Fueling Expectations: The Causal Impact of Gas Prices on Inflation Expectations and Consumption*

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Abstract

We investigate the effects of temporary state-level gas tax suspensions on inflation expectations and consumption. Using a difference-in-differences strategy, we show that households in states that lower the gas tax reduce both their inflation expectations and consumption, but the impact of the policy depends on how much of the tax cut was passed through to prices. We also show experimental evidence that informing households about the tax reduction leads them to adjust their inflation expectations downward. Our results provide new causal evidence of the link between gas prices and household inflation expectations and highlight the potential for alternative policy levers to impact household beliefs and behavior.

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1 Introduction

Recent interest among central bankers and researchers has surged in how households form inflation expectations, a critical factor for monetary policy effectiveness. While monetary authorities can control nominal interest rates, it is the real interest rate—calculated by the Fisher Equation as the nominal rate minus inflation expectations—that impacts economic decisions such as consumption, savings, and investment. Understanding the formation of inflation expectations is thus vital for policy efficacy.

A series of influential papers have highlighted gasoline prices as an important driver of inflation expectations.[1] However, prior literature has primarily used variation in gas prices in the time series induced by shocks to global oil markets. A natural concern is that these time-varying shocks may be correlated with other unobservable macroeconomic factors that also influence household beliefs.

In this paper, we provide novel, quasi-experimental evidence on the causal effect of gas prices on inflation expectations. We exploit variation induced by temporary cuts in the gas tax in five US states during 2022, a period of rapid growth in the prices of both gasoline and other goods. Ex-ante, the effect of a temporary gas tax reduction on inflation expectations is uncertain. A reduction in gas prices could lead consumers to adjust their inflation expectations downwards, consistent with past literature. However, if consumers understand that the change is temporary, they may not change their beliefs at all, or may even increase their expectations of future price growth. Indeed, we find evidence that even temporary fluctuations in gas prices have large impacts on inflation expectations.

A key feature of our empirical setting is that the state-level decision to implement gas tax holidays was largely driven by political motives rather than by idiosyncratic macroeconomic conditions in the state. While gas tax holidays were formally proposed in 21 state legislatures, they were only implemented in 5 states. We argue that the final decision to enact these policies was orthogonal to economic conditions by showing that implementing and non-implementing states exhibit similar economic characteristics prior to the policy. We leverage this policy variation in our research design to overcome a key empirical challenge:

[1] See, for example, Trehan (2011), Coibion and Gorodnichenko (2015), Binder (2018), and Kilian and Zhou (2022) among others.

the potential endogeneity of gas prices to macroeconomic conditions. There are two possible identification concerns in using time series-based variation in gas prices. First, changes in global oil prices may be caused by other events that also impact attitudes about inflation (such as political events or new information about aggregate demand). For example, the Russia-Ukraine conflict impacted both oil production and the supply chains for other goods, which raised gas prices and inflation expectations simultaneously. Second, there is a reverse causality concern; US macroeconomic conditions may themselves impact prices in oil markets. Our research design deals with the potential endogeneity issue by comparing states that introduced a gas tax holiday to those that did not at the same point in time.

We begin by documenting how temporary gas tax suspensions are passed through to retail gas prices. In imperfectly competitive markets, pass-through may be incomplete, which could blunt the impact of the tax holiday on inflation expectations.[2] We estimate the degree of pass-through in each state using a difference-in-differences design that compares gas prices in tax holiday states to nearby controls. We find significant variation in pass-through rates across states. In Maryland, for example, a 36 cent gas tax cut decreased prices by 30 cents, implying an 83% pass-through. In contrast, New York's 16 cent tax reduction resulted in negligible impacts on consumer fuel prices.

We then turn to assessing how changes in gas prices due to the policy affected household beliefs. We combine two data sources to measure state-level inflation expectations. First, we use data from the Survey of Consumer Expectations (SCE) provided by the Federal Reserve Bank of New York, which surveys a panel of approximately 1,300 respondents in each month, averaging about 25 respondents per state. We supplement the SCE by administering an additional online survey in treated states and neighboring control states. Our survey closely mirrors the questions and design from the SCE and asks the same set of respondents to report inflation expectations at multiple intervals around the implementation of the tax holiday. The additional survey significantly improves the precision of our estimates in treated states, while the SCE data provides broad coverage for control states.

Our main analysis uses a difference-in-differences specification that compares individu-

[2] Doyle and Samphantharak (2008) study similar gas tax holidays and report pass-through rates of about 0.7 , while Genakos and Pagliero (2022) find pass-through rates that range between 0.4 and 1 and depend on the competitiveness of local retail gasoline markets.

als in tax holiday states to those in neighboring control states. Our identification assumption is that inflation expectations in both groups would have followed parallel trends in the absence of the policy. We show empirical support for this assumption in the data; inflation expectations in gas tax holiday states closely track those in control states prior to the tax cut. Our preferred specification exploits the unique panel nature of our dataset by controlling for individual and time-fixed effects. In contrast to previous studies that relied solely on time series variation in gas prices, our research design isolates the impact of the tax holiday from other time-varying macroeconomic shocks, such as changes in monetary policy, supply chain disruptions, or the Russia-Ukraine war.

We first perform the analysis separately for each state. We find that the respondents in treated states reduced their inflation expectations relative to control states during the tax holiday. The effects are large and statistically significant in Maryland, Georgia, and Connecticut, ranging from -1.4 to -2.1 percentage points on a mean of approximately 8%. We find negative but insignificant effects in New York (where we estimate a pass-through rate close to zero) and Florida (where the beginning of the tax holiday coincided with the landfall of Hurricane Ian).

We then adopt a stacked difference-in-differences specification that combines the five state-level experiments. We find that the average effect of the gas tax holidays was to lower inflation expectations by 0.31 percentage points. When we interact the treatment coefficient with the state-level realized change in gas prices, we find that the effects are driven by the states with the largest price declines, consistent with our hypothesized channel. To further establish the role of the policy, we conduct a set of placebo tests using states that proposed but did not implement gas tax holidays. We find no effect of these placebo policies, underscoring the role of the gas price change on household beliefs.

Our estimates imply that a 1% decline in gas increases reduces inflation expectations by 0.13 percentage points (pp). Our findings are qualitatively consistent with prior evidence that retail gas prices play an important role in shaping inflation expectations (Trehan (2011); Coibion and Gorodnichenko (2015); Binder (2018); Kilian and Zhou (2022)), but quantitatively much larger than past estimates identified from time series variation in oil prices.[3]

[3]Coibion and Gorodnichenko (2015) and Binder (2018) find that a 1% decrease in gas prices reduces inflation expectations by 0.016 and 0.009 pp, respectively.

When we replicate the specification from Coibion and Gorodnichenko (2015) using our data, we find a much smaller estimate; a 1% decrease reduces expectations by 0.036 pp, which is about one quarter of our baseline estimate. The comparison underscores the importance of using quasi-experimental variation to identify the impact of gas prices on household beliefs.

The magnitudes of our estimates imply that households disproportionately consider gas prices when forming beliefs. Results from our pooled specification imply that the gas tax suspension reduced inflation expectations by 0.77 pp in Maryland, while there was no detectable effect in New York. Estimates from the Consumer Expenditure Survey suggest that gas expenditures account for 4.3% of total consumption, and the observed reduction in gas price due to the tax cut ranges from near zero in New York to about 7.7% in Maryland. This implies that a household that weights gas prices according to its expenditure share should decrease its inflation expectations by between 0 percentage points (New York) and 0.33 percentage points (Maryland). Thus, our findings further highlight the outsized role of current gas prices in determining household future inflation expectations. This finding also suggests that households put emphasis on their previous experiences with gas prices over anticipated future trends. Such behavior appears to diverge from the Full-Information Rational Expectation (FIRE) model.

We also consider the question of how policymaker communication around the tax cut impacts household beliefs. Given that the pass-through rates of gas tax changes are the result of market equilibrium, which is outside the direct control of policymakers, effective communication may be particularly important in this context. To study the role of communication, we incorporate a randomized experiment within our online survey, drawing on methodologies introduced by Coibion et al. (2022, 2023) in the macroeconomics context. Participants from three treated states—Maryland, New York, and Florida—were provided with details about the extent and duration of the gas tax cut at the conclusion of the survey. Subsequently, we asked them to report again their inflation expectations and consumption sentiments after exposure to the information treatment. We find that respondents who received the information treatment reduced their inflation expectations by 0.7 percentage points and reported that they were less inclined to purchase durable goods, consistent with intertemporal substitution motives.

Finally, we examine the impact of the policy on consumer spending using data from

credit and debit card transactions. The tax suspension could influence consumer behavior in two principal ways: through the positive income effect and the intertemporal substitution effect. First, given the relatively inelastic nature of gasoline consumption, a reduction in gas prices would likely decrease overall expenditure on gasoline, thereby increasing disposable income for consumers, which could, in turn, enhance consumption. Conversely, the gas tax holiday may trigger intertemporal substitution effects due to its influence on inflation expectations. As inflation expectations decrease, perceived interest rates would rise, prompting consumers to opt for saving over spending, thus lowering consumption. We find gas tax holidays appear to decrease consumption, particularly in high pass-through states. Specifically, we find that overall consumption expenditure decreased by 1.6 percentage points in the highest pass-through states. The strongest declines in consumption are driven by service expenditures, which include discretionary spending categories like bars and restaurants, hotels, and entertainment.

Our paper contributes to a large literature in macroeconomics that studies the formation of inflation expectations. In particular, several important papers have documented a correlation between gas prices and household beliefs (Trehan, 2011; Coibion and Gorodnichenko, 2015; Binder, 2018; Kilian and Zhou, 2022). While earlier studies predominantly utilize time series data to explore variations in gas prices, there has been a growing effort to establish a causal link between energy prices and inflation expectations using quasi-experimental methods. For instance, Wehrhöfer (2023) uses the staggered nature of energy-contract renewals in Germany in 2021. Aidala et al. (2024) examine households' reactions to hypothetical scenarios of gas price fluctuations in an experimental setting. Our approach is similar to Binder and Makridis (2022), who also use state-level variation in gas prices to measure the impact on consumer sentiment. Our work differs in two ways: first, we measure inflation expectations directly. Second, our price variation comes directly from the tax change, rather than state-level differences in gas prices, as in Binder and Makridis (2022). We use this novel variation to bring new causal estimates to the literature.

Our work also provides new evidence in how households weight past and anticipated future gas price changes in forming inflation expectations. The gas tax holiday presents a unique situation, showcasing a divergence in price patterns: a decrease in past gas prices contrasted with an anticipated increase in future gas prices. Our findings reveal that house-

holds adjust their inflation expectations downward in response to temporary price drops, emphasizing the importance of past price growth as predictive of future price changes. This finding is inconsistent with the implication of FIRE models, aligning instead with previous studies that highlight the strong impacts of past price increases on inflation expectations (D'Acunto et al., 2021).[4]

We also contribute to a growing literature that studies the effect of fiscal policy on inflation expectations. Correia et al. (2013) examine the effects of unconventional fiscal policy, suggesting that an increasing path of consumption tax can boost inflation and, consequently, consumption when interest rates are at the zero lower bound. A study by Cloyne et al. (2023) demonstrates that an increase in personal income tax reduces inflation expectations in the US. In Germany, research by D'Acunto et al. (2021) and Bachmann et al. (2021) investigates the effects of unexpected changes in the value-added tax (VAT) on inflation expectations and consumer spending. Our research diverges from these studies by concentrating on the taxation of a single commodity—gasoline—and evaluates whether changes in the gas tax can influence household beliefs. To our knowledge, this is the first work to consider the impact of policy levers that reduce gas prices as tools to impact inflation expectations.[5]

The remainder of the paper is organized as follows. Section 2 provides an overview of the 2022 gas tax holiday policy changes and outlines our identification strategy. Section 3 describes the data. In Section 4, we estimate how changes in the gas tax affected retail prices. Section 5 investigates the effects of gas price changes on household inflation expectations. Section 6 discusses the role of public communication to complement the policy and enhance its overall effectiveness. Section 7 examines responses in consumption behavior. Section 8 concludes.

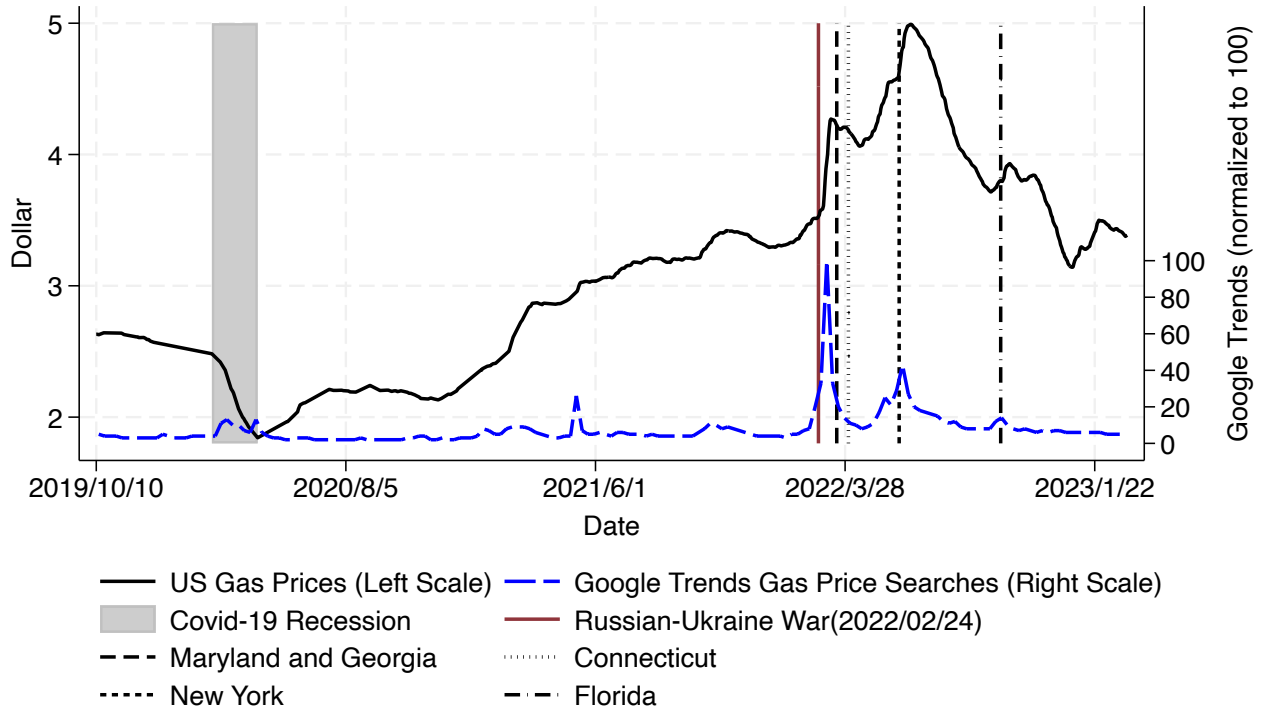
2 Gas Tax Holiday and Identification Strategy

The supply disruptions caused by the COVID-19 pandemic and the Russia-Ukraine war in 2022 led to rapid increases in retail gas prices. Figure 1 shows that the average price of

[4]This fact alone does not allow us to rule out that households do not understand the temporary nature of the policy. However, we find that providing survey respondents with information about the tax holiday, including its temporary nature, leads them to further reduce their inflation expectations.

[5]Other examples of similar policy interventions include the 2022 sale of 180M barrels of oil from the Strategic Petroleum Reserve (US Department of the Treasury, 2022).

Figure 1: US average regular-grade gas prices



The solid line plots the average regular-grade gas prices in the US from October 2019 to March 2023 on the left scale, while the long dashed blue line represents US Google searches for the query "gas prices" (from Google Trends data), normalized to 100 at the maximum value, on the right y-axis. The shaded area highlights the Covid-19 recession period. The solid red vertical line marks the start of the Russia-Ukraine war. The dashed vertical lines indicate the beginning of the implementation of the gas tax holiday in Maryland and Georgia. The dotted, short-dashed, and dash-dot vertical lines indicate the start date of the implementation of the gas tax holidays in Connecticut, New York, and Florida, respectively.

regular gasoline increased by over 50% in the first half of 2022. In response, several U.S. state governments as well as the federal government contemplated temporary suspensions of the gas tax to mitigate the impact of these high prices. A distinctive feature of gas prices is that the price displayed at the pump is inclusive of federal and state-level gas taxes. Thus, changes in the tax rate are particularly salient, as they are displayed directly in the price. The federal excise tax is 18.4 cents per gallon, while state tax rates vary widely, ranging from 14 cents per gallon in Alaska to 62 cents per gallon in California.

Although 21 states proposed gas tax suspensions in their state legislature, only five — Maryland, Georgia, Connecticut, New York, and Florida — implemented such measures, enacting what became known as a gas tax holiday. Figure 1 displays US gas prices as well as the start dates of each tax holiday, while Table 1 provides the details of the policies in

each state. Maryland, Georgia, and Connecticut were the first three states to act. Maryland reduced its tax by 36.1 cents per gallon, Georgia by 29.1 cents, and Connecticut by 25 cents. All three states signed these changes into law on March 18th and implemented them within a week of passage. Maryland's suspension lasted for one month, while Georgia and Connecticut initially proposed a two-month gas tax holiday but eventually extended their policies through the end of 2022. Connecticut gradually phased the gas tax back in over a four month period. New York offered a 16-cent reduction per gallon from June 1st to December 31st. Despite signing the bill on April 7th, New York delayed its implementation for nearly two months. The policy in New York, which had a standard state gas tax of 25 cents, was only a partial suspension. Lastly, Florida enacted a 25.3 cent cut in October, following a mid-July signing. Given the timelines of these implementations, retailers in New York and Florida may have anticipated these tax cuts.

Figure 1 also shows the (indexed) number of US Google searches for the query "gas prices" during this period (dashed blue series, plotted on the right y-axis). Search volumes are a proxy for the level of media coverage and consumer attention focused on gasoline markets during this period, and may reflect the salience of gas prices for consumers. Interestingly, search volumes are imperfectly correlated with actual fuel prices. Searches peak in February and March 2022 immediately prior to the implementation of the policies in Maryland, Georgia, and Connecticut, which coincides with a large initial run-up in gas prices. There is another surge in June (when prices hit their highest point), around the start of the tax holiday in New York, but it is only about 40% of the level from February 2022. Search volumes are significantly lower around the date of Florida's implementation.

Prior literature has established a link between gas prices and inflation expectations (Coibion and Gorodnichenko, 2015; Binder, 2018; Kilian and Zhou, 2022). However, it is difficult to isolate the impact of gas prices on inflation from other unobservable shocks using time series variation alone. For instance, the Russia-Ukraine conflict disrupted supply chains in multiple industries, simultaneously raising gas prices and inflation expectations. Our research design avoids this pitfall by exploiting policy-induced variation in the gas tax across states and over time. Our primary analysis uses a difference-in-differences specification that compares households in states that implemented a gas tax holiday with those in neighboring states that did not. All of our specifications include time fixed effects which par-

Table 1: Gas Tax Holiday in the United States in 2022

States	Governor	Gas Tax Cut	Period	Signed
Maryland	Larry Hogan (R)	36.1¢/gal	Mar 18 - Apr 17, 2022	Mar 18
Georgia	Brian Kemp (R)	29.1¢/gal	Mar 18, 2022 - Jan 10, 2023	Mar 18
Connecticut	Ned Lamont (D)	25¢/gal	Apr 1 - Dec 31, 2022*	Mar 24
New York	Kathy Hochul (D)	16¢/gal	Jun 1 - Dec 31, 2022	Apr 7
Florida	Ron DeSantis (R)	25.3¢/gal	Oct 1 - 31, 2022	Jul 14

*Unlike other states, Connecticut gradually phased out the gas tax holiday. Following the 25 cent cut in 2022, the tax increased by 5 cents per month beginning in January of 2023, until it reached the previous level of 25 cents in May 2023.

tial out the impact of changes in the national or global macroeconomic environment, such as shifts in monetary policy, supply chain disruptions, or shocks to commodity markets.

The key identification assumption in our research design is that inflation expectations would have followed parallel trends in treated and control states absent the passage of the gas tax holiday. This would be violated if the decision of states to enact tax holidays is correlated with time-varying unobserved macroeconomic shocks that also affect household beliefs.

We provide two pieces of evidence to support this assumption. First, whether states implemented tax holidays appears to be primarily driven by political considerations. As an illustrative example, consider neighboring states Maryland and Virginia, which both experienced similar increases in gas prices. Governors of both states pushed for tax suspensions in March 2022. However, Virginia governor Glenn Youngkin's proposal was opposed by transit proponents and rejected by Democrats in the state Senate, while Maryland's policy garnered bipartisan support and was signed into law (Moomaw, 2022; Collins, 2022). Similarly, in Michigan, the state House and Senate passed a gas tax holiday, but Democratic governor Gretchen Whitmer vetoed the bill. In total, gas tax holidays were proposed in 21 state legislatures, but implemented only in five. Additional discussions of states that proposed legal actions that did not implement a gas tax holiday are available in Table A.1 in Appendix A.2. In general, states with Republican governors and legislatures tended to favor tax suspension policies, while Democratic-controlled state houses tended to oppose them.[6]

[6]Of the 21 states that debated these policies, they were proposed by a Republic governor or congressperson

One might wonder if specific state-level characteristics influenced the decision to consider and implement gas tax holidays. For instance, legislators in states experiencing more rapidly rising inflation might be more inclined to introduce temporary tax suspensions, or those in states with higher economic growth might have more fiscal leeway to reduce taxes. To address these considerations, we compare a number of macroeconomic variables across states that implemented gas tax suspensions versus those that did not in Table 2. We find that the overall economic environments of the treatment and control states are quite similar. Notably, our main variable of interest, the 1-year ahead inflation expectations, is not statistically significantly different across the two groups of states.[7] Therefore, it appears unlikely that state governments were reacting to state-specific macroeconomic conditions that could potentially create an endogeneity bias.

Second, we conduct several analyses to substantiate the parallel trends assumption. In Section 5.2, we perform an event study analysis that shows that household inflation expectations appear to follow similar paths prior to the enactment of the policy. Gas prices in treated and control states also appear to be on parallel trends before the tax is suspended, which we show in Section 4. We also perform a set of placebo analyses using the set of states that debated but did not implement gas tax holidays, which we discuss further in Section 5.

Finally, we note that the most plausible stories for endogeneity of the policy implementation would bias us towards finding a null effect. Suppose treated states were on a higher inflation trajectory relative to control states, and lawmakers responded by suspending the gas tax. This would lead us to find that inflation expectations in treated states would have *risen*, not fallen, relative to the control group absent the policy. If this were the case, the treatment effects that we estimate in this paper would be a lower bound for the true impact of the policy.

One potential area of concern is the tax suspension in Florida. Florida originally passed a gas tax holiday in May 2022 to take effect in October. However, the first weekend of the tax cut was concurrent with the landfall of Hurricane Ian, which resulted in 161 deaths and caused over $50B in infrastructure damage. As our survey was also active during this

in 15 (see Tables 1 and A.1).

[7]We observe that the macro variables for states that implemented the gas tax holiday align closely with those for states that considered but did not implement it. Further analysis confirms that our results are robust when using this latter group as the control, instead of all other states.

Table 2: Macroeconomic variables in Gas Tax Holiday states vs. others

	(1)	(2)	(3)
	States		
	Implemented	Did Not Implement	
Average from 2021M2 to 2022M2		Considered	Did Not Consider
Unemployment Rate (%)	5.26	5.15	4.21
	(0.18)	(0.09)	(0.07)
Growth Rate of Real GDP (%)	6.26	5.74	5.00
	(0.37)	(0.25)	(0.18)
Growth Rate of Nominal GDP (%)	10.56	11.57	12.27
	(0.39)	(0.23)	(0.20)
Inflation rate (%)	4.73	4.90	4.64
	(0.21)	(0.16)	(0.08)
1 year ahead Inflation Expectations (%)	5.15	5.03	5.25
	(0.14)	(0.10)	(0.08)
Growth Rate of Consumption (%)	16.80	17.08	16.98
	(1.32)	(0.68)	(0.47)
Number of States	5	16	29

This table displays the mean values of each state-specific macro variable for the three groups of states before the implementation of the gas tax holiday, from February 2021 to February 2022. Standard errors are provided in parentheses. The data sources are as follows: the unemployment rate is from the Local Area Unemployment Statistics Database (BLS); growth rates of real and nominal GDP are from the BEA regional data (series SQGDP2 and SQGDP9); 1-year ahead inflation expectations are calculated based on the NY-Fed SCE; and the growth rate of credit card consumption is from the Opportunity Insight Database. State-level price indices are derived from the Regional Price Parities from BEA, multiplied by the US CPI from BLS. Since Regional Price Parities data are available only annually, the table reports annual inflation rates for 2021.

time, we are cautious in interpreting these results, as the effects of the tax holiday may be confounded by the impacts of the hurricane on the state's economic conditions.

3 Data

Our analysis in this paper combines data from several sources. We use state-level data on gas prices from the American Automobile Association (AAA).[8] They report daily price data for regular, mid-grade, and premium fuel. We scrape the historical data from all available dates between January 1, 2021 to August 17, 2023 using the Internet Archive. The data are available for approximately 2/3 of the days in this interval. We take the daily price in each state as the average of the three fuel grades.

[8]Data is publicly available at https://gasprices.aaa.com/state-gas-price-averages/

To measure consumption responses to the policy, we use state-level debit and credit card consumption data sourced from Opportunity Insights.[9] This data is constructed by Affinity Solutions and captures 10% of all debit and credit card spending in the US (Chetty et al., 2023). Evidence from the Diary of Consumer Payment Choice shows that 60% of US payments were made using credit and debit cards in 2022, which accounted for 35% of total payment value (Foster et al., 2023).

3.1 Household inflation expectations

For our analysis of state-level inflation expectations, we utilize data from two sources: the Survey of Consumer Expectations (SCE) conducted by the Federal Reserve Bank of New York and an online survey that we implemented independently. The SCE is a nationally representative, internet-based survey of a rotating panel of approximately 1,300 respondents monthly. Survey respondents are asked a series of questions about their perception of inflation, unemployment, and other macroeconomic variables. Importantly, the SCE surveys the same respondent in multiple months, which allows comparisons within an individual over time. A drawback of the SCE for this study is that the sample size in each state is relatively small. On average, the survey includes about 25 respondents per state in each month, with a higher number of participants from more populous states. We use SCE data from January 2021 to January 2023.

To increase statistical power, we conducted an additional online survey using the platform Prolific. This survey included respondents from both treated states and neighboring control states, and was administered in multiple waves to measure inflation expectations before, during, and after the tax holidays took effect. Our survey questions were designed to align closely with those used in the SCE. The sample survey questionnaires used in our study can be found in the Online Appendix Section A.4.

Our survey gathered samples from four states that implemented a gas tax holiday: Maryland, Georgia, New York, and Florida. In each survey wave, we also collected data from a neighboring control state which did not reduce the gas tax. Detailed information on the scope of the online survey can be found in Table A.2. Our dataset primarily consists of panel data, except for the data from Georgia and Alabama, where we administered only one sur-

[9] Data is publicly available at https://www.opportunityinsights.org/data

vey wave. The data collection periods were varied, covering time frames before, during, and after the gas tax holiday.

When gathering our data, we did not impose any demographic restrictions on our sample. To ensure a fair representation of each state's demographics, we apply survey weights for analysis. These weights are constructed based on state-level demographic characteristics as obtained from the American Community Survey (ACS). Table A.3 presents aggregated demographic characteristics across the states. Compared to ACS data, our unweighted Prolific sample tends to skew towards a younger and more highly educated population. This skew might reflect the demographic characteristics of individuals who typically participate in online surveys. In contrast, the unweighted SCE data tends to over-represent white, older, and highly educated demographics. We combine the SCE and Prolific data and construct individual survey weights to match state-level demographic characteristics. After applying these weights, the demographic distribution in our dataset closely aligns with the figures from the ACS.

To gather data on inflation expectations, we adopt the exact same questionnaire format used by the SCE. The SCE asks respondents to allocate a percentage chance across predefined intervals of inflation rates, a method known as soliciting density forecasts of inflation expectations. Our primary measure of inflation expectations is the expected value computed from this density forecasts. Table A.4 compares the survey-weighted average and standard deviation of 1-year ahead inflation expectations during the gas tax holiday, as derived from our online Prolific survey and the SCE.[10]

In general, the Prolific data reports higher 1-year ahead inflation expectations compared to the SCE. Several factors might contribute to this discrepancy. There could be inherent differences between respondents from the Prolific platform and SCE participants. Additionally, learning effects through repeated survey participation in SCE could influence results. Kim and Binder (2023) discuss these learning-through-survey effects for SCE's repeat participants. The SCE revisits their respondents up to 12 times, and they find that SCE participants consistently reported lower inflation expectations as they became more familiar with

[10]Note that the online survey period does not cover the entire duration of the gas tax holiday. When comparing the weighted average of inflation expectations during the online survey data collection period, the SCE data has only a few observations.

the survey. By the end of their participation, their inflation expectations dropped by approximately 2 percentage points compared to their initial responses. These learning effects might be more prevalent for SCE data since our online data revisits the respondents at most 3 times. Given these nuanced disparities in reported expectations, we incorporate survey tenure fixed effects in our models to control for these level differences.

In addition to the inflation and consumption-related questions that mimic the SCE, our survey's final phase also included a randomized experiment component with an information treatment, which was administered after respondents had reported their inflation expectations. Specifically, we randomly selected half of the respondents in the treated states and gave them additional information about the gas tax holiday. This experiment was designed to assess whether increased awareness of the policy influenced households' inflation expectations relative to a control group in the same state that did not receive this information. Following the information treatment, selected respondents were again asked to report their inflation expectations. Control group participants were also asked to report their inflation expectations a second time, but received no information about the policy.

4 Pass-through rates to Retail Gas Prices

We begin our analysis by documenting the effect of the gas tax holidays on retail gasoline prices. If markets are imperfectly competitive, gas tax reductions may not be fully passed on to consumers, and the effect of the policy on inflation expectations may be blunted. Indeed, prior studies of gas tax holidays find incomplete pass-through rates range between 0.4 and 1 (Doyle and Samphantharak, 2008; Genakos and Pagliero, 2022).

Pass-through was an issue of particular concern among state governments in this context. The attorneys general in Georgia, New York, and Connecticut threatened gas stations that did not pass through the tax cut with legal action for violating price gouging statutes, while retail gasoline providers complained that they were stuck with taxed fuel that they had purchased before the tax cut took effect (Reisman, 2022; Herb, 2022; Shirek, 2022).[11] This could create incentives for retail gas stations to raise prices prior to the tax holiday to leave themselves room to cut them again as the policy took effect. Indeed, we see evidence of anticipatory price increases in some states.

[11] In many states the fuel excise tax is collected by the supplier or distributor.

We first study the dynamics of gasoline prices in tax holiday states with the following regression equation:

$$P_{st} = \alpha_s + \beta_t + \lambda_{st} \times D_s + \epsilon_{st}, \tag{1}$$

where P_{st} is the retail gasoline price in state s and day t, α_s and β_t are state and day fixed effects, and D_s is a dummy variable equal to one for states implementing a gas tax holiday. The λ_{st} reflects the weekly gas prices in a treated state compared to control states, which are defined as neighboring states.

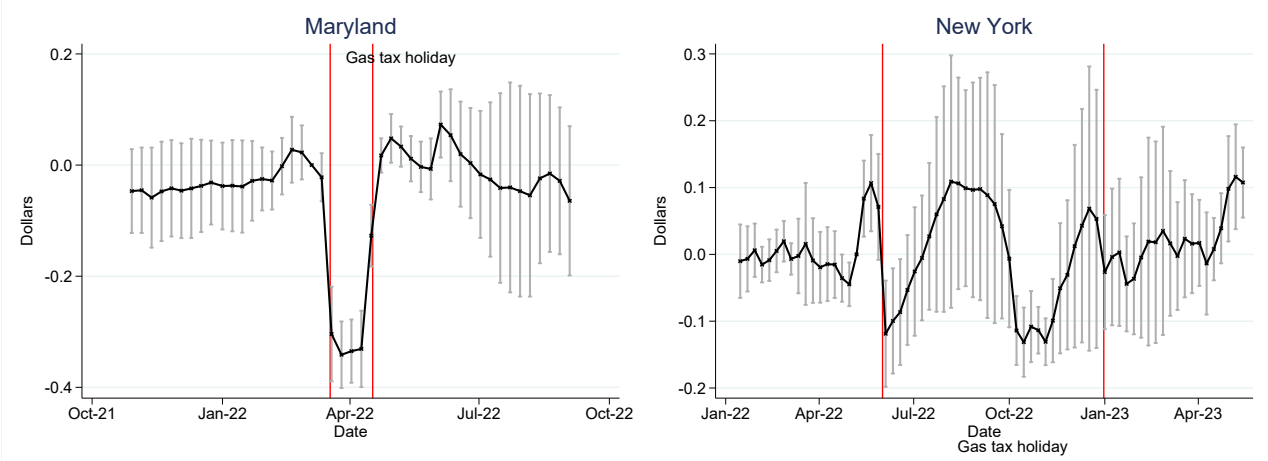
Figure 2 plots the time-varying coefficients, $\widehat{\lambda}_{st}$, along with their 95% confidence intervals for the gas tax holidays in Maryland and New York. In Maryland, retail gas prices prior to the holiday closely track those of neighboring states. When the tax holiday goes into effect, prices immediately drop by close to the full amount of the tax reduction and remain lower for the duration of the period. On average, prices during the holiday were 30 cents lower relative to control states, indicating near-complete pass-through of the 36 cent tax reduction.

The right panel of Figure 2 shows the same analysis for the New York tax holiday, where the story is quite different. In contrast to Maryland, which approved a tax suspension in March 2022 to be effective immediately, New York passed its tax holiday in April to take effect in June 2022. In the three months prior to the holiday, prices in New York remained close to those in neighboring states. About three weeks before the policy was set to take effect, the relative price in New York increased by about 10 cents, before dropping again as the tax was reduced by 16 cents beginning on June 1. As a result of the increase prior to the policy, the gas price in New York did not drop by nearly as much as in Maryland, relative to the prices in neighboring states. Interestingly, after the expiration of the tax holiday, New York gas prices appear to resume tracking those of control states. We interpret this apparent low pass-through as evidence that a significant fraction of the tax cut was captured by gasoline suppliers in New York.[12]

We then estimate average pass-through during the tax cut using a static difference-in-differences specification:

[12]We repeat this event study analysis for Connecticut, Georgia, and Florida, which we show in Figure A.1. Results look similar to Figure 2, with no obvious pretrends..

Figure 2: The Gas Prices in Gas Tax Holiday states vs. neighboring states



Notes: The figures plot the estimates $\widehat{\lambda}_{st}$ from the regression equation (1), along with a 95% confidence interval. In the left panel, the treated state is Maryland, with Pennsylvania (PA), Delaware (DE), Virginia (VA), and West Virginia (WV) serving as control states. In the right panel, the treated state is New York, with Pennsylvania (PA), Delaware (DE), New Hampshire (NH), and New Jersey (NJ) chosen as control states. The periods between the red vertical line indicate the period of gas tax holiday. Standard errors are clustered at the state level.

$$P_{st} = \alpha_s + \beta_t + \gamma_s D_{st} + \epsilon_{st}, \tag{2}$$

where D_{st} is an indicator variable set to one during the gas tax holiday period in treated states. Table 3 presents the regression results. Our findings indicate significant state-by-state variation in pass-through rates. Consistent with Figure 2, prices in Maryland fell by nearly 30 cents of the 36 cent tax decrease, implying a pass-through rate of 0.83. In Florida, we find a decrease of 20.8 cents per gallon, translating to a pass-through rate of 0.82 with a 25-cent tax cut. Georgia and Connecticut saw reductions of 18.1 and 13.9 cents per gallon, corresponding to pass-through rates of 0.62 and 0.56, respectively. New York, however, showed an almost negligible pass-through effect on its retail gas prices, although we note that the 95% confidence interval includes values as large as 0.5.

Our study explores the average pass-through rates of gas tax suspensions on state-level gas prices. Nonetheless, it is conceivable that the gas tax holiday's impacts vary within a state, particularly between cities near state boundaries compared to those more centrally located. This hypothesis aligns with findings from Doyle and Samphantharak (2008), showing smaller pass-through estimates near state borders. While an in-depth analysis of differential

Table 3: State-level Gas Tax Holiday Pass-through

	(1)	(2)	(3)	(4)	(5)
	Daily Gas Prices (dollars)				
	MD	GA	CT	NY	FL
Gas Tax Holiday (D_{st})	-0.299***	-0.181***	-0.139***	0.00471	-0.208***
	(0.0355)	(0.0183)	(0.0301)	(0.0393)	(0.00678)
Constant	3.724***	3.479***	3.836***	3.808***	3.504***
	(0.000247)	(0.00154)	(0.00236)	(0.00188)	(0.0000337)
State FE	Yes	Yes	Yes	Yes	Yes
Day FE	Yes	Yes	Yes	Yes	Yes
Observations	4,315	3,452	4,315	4,315	6,041
R^2	0.99	1.00	0.99	0.99	1.00
Gas tax cut (dollar)	0.36	0.29	0.25	0.16	0.25
Passthrough	0.83	0.62	0.56	0.03	0.82
Passthrough 95% CI	[0.64,1.02]	[0.50,0.75]	[0.32,0.79]	[-0.45,0.51]	[0.77,0.88]
Percent change (%)	-7.72	-4.88	-3.40	0.10	-4.97
Percent change 95% CI	[-9.52,-5.93]	[-5.84,-3.91]	[-4.83,-1.96]	[-1.53,1.73]	[-5.28,-4.65]

Notes: The table presents the regression results based on the regression equation (2). The row labeled "Gas tax cut(dollar)" represents the size of the temporary gas tax cut in dollar terms, while the "Passthrough" row reports the pass-through rates for each state. "Passthrough 95% CI" notes 95% confidence interval. "Percent change (%)" reports percent changes in gas prices compared to the average over the previous three months before the implementation of the tax holiday and "Percent change 95% CI" reports 95% confidence interval. The control states for the analysis are as follows: for Maryland, Pennsylvania (PA), Delaware (DE), Virginia (VA), and West Virginia (WV); for Georgia, Tennessee (TN), South Carolina (SC), and Alabama (AL); for Connecticut (CT), Massachusetts (MA), Rhode Island (RI), and Pennsylvania (PA); for New York (NY), Pennsylvania (PA), Delaware (DE), New Hampshire (NH), and New Jersey (NJ); and for Florida, North Carolina (NC), South Carolina (SC), Virginia (VA), Tennessee (TN), Alabama (AL), and Mississippi (MS). State-level clustered standard errors are indicated in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

pass-through rates within states is feasible, our investigation focuses on state-level averages, as the sample size of our survey is insufficient to measure inflation expectations at a finer geographical level.

The extent to which the gas tax holiday affected retail gas prices varies widely across the five treated states. There could be several possible reasons for this heterogeneity. There may be differences in local market structure and demand elasticity across states, which would generate variation in pass-through rates. It may also be the case that the degree of pass-through depends on the magnitude and duration of the tax cut. A larger tax cut or shorter duration may have made the effects on gas prices more pronounced. Finally, the timing of the announcement of the policy may affect the pass-through. In states like Florida and New York, the tax cut was announced several months prior to its implementation, which may have allowed retailers to raise their prices in advance of the policy. Our data does not allow us to distinguish between the possible factors that affect the pass-through of the tax cut. Rather, we take the incidence of the policy as given and aim to investigate its effects on inflation expectations and consumption.

5 Household inflation expectations

5.1 State-level specification: compared to neighboring control states

In order to assess how the gas tax holiday affects inflation expectations, we first start with a state-level difference-in-differences regression approach with both individual and time-fixed effects, as shown below:

$$\pi^e_{ist} = \alpha_i + \beta_t + \gamma X_{it} + \beta D_{st} + \epsilon_{st}, \tag{3}$$

where π^e_{ist} denotes 1-year ahead inflation expectations for individual i in state s and month t, α_i represents individual-fixed effects, β_t captures monthly fixed effects, X_{it} includes survey tenure dummies, and D_{st} is an indicator equal to one if the survey was administered during the gas tax holiday in the treated state. We estimate effects for each treated state separately, including a set of nearby non-treated states as controls. Table 4 reports the regression results. We find large negative and statistically significant effects of the gas tax policy on

inflation expectations in Maryland, Georgia, and Connecticut. In Maryland, 1-year ahead inflation expectations during the gas tax holiday are 1.4 percentage points (pp) lower than in control states, with Georgia and Connecticut showing reductions of 1.4 pp and 2.1 pp, respectively. The coefficients for New York and Florida are negative but not statistically different from zero.[13]

We attribute the heterogeneity in estimated effects across states to several factors. We first note that our results in Section 4 indicate that New York had essentially zero pass-through of the tax cut into gasoline prices over the holiday period. If gas tax changes impact inflation expectations through retail gas prices, it should be unsurprising that the observed effect in New York is more muted than in other states. Building on this insight, we explore a regression specification that relates the observed decline in gas prices to inflation expectations in the following section.

In contrast, in Florida, we find that the policy decreased prices by \$0.21 (on a tax cut of \$0.25), yet still observe no effect on inflation expectations. We note that the beginning of the gas tax suspension in Florida coincided with the landfall of Hurricane Ian on September 29, 2022, which killed 161 people and caused over \$50B in damage. We thus interpret results from Florida with caution, as the destruction caused by the storm could have interrupted usual the gasoline purchases of consumers. This event also could have impacted household attitudes towards the economy, potentially raising inflation expectations during the holiday, consistent with the findings from Kamdar (2019), who suggest that households associate higher inflation expectations with pessimistic beliefs about the economy.

Finally, it may be the case that the importance of gas prices for inflation expectations varies during our sample period. We note that the Maryland, Georgia, and Connecticut tax cuts were implemented in Spring 2022 during a time when both inflation and gas prices were rapidly rising, while the New York and Florida policies took effect in June and October 2022, respectively, when gas prices had declined slightly and inflation growth was more stable, as shown in Figure 1. During periods of rapid price increases (particularly in early 2022), there was also heightened public attention to gas prices, corroborated by Google searches for "gas prices" peaking in February and March and declining significantly by October (also

[13]Table A.5 in Online Appendix A.2 reports the regression results based solely on SCE data. Results are similar, but less precisely estimated.

Table 4: State-level effects on inflation expectations

	(1)	(2)	(3)	(4)	(5)
	Expected inflation rate (density)				
Gas Tax Holiday (dummy)	-1.365** (0.676)	-1.449** (0.711)	-2.065** (0.888)	-0.185 (0.292)	-0.0171 (0.220)
State	MD	GA	CT	NY	FL
Sampling Weight	Yes	Yes	Yes	Yes	Yes
Time Fixed Effect	Yes	Yes	Yes	Yes	Yes
Individual Fixed Effect	Yes	Yes	Yes	Yes	Yes
Survey Tenure Fixed Effect	Yes	Yes	Yes	Yes	Yes
Data	Combined	Combined	Combined	Combined	Combined
Observations	1,881	2,251	2,312	3,270	6,241
R^2	0.71	0.64	0.66	0.70	0.71

Notes: The table presents the weighted regression results based on the regression equation (3), utilizing pooled data with individual and monthly-time fixed effects. Control states are defined as neighboring states to the treated states. The control states for Maryland are Pennsylvania, Delaware, Virginia, and West Virginia. For Georgia, the control states are Tennessee, South Carolina, and Alabama. Connecticut's control states are Massachusetts, Rhode Island, Pennsylvania, and New Jersey. The control states for New York include Pennsylvania, Delaware, New Hampshire, and New Jersey. Lastly, the control states for Florida are North Carolina, South Carolina, Virginia, Tennessee, Alabama, and Mississippi. Individual-level clustered standard errors are indicated in parentheses.

shown in Figure 1). This increased attention may have intensified the influence of gas prices on inflation expectations. This hypothesis is also aligned with Pfäuti (2024), showing that public's attention on inflation rises nonlinearly with increases in inflation.

5.2 Pooled specification

We next turn to a pooled specification that combines the five state-level experiments in a single regression. Pooling the data both improves statistical power and yields an average treatment effect across the different policy implementations. A growing body of work in econometrics has raised concerns with using standard panel data models to estimate the effects of staggered treatments. A principal issue is that the two-way fixed effects model uses earlier-treated units as a control for later-treated observations, which can introduce bias when treatment effects are heterogeneous (Goodman-Bacon, 2021).

We deal with this issue by adopting the stacked difference-in-differences approach from Cengiz et al. (2019). The process begins by compiling a dataset that encompasses the treated states and all other states serving as controls, specifically excluding any states that under-

went treatment, for a duration of 100 days both preceding and following the gas tax holiday. Subsequently, we "stack" these individual datasets into a single dataset for analysis. We use this combined dataset to run a regression that includes interactions between individual IDs and an indicator for the experiment, as well as interactions between time and the experiment, where the experiment refers to a single treated state and its associated control group. The regression equation is as follows:

$$\pi^{e}_{eit} = \alpha_{ei} + \gamma X_{eit} + \beta_{et} + \beta D_{eit} + \epsilon_{eit}, \tag{4}$$

where π^{e}_{eit} denotes 1-year ahead inflation expectations in experiment e for an individual i at time t, α_{ei} is an indicator set to one during the gas tax holiday for individuals in a treated state.

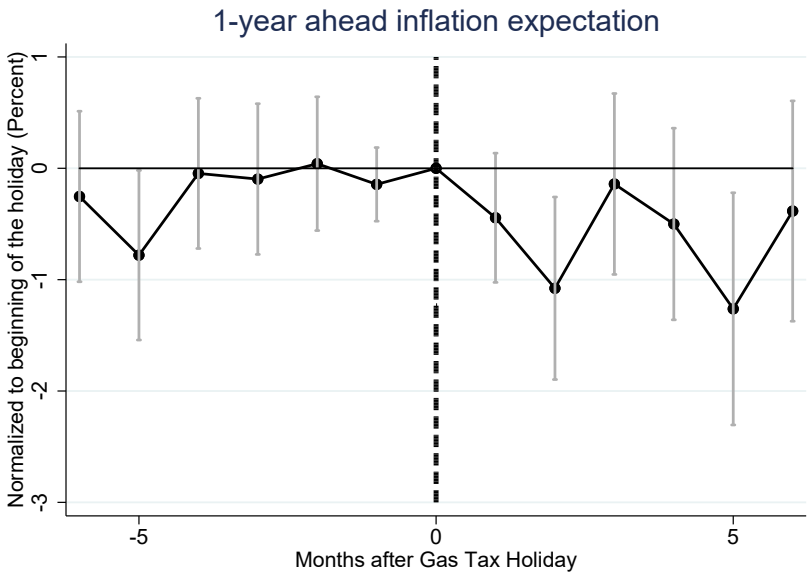
As we discuss in Section 2, the validity of our identification strategy depends on the assumption that inflation expectations would have followed parallel trends in treated and control states in the absence of the policy. We first investigate this assumption by running a dynamic, or event study, version of the stacked difference-in-differences specification in equation (4) in which we allow the treatment coefficient β to vary over time. We plot the results of this analysis in Figure 3, where the coefficient in month 0, the calendar month in which the treatment was enacted, is normalized to 0. Prior to the implementation of the gas tax holiday, there is no evident pre-trend. Following the tax suspension, we see a noticeable decline in household inflation expectations, beginning in month 1.[14]

Table 5 presents the regression results. The first two columns show our baseline specification, while the latter two columns add time-varying state-level controls – the unemployment rate and growth rates of nominal and real GDP.[15] We find that the implementation of the gas tax holiday reduced inflation expectations by 0.31 percentage points on average, with a 95% confidence interval that ranges between -0.59 and -0.03. In columns (2) and (4), we interact the treatment dummy with the average percent change in gas prices multiplied by 100. Our estimates imply that a tax reduction that resulted in a 5% decline in gas prices reduced in-

[14]We note that the tax suspension begins in the middle of the calendar month in Georgia, Maryland, and Connecticut, and so month 1 in the plot is the first fully treated period.

[15]Note that the nominal and real GDP data are available on a quarterly basis. To convert this data into a monthly frequency, we interpolated the data.

Figure 3: Event study specification



Notes: The figure illustrates the dynamics of 1-year ahead inflation expectations in treated states compared to control states, as per the stacked difference-in-differences (DID) specification. On the y-axis, the inflation expectations are normalized to zero in month 0, the month that the tax suspension takes effect (also marked by the vertical dashed line).

flation expectations by approximately 0.4 percentage points. This finding underscores that the principle channel through which the tax cut can impact household beliefs is through prices. It also may provide guidance for policymakers seeking to design tax holidays during inflationary periods as to their likely effects on household expectations.

Drawing from the pass-through estimates reported in Section 4, we can project the state-level changes in inflation expectations attributable to the gas tax holiday using estimates from Table 5. The red bars in Figure 4 illustrate the predicted changes in inflation expectations due to the gas tax holiday across the treated states. According to our estimation, Maryland is predicted to have lowered inflation expectations by 0.77 percentage points. In comparison, Florida and Georgia are projected to reduce inflation expectations by 0.42 and 0.41 percentage points, respectively. Meanwhile, Connecticut is expected to see a decrease of 0.21 percentage points in inflation expectations, while New York exhibits a 0.24 percentage point increase; however, we note that the confidence intervals around the estimated effect in New York and Connecticut include zero. These predictions qualitatively align with our

Table 5: Impact of the Gas Tax Holiday on Inflation Expectations: Pooled Effects

	(1)	(2)	(3)	(4)
	Control Group: All states			
	1-year ahead Inflation Expectation Rate (Density Forecast)			
Gas Tax Holiday (dummy)	-0.314**	0.280	-0.305*	0.229
	(0.156)	(0.223)	(0.157)	(0.236)
Gas Tax Holiday × Percent Gas Price Change		0.145**		0.130**
		(0.0565)		(0.0591)
Sampling Weight	Yes	Yes	Yes	Yes
Experiment × Individual FE	Yes	Yes	Yes	Yes
Experiment × Time FE	Yes	Yes	Yes	Yes
Experiment × Survey Tenure FE	Yes	Yes	Yes	Yes
State-level controls	No	No	Yes	Yes
Data	Combined	Combined	Combined	Combined
Observations	68,463	68,463	68,463	68,463
R^2	0.67	0.67	0.67	0.67

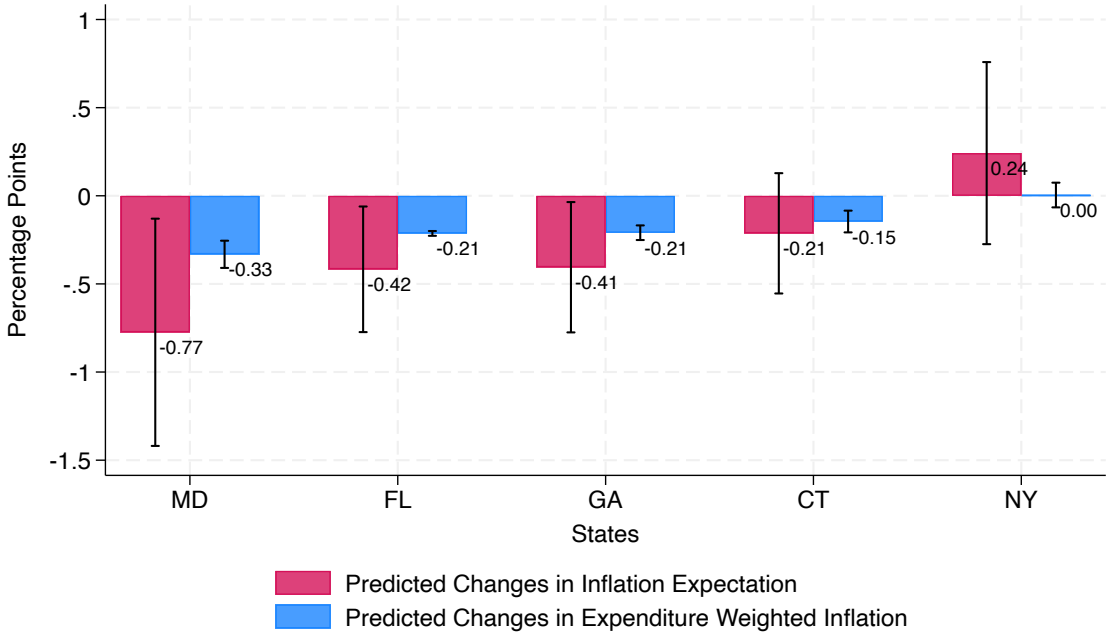
state-level difference-in-differences regression findings, with Florida being the exception.[16]

To benchmark the magnitude of this effect, Figure 4 compares the predicted changes in inflation expectations (red bar) with the predicted changes in expenditure-weighted inflation (blue bar) attributable to the gas tax holiday. Utilizing data on gas price reductions during the tax holiday, we can compute the state-level expected change in the expenditure-weighted inflation rate. Consider Maryland as an example: state-level gas prices declined by approximately 7.7% during the holiday. Given that gas consumption constitutes about 4.3% of total expenditures nationally, this reduction in gas prices would curtail inflation by about 0.3 percentage points. This comparison suggests that households tend to place greater importance on gas prices in shaping their inflation expectations than the actual expenditure share of gas might suggest, although we note that the expenditure-weighted estimate is within the confidence interval of the predicted effect.[17] One caveat to this exercise is that

[16]The quantitative differences between the estimates in Table 4 and Table 5 primarily stem from Florida. Although the tax cut in Florida had a relatively large effect on gas prices, we find almost no effect on inflation expectations, possibly due to Hurricane Ian or the timing of the holiday's enactment. Our pooled regression analysis, which still includes Florida, may therefore underestimate the effect of the gas tax holiday. Table A.7 in Online Appendix A.2 presents the results of a pooled regression that excludes Florida, showing that the quantitative implications become more aligned with those from Table 4.

[17]This comparison is conservative, particularly because our pooled specification incorporates data from Florida. Upon excluding Florida from our analysis, we observe a marked difference: households in the treated states, on average, place 5.6 times more emphasis on gas prices in shaping their inflation expectations (relative

Figure 4: Predicted changes in inflation expectations across states



Notes: In the figure, the red bars represent the predicted changes in inflation expectations, as based on our estimates reported in Table 5. Conversely, the blue bars illustrate the expenditure-weighted changes in inflation expectations attributable to changes in gas prices during the gas tax holiday. The black solid line across the bars indicates the 95% confidence interval.

Table 6: Time Series Analysis of Gas Price Fluctuations and Inflation Expectations

	(1)	(2)	(3)
	Changes in 1-year ahead Inflation Expectation		
	$\pi^e_t - \pi^e_{t-1}$	$\pi^e_{st} - \pi^e_{st-1}$	$\pi^e_{it} - \pi^e_{it-1}$
Monthly Growth Rates of Gas Prices (%)	0.0462*	0.0419***	0.0364***
	(0.0222)	(0.00671)	(0.00366)
Constant	-0.0940	-0.0739	-0.143***
	(0.172)	(0.0562)	(0.0288)
Unit of Observation	Aggregate	State	Individual
Gas Prices	National	State	State
Observations	13	661	16,072
R^2	0.28	0.06	0.01

Notes: Sample period: December 2021 to January 2023. Column (1) examines how aggregate 1-year ahead inflation expectations respond to monthly percent changes in national gas prices. Column (2) investigates how state-level 1-year ahead inflation expectations are influenced by monthly percent changes in state-level average gas prices. Column (3) analyzes individual inflation expectations in response to state-level monthly percent changes in gas prices. Standard errors are provided in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

gasoline may itself be an input to other goods, although evidence from Cavallo (2008) and Binder (2018) suggest that gas price inflation has limited influence on core inflation rates.

Our estimates are notably larger than the effect sizes from prior literature, which has primarily used time-series variation in gas or oil prices. After controlling for state-level macroeconomic conditions (column (4) in Table 5), we observe that a 1 percentage point (pp) decrease in gas prices leads to a reduction in inflation expectations by about 0.13 pp. In comparison, Coibion and Gorodnichenko (2015) find that a 1 pp increase in gas prices results in an increase in inflation expectations of 0.016 pp, and Binder (2018) reports that a 1 pp increase in gas prices corresponds to a 0.01 pp rise in headline inflation expectations.[18]

The divergence between our results and those in past literature could result from the potential endogeneity of gas prices to other macroeconomic shocks that impact inflation expectations. For example, monetary policy responds to the headline inflation rate including food and energy prices (Powell (2022)). Additionally, if positive oil price shocks occur during

to about 2 in more baseline estimates) than what would be suggested by their share in total expenditures.

[18] An exception is Aidala et al. (2024), who study inflation in a similar period to our study using an experimental design in which survey individuals report how their inflation expectations would change under a hypothetical change in gas prices. They report that a 1 pp increase in gas prices leads to a 0.075 pp increase in inflation expectations.

times when inflationary pressures are low, the measured sensitivity of inflation expectations to gas prices may be attenuated. However, the discrepancy may also simply reflect differences in the impact of gas prices across different sample periods. To further investigate this, we replicate the analysis from Coibion and Gorodnichenko (2015) during our sample period (December 2021 to January 2023).[19]

We report the results from both aggregate and individual-level first difference specifications in Table 6. In contrast to our baseline estimates that are identified purely from gas price variation across states induced by the tax holidays, the coefficients in Table 6 are primarily identified from fluctuations in global oil markets over time. The individual-level specification in column (3) shows that a 1% decrease in gas prices leads to a reduction in inflation expectations of 0.036 pp, which is about a quarter of the size of the effect from Table 5 and much closer to estimates from prior literature. The large differences in treatment effects between the two approaches further highlight the identification advantages of our policy setting.

Of course, we cannot completely rule out the role of other factors that explain the difference between our results and those from prior work. We study an inflationary period that coincides with an extremely rapid increase in gas prices (an average increase of over 50% during the first 6 months of 2022). Gasoline prices may be particularly salient in this context, given the large amount of focus in the popular press on retail gas markets and price levels more broadly.[20] However, analysis of behavior during this period may also be particularly valuable, as this is the exact setting in which monetary or fiscal policy may have the largest impact on household expectations, and thus future inflation.

We show that the variation across states in the effects of the policy on beliefs is significantly correlated with the actual impact on gas prices, which depends on the local pass-through rate. One possibility is that the competitiveness of local gasoline markets itself influences how households form inflation expectations. A more competitive gasoline market

[19]Specifically, following equation (8) in Coibion and Gorodnichenko (2015), we regress the first difference of one-year ahead inflation expectations on the first difference in logged gas prices. While Coibion and Gorodnichenko (2015) uses first differences in logged oil prices, Binder (2018) documents the same results using gas prices. A caveat is that we compute first differences over one-month intervals, while they use six-month intervals.

[20]This evidence is also consistent with D'Acunto et al. (2021), who show that the impact of price increases on household beliefs is significantly larger than price decreases.

may lead to higher pass-through of gas tax reductions, potentially causing broader spillover effects on other prices within the consumption basket, leading to more pronounced changes in inflation expectations. We note that this does not affect the validity of our identification strategy as long as market competitiveness in each state is stable around policy implementation.

If households were to fully grasp the temporary nature of the gas tax holiday and formulate inflation expectations through rational expectations, they may adjust their inflation expectations upwards in anticipation of a future rise in gas prices. Contrary to this prediction, our findings indicate a decline in inflation expectations during gas tax holidays, suggesting a deviation from the FIRE model. This discrepancy may suggest that households adopt a backward-looking approach to forming inflation expectations related to gas prices, focusing on past rather than anticipated future prices.

Alternatively, this deviation could be attributed to households' partial comprehension of the temporary nature of gas tax holiday. This interpretation aligns with findings by Bachmann et al. (2021), who reported that a significant fraction of German households misinterpreted the temporary VAT tax cut as a permanent decrease. However, we also find that providing survey respondents in treated states with more information about the gas tax holiday, including its temporary aspect, leads them to lower their inflation expectations (detailed in Section 6). This observation suggests that even with an understanding of the temporary nature of price reductions, respondents still tend to revise their inflation expectations downward, adopting what appears to be a backward-looking method of forming inflation expectations.

5.3 Robustness and Heterogeneity

As we discuss in Section 2, our maintained identification assumption is that inflation expectations would have followed parallel trends in treated and control states absent the policy change. One possible violation of this assumption would be if lawmakers in treated states implemented the policies to respond to some idiosyncratic set of economic shocks in that state. *Ex ante*, we believe this is unlikely; policy implementation was primarily driven by the state political environment, and we find that pre-period macroeconomic conditions appear similar in states that implemented the policy relative to those that did not (see Table 2).

We further test this assumption with two exercises. First, we perform our primary analysis using a different set of control states: those where a tax holiday was formally proposed in the legislature, but not implemented.[21] If gas tax holidays were a response to a particular state-level shock, we might expect the treatment effect to narrow when we compare implementing states to those that proposed the policy, but did not implement it. In Table 7, column (3) shows our overall treatment effect using this control group is -0.437, which is statistically identical to the estimate in our baseline analysis (-0.305 from Table 5, column (3)). Column (4) shows the results from a specification in which we interact the effect with the change in gas prices, which yields a coefficient of 0.0973 (relative to the baseline estimate of 0.130).

Second, we conduct a set of placebo tests using the non-implementing states. Specifically, we take the set of 7 states from Table A.1 where we were able to obtain proposed implementation dates (Alaska, Arizona, Massachusetts, Michigan, Pennsylvania, Virginia, and Washington). We then estimate a version of equation (4) where we define the treatment to be the proposed policy in the non-implementation states, with states that did not consider a gas tax holiday serving as controls. We get a coefficient of -0.0175 (Table 7, column (5)), which is statistically insignificant and much smaller than our primary treatment effect. This provides additional evidence that the effect that we measure is being driven by the gas tax holiday, rather than other confounding factors.

Finally, as we discuss in Section 3, our primary analysis incorporates two distinct sources of data: the SCE, which is administered by the Federal Reserve Bank of New York, and an online survey that we administered via Prolific. We repeat both the state-level analysis (equation (3), presented in Table A.5) and the pooled analysis (equation (4), results in Table A.6) using the SCE data alone. The results are similar to the combined data, although less precisely estimated.

We also explore potential heterogeneous effects of the gas tax holiday on household beliefs. Heterogeneity in inflation expectations across various demographic groups is well-documented in prior literature (see D'Acunto et al. (2023) for a survey). We explore this in our study by estimating equation (4) separately for different groups of respondents. We report the results in Table A.8. We find that treatment effects are particularly strong among male, non-white, and younger age groups. Consistent with our results, D'Acunto and Weber

[21] We provide details of the legislative process in these 16 additional states in Table A.1.

Table 7: Robustness: alternate control groups and placebo tests using non-implementing states

	(1)	(2)	(3)	(4)	(5)
	Expected inflation rate (density)				
Gas Tax Holiday (dummy)	-0.451***	0.111	-0.437**	-0.0495	
	(0.175)	(0.239)	(0.176)	(0.254)	
Gas Tax Holiday × Percent Gas Price Change		0.141**		0.0973	
		(0.0613)		(0.0644)	
Placebo (dummy)					-0.0175
					(0.238)
Sampling Weight	Yes	Yes	Yes	Yes	Yes
Experiment × Individual FE	Yes	Yes	Yes	Yes	Yes
Experiment × Time FE	Yes	Yes	Yes	Yes	Yes
Experiment × Tenure FE			Yes	Yes	Yes
State-level controls	No	No	Yes	Yes	Yes
Data	Combined	Combined	Combined	Combined	Combined
Observations	37,482	37,482	37,482	37,482	55,383
R^2	0.65	0.65	0.65	0.65	0.68

Notes: The table presents the robustness results of our main specification, Equation (4). In columns (1)-(4), perform estimation using states proposed gas tax holidays but did implement them as the control group. Column (5) reports the results of a placebo test using 7 states that proposed gas tax holidays but did not implement them in which we were able to obtain proposed implementation dates (Alaska, Arizona, Massachusetts, Michigan, Pennsylvania, Virginia, and Washington; see Table A.1 for details). We form a control group from states that did not propose or implement gas tax holidays and show the results of the placebo treatment in column (5). The average percent change in gas prices indicates changes in gas prices during the holiday compared to the previous 3-month average gas prices multiplied by 100. Columns (1) and (2) report the results with the experiment interacted with individuals, time, and survey tenure fixed effects but without including state-level control variables. In contrast, Columns (3), (4), and (5) incorporate these fixed effects, while also controlling for state-level variables – state-level unemployment rate and growth rates of nominal and real GDP. Individual-level clustered standard errors are provided in parentheses.

(2020) also emphasize that males are more likely than females to recall gas prices in forming their beliefs.

Columns (10) and (11) of Table A.8 provide a comparison between respondents in the treated states who were aware of the Gas Tax Holiday and those who were not. Our findings indicate that respondents who were aware of the gas tax holiday demonstrate a higher responsiveness of inflation expectations to gas prices. This highlights a potential role for public policy communication in enhancing the effectiveness of such a policy. We investigate this issue further in the next section.

6 Public Policy Communication

The results in the previous section establish that a temporary cut in the gas tax reduced inflation expectations, provided that the tax cut is actually passed through to prices. However, the degree of pass-through in retail gasoline markets is determined by local market structure, which is outside of the direct control of policymakers. Acknowledging this limitation, this section pivots to explore the influence of another lever that may influence the effectiveness of the instrument: public policy communication.

Even if pass-through of the tax cut is incomplete, making consumers aware of the policy may still affect how households adjust inflation expectations.[22] To assess the impact of policy awareness, we implement a randomized experiment in the survey we administered. At the survey's conclusion (and after households have already reported their inflation expectations), we randomly selected half of the participants in treated states to receive an information treatment. We first asked this group whether they were aware of the gas tax holiday, and their prediction for how the policy would impact gas prices. We then provided detailed information about the size and duration of the reduction in the gas tax cut in their state.[23] The other half of respondents were not provided with any additional information. We then asked both groups to report their inflation expectations and consumption sentiments a second time to determine if any adjustments occurred.

We report descriptive statistics from households in three treated states where we admin-

[22]Informing households of the tax cut may also affect competition and thus pass-through rate directly, as shown in Montag et al. (2023).

[23]The specific details of the additional information provided are documented in Figures A.2-A.4, all of which can be found in the Online Appendix A.3.

istered the information treatment—Maryland, New York, and Florida—in Table A.9. Notably, there is some variation across states in when we administered the information treatment; in Maryland, it was run while the gas tax holiday was in effect, while in New York we ran the survey prior to the implementation of the policy. In Florida, we administered the treatment in two waves, one of which occurred prior to the treatment and the other which occurred during the gas tax holiday period. As expected, respondents surveyed during the tax holiday were generally more cognizant of the policy. A majority of participants reported that they expected that the policy would lead to lower gas prices, although their expected pass-through rates are lower than our empirical estimates from Section 4.

In order to assess the effect of the information treatment on inflation expectations, we consider the following regression equation:

$$\pi_{ist}^{e,post} - \pi_{ist}^{e,pre} = \alpha + T_{ist} + \text{control}_{ist} + \epsilon_{ist}, \tag{5}$$

where $\pi_{ist}^{e,post} - \pi_{ist}^{e,pre}$ denotes individual i's revision in inflation expectation post information treatment compared to pre-treatment within the same survey. T_{ist} is an indicator for information-treated respondents. Respondents from the same treated states who did not receive this information serve as our control group. Instead of individual fixed effects, we control for demographic characteristics since we have one observation for each individual. Table 8 displays the regression results. Following the treatment, respondents largely anticipated a cut in gas prices, which led to diminished inflation expectations. In columns (1) and (2), we estimate the effect of the information treatment across all survey waves. Column (1) uses OLS, while column (2) uses Huber robust regression to reduce the influence of outliers. The result in column (2) suggests that the information treatment reduced inflation expectations by approximately 0.7 percentage points.

We further divide the sample by whether the survey was conducted before the cut period (in New York and Florida, columns (5) and (6)) or during the tax holiday (in Maryland and Florida, columns (3) and (4)). We find that the information treatment had a larger effect for respondents surveyed before the tax holiday commenced. This distinction underscores the importance of timely and effective public policy communication, suggesting that preemptive dissemination of policy details may amplify its impact on public inflation expectations.

Table 8: Immediate Revisions in Inflation expectations

	(1)	(2)	(3)	(4)	(5)	(6)
	Forecast revisions in 1-year ahead Inflation Expectations					
Information	-1.957**	-0.704*	-1.682	0.174	-1.613***	-0.890**
treatment	(0.865)	(0.371)	(1.754)	(0.980)	(0.568)	(0.426)
			Survey Implementation			
			During		Before	
Sample fixed effect	Yes	Yes	MD1,FL2	MD1,FL2	NY1,FL1	NY1,FL1
Control for demographics	Yes	Yes	Yes	Yes	Yes	Yes
Robust	OLS	Huber	OLS	Huber	OLS	Huber
Observations	1,220	1,220	209	209	1,011	1,011
R^2	0.07	0.05	0.36	0.15	0.06	0.08

Notes: The table reports the regression results based on (5), incorporating a comprehensive set of control variables such as age, gender, race, income, employment status, level of education, political orientation, housing status, and gas consumption. The analysis divide the sample into two distinct groups: one comprising participants who received information treatment prior to the gas tax holiday (New York wave 1 and Florida wave 1) and another group that was informed during the gas tax holiday (Maryland wave 1 and Florida wave 2). Columns (1) and (2) feature results using OLS regression and robust regression, respectively, and include sample fixed effects to account for the division into pre- and during gas tax holiday groups. Columns (3) and (4) focus on results from the group informed during the Gas Tax Holiday, while Columns (5) and (6) present findings from the group informed prior to the holiday. Each set of results—those using OLS regression in Columns (1), (3), and (5), and those applying robust regression in Columns (2), (4), and (6). Individual-level clustered standard errors are provided in parentheses.

The survey we administered also asked respondents about their planned consumption decisions, including whether they felt it was a good time to make significant purchases such as homes, cars, or other durable goods. We tested the impact of the information treatment on consumption sentiment with the following regression equation:

$$\text{Good Time to Buy}_{ist}^{e,post} - \text{Good Time to Buy}_{ist}^{e,pre} = \alpha + T_{ist} + \text{control}_{ist} + \epsilon_{ist} \tag{6}$$

The regression results presented in Table A.10 reveal that respondents informed about the gas tax holiday reported feeling less inclined to make large purchases compared to the control group, in particular for cars. This finding is consistent with the principles of intertemporal substitution, suggesting that informed individuals perceive a higher real interest rate and consequently opt to reduce their current consumption. To delve deeper into whether these shifts in consumption sentiment translated into actual spending behaviors, the following section investigates actual consumption patterns.

7 Consumption during the Gas Tax Holiday

Finally, we investigate whether the implementation of the gas tax holiday resulted in changes in consumption. We use credit and debit card expenditures at the state level from Opportunity Insights.

The effect of a reduction in the gas tax on overall consumption is theoretically ambiguous. Because demand for gas is inelastic, the direct effect of the tax change is to decrease total expenditure on gasoline.[24] This decrease in consumption increases consumers' disposable income, which could, in turn, stimulate consumption. This effect is consistent with the findings of Gelman et al. (2023), which demonstrate that savings on gas led to an increase in non-gas spending. Nonetheless, there could be a potentially offsetting effect; if the policy reduces inflation expectations, it may increase the perceived interest rate, which could encourage intertemporal substitution. This shift could prompt consumers to perceive saving as more beneficial than spending, ultimately reducing consumption.

To investigate the effect of the gas tax holiday on consumption, we utilize a stacked difference-in-differences approach as described below:

[24] Levin, Lewis, and Wolak (2017) estimate the state-level elasticity of demand to be between -0.245 and -0.325, utilizing credit card transaction data.

$$\ln(C_{est}) = \alpha_{es} + \beta_{et} + \gamma D_{st} + \delta\ D_{st} \times \text{Percent Changes in Gas Prices}_s + \epsilon_{est}, \tag{7}$$

where $\ln(C_{est})$ represents log weekly consumption in experiment e in state s at time t, α_{es} captures state fixed effects for each experiment, and β_{et} controls for monthly time fixed effects for each experiment. D_{st} is an indicator set to one during the gas tax holiday in the treated state, and Percent Changes in Gas Prices$_s$ represents the estimated percentage change in gas prices from Section 4. In this specification, the coefficient δ, measuring the impact of the gas price changes on consumption in a treated state, captures both the extent of reduced gas spending and the intertemporal substitution that occurs during a gas tax holiday. States experiencing a more substantial decline in gas prices result in a reduction in gas expenditure. On the other hand, building upon our earlier findings, larger changes in gas prices are linked to bigger drops in inflation expectations, which in turn fosters stronger motives for intertemporal substitution among consumers.

We report results from estimating equation (7) in Table 9. Our findings reveal that consumption responses are largely negative, and states with larger changes in gas prices experienced more significant reductions in consumption. Specifically, a 1 pp decrease in gas prices resulted in a 0.34 pp drop in consumption. Here, nondurable goods consumption in our analysis includes gas consumption. We find insignificant results in nondurable goods, likely due to the combined effects of savings from reduced gas prices and the positive income effects from these savings.

Remarkably, our findings reveal that the decrease in consumption was more accentuated in the services sector than in the goods sector. This contrasts with prior literature, which has primarily measured the response in purchases of consumer packaged goods using scanner data from AC-Nielsen (Coibion et al., 2022, 2023) or has used survey-reported spending plans (Jiang et al., 2024), which often exclude service consumption. Our study highlights the broader intertemporal substitution effects across both the goods and services sectors, leveraging actual spending data. Service spending in our data includes accommodation and restaurants as well as arts, entertainment, and recreation, which may be more discretionary; in contrast, non-durable goods in this data source include many necessity categories like groceries, general merchandise, and gasoline. The discretionary nature of service spending

Table 9: Consumption During the Gas Tax Holiday

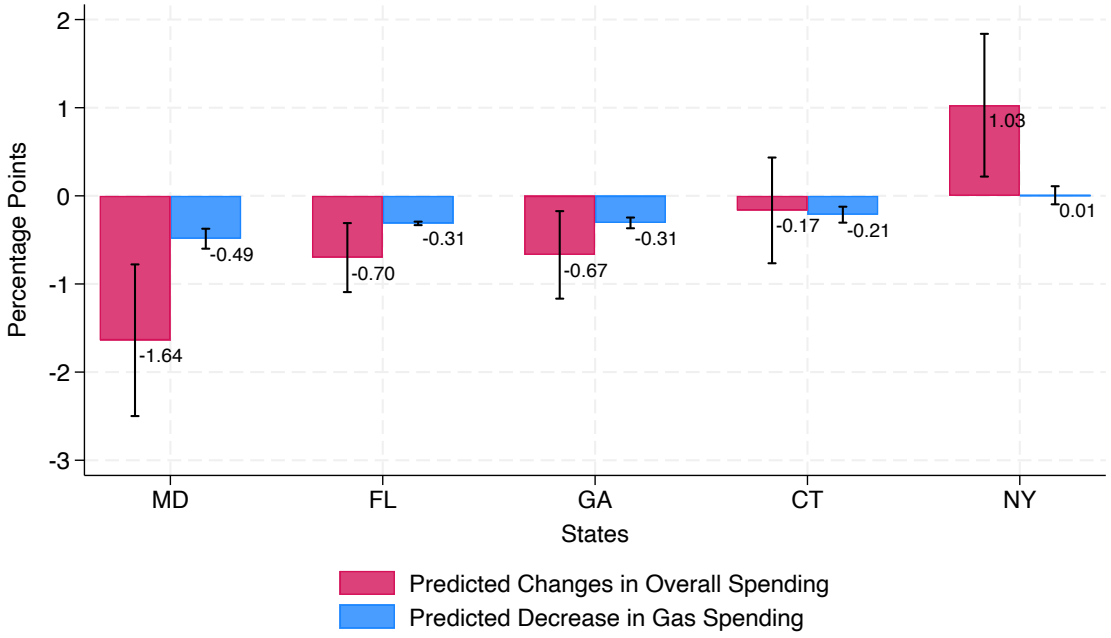
	(1)	(2)	(3)	(4)	(5)
	Control Group: All states				
	Log Spending × 100				
		Goods		Services	
	All	Durables	Non-durables	In Person	Remote
Gas Tax Holiday	0.994***	0.914*	-0.796	3.196***	1.750***
(Dummy)	(0.295)	(0.478)	(0.481)	(0.541)	(0.575)
Gas Tax Holiday	0.341***	-0.0231	0.102	0.713***	0.663***
× Percent Gas Price Change	(0.0637)	(0.113)	(0.0813)	(0.170)	(0.155)
Experiment × State FE	Yes	Yes	Yes	Yes	Yes
Experiment × Time FE	Yes	Yes	Yes	Yes	Yes
State-level Controls	Yes	Yes	Yes	Yes	Yes
Observations	12,236	12,236	12,236	12,236	12,236
R^2	0.89	0.77	0.76	0.82	0.80

Notes: The table shows regression results based on the estimation of equation (7). The dependent variables analyzed are: log spending across all consumption categories (Column (1)), log spending on durable goods (Column (2)), log spending on non-durable goods (Column (3)), log spending on in-person services (Column (4)), and log spending on remote services (Column (5)). Experiment-level state and monthly fixed effects have been incorporated. State-level controls encompass monthly state-level real and nominal GDP. The two main regressors are a gas tax holiday dummy variable and an interaction term between the gas tax holiday dummy and the percent changes in gas prices. The percent change in gas prices indicates changes in gas prices during the holiday compared to the previous 3-month average gas prices, multiplied by 100. State-level clustered standard errors are provided in parentheses.

may account for the heightened sensitivity that we observe.

Drawing from the estimates in Table 9 and the estimated pass-through rates in Table 3, we can infer the predicted changes in overall spending during the gas tax holiday. The red bar in Figure 5 illustrates these predicted changes in consumption. our estimates suggest that larger declines in gas prices correspond to significant reductions in aggregate consumption. Specifically, in Maryland, a 30-cent reduction in gas prices resulted in a 1.64% decrease in total spending. Conversely, in Connecticut, a state with moderate percent changes in gas prices, a 13.9-cent cut in gas prices led to a 0.17% decrease in overall expenditure. The primary aim of the gas tax holiday was to alleviate the inflationary pressures on consumers and potentially stimulate consumption by increasing disposable income. However, these results suggest it may have had an unintended consequence; by raising the perceived real interest rate, the tax holiday may have inadvertently spurred increased household savings.

Figure 5: Predicted Changes in Overall Spending vs. Decrease in Gas Spending



Notes: The red bar in the graph represents the predicted percentage changes in spending, derived from the estimates in Table 9 and Table 3. The blue bar illustrates the projected decrease in gas spending. To compute this, we use the observed decline in gas prices measured in Section 4 and assume a demand elasticity of gasoline consumption of -0.3. The black solid line across bars indicates the 95% confidence interval.

The drop in consumption that we measure is partially driven by a reduction in gas expenditure because of lower prices. Our expenditure data does not measure gasoline expenditures separately from other non-durable goods. To put the consumption effects in context, we compute the predicted changes in spending due to lower gas prices (the blue bar in Figure 5) and compare them to the aggregate effects (red bar), assuming that the elasticity of gas consumption is -0.3 (Levin et al., 2017). In Maryland, for instance, gas prices dropped about 30 cents, and the average pre-holiday gas price was $3.80 per gallon, for a price reduction of 7.7%. With the given elasticity, this price drop increases the quantity of gas consumed by 2.3% and decreases gas expenditure by 5.4%. Given that gas expenditure represents 9% of total debit/credit card consumption, the projected decrease in aggregate consumption due to savings on gas is 0.49%, about half of the decline in aggregate consumption.

Based on the marginal propensity to consume (MPC) from savings due to reduced gas expenses, we can measure the intensity of the intertemporal substitution response. If the MPC is zero, absent any intertemporal substitution, we would expect a drop in aggregate spending equal to the reduction in gasoline expenditure (the blue bar). This implies that a lower bound for the part of the consumption effect that is due to changes in inflation expectations is the difference between the red bar and the blue bar. For example, in Maryland, a 1.64% reduction in consumption can be dissected into a 0.49% decline due to lower gas consumption and a 1.15% reduction from overall consumption decreases driven by intertemporal substitution motives. Higher MPC implies larger intertemporal substitution effects to rationalize the observed changes in aggregate consumption. If the MPC is one, all savings from decreased gas expenditures are spent, indicating that the total 1.6% consumption reduction could be attributed to intertemporal substitution effects. Our findings suggest that states with larger gas price changes exhibit pronounced intertemporal substitution effects, emphasizing the real allocative effects on consumption driven by changes in inflation expectations.

Finally, we investigate heterogeneity in consumption effects due to the gas tax holiday across income groups. The Opportunity Insights data reports credit and debit card spending by income quartiles, based on the median income in the cardholder's zip code. We re-estimate equation (7) for each income quartile and report the results in Table A.11. The expenditure share on gas tends to be higher among lower-income groups,[25] which suggests

[25]For instance, estimates from the 2022 Consumer Expenditure Survey show that the lowest quintile spends

that the positive income effect from reduced gas prices may be particularly important. Our findings show that, in states with high pass-through rates, lower-income groups do reduce their consumption, albeