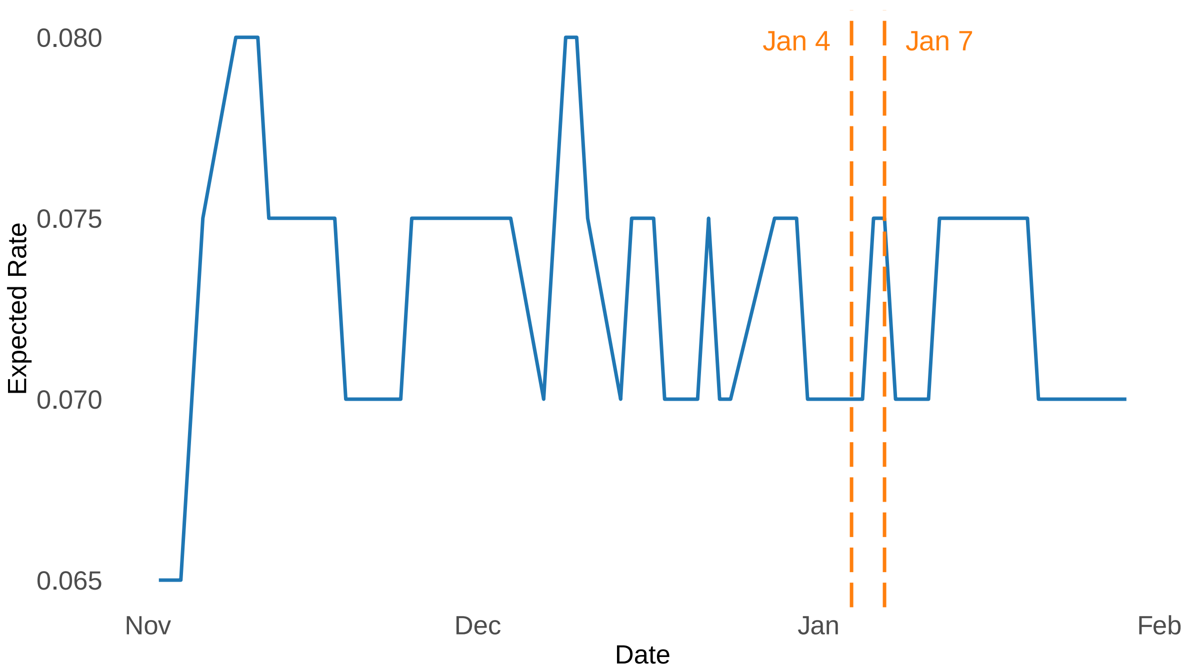
Notes: this graph plots the end-of-day 5 year nominal interest rate on government bonds expected after 5 years; against end of day probability of Democrat victory from PredictIt. Standard errors, in brackets, are Newey-West with automatic lag length (Lazarus et al. 2018).

Figure C.26: Federal Funds Futures - 3-month ahead



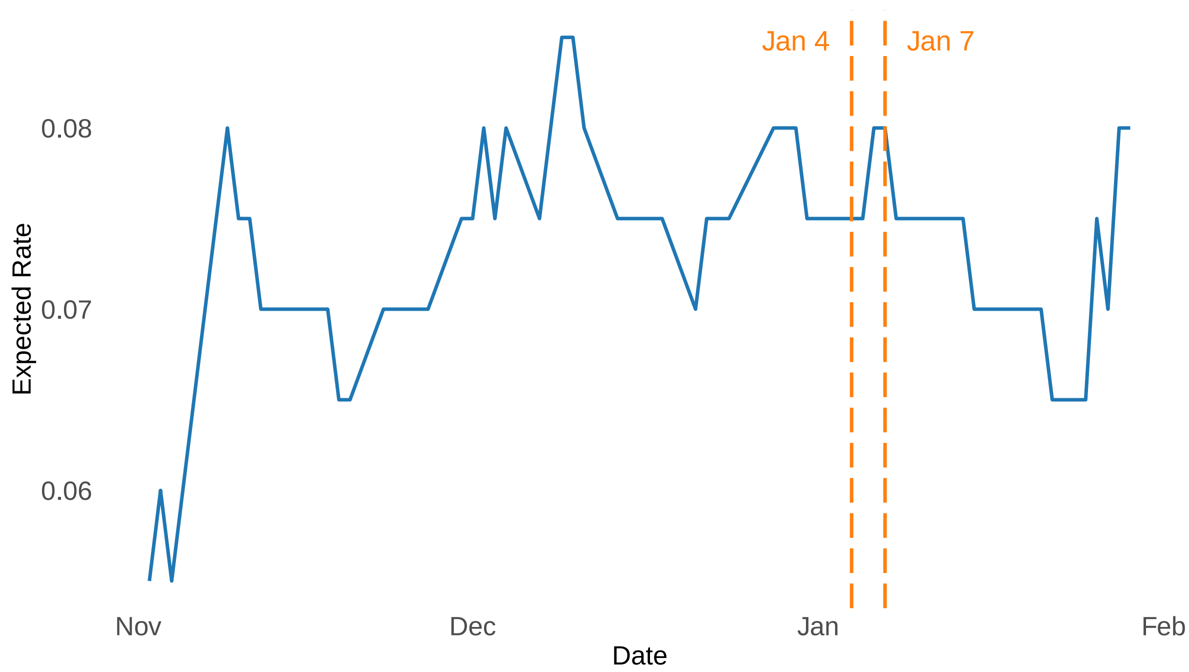
Notes: this figure contains a plot of expected annual 3-month ahead EFFR rate from CME Federal Funds Futures. The expected rate is calculated as 100-P, where P is price of the futures contract.

Figure C.27: Federal Funds Futures - 6-month ahead



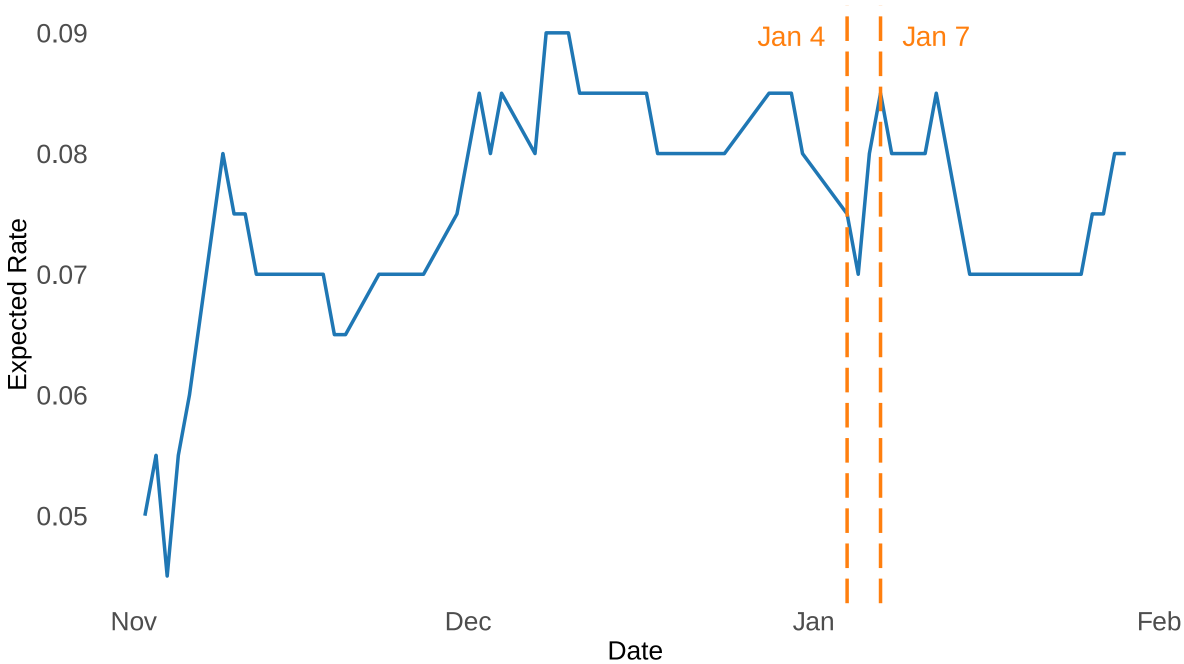
Notes: this figure contains a plot of expected annual 6-month ahead EFFR rate from CME Federal Funds Futures. The expected rate is calculated as 100-P, where P is price of the futures contract.

Figure C.28: Federal Funds Futures - 9-month ahead



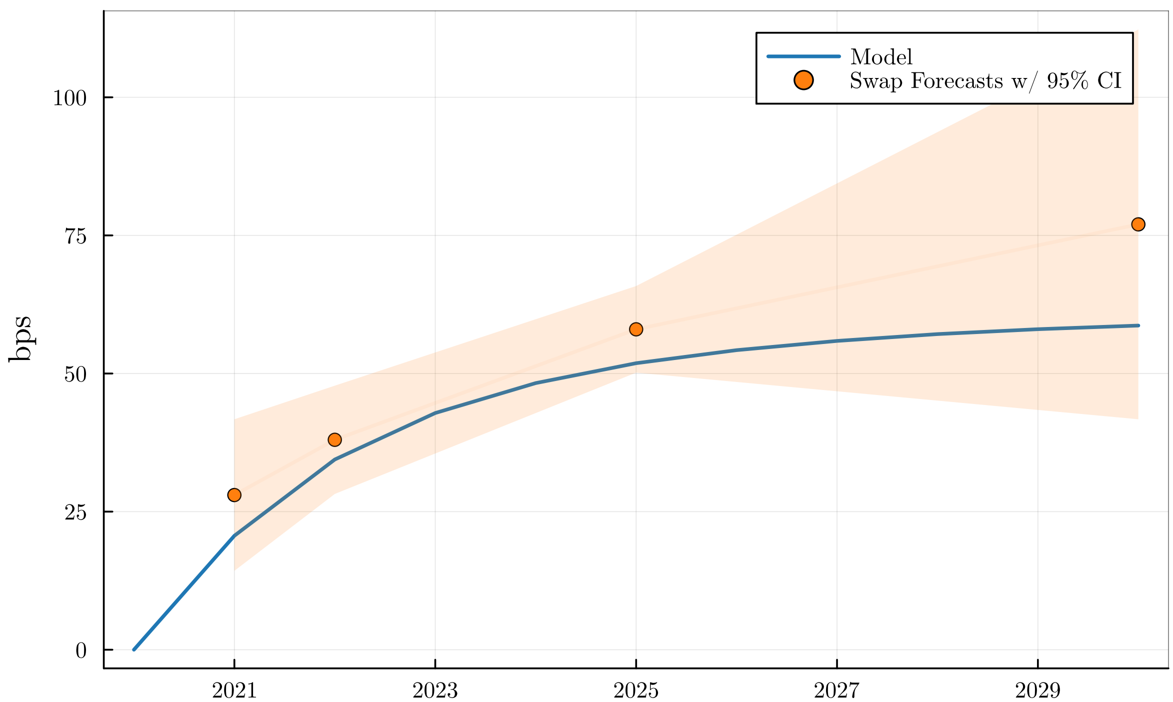
Notes: this figure contains a plot of expected annual 9-month ahead EFFR rate from CME Federal Funds Futures. The expected rate is calculated as 100-P, where P is price of the futures contract.

Figure C.29: Federal Funds Futures - 12-month ahead



Notes: this figure contains a plot of expected annual 12-month ahead EFFR rate from CME Federal Funds Futures. The expected rate is calculated as 100-P, where P is price of the futures contract.

Figure C.30: Impulse response for price level



Notes: this graph plots impulse responses of the price level. All responses are to the shocks shown in Figure 8. Price level forecasts from the data are shown with their 95% confidence interval.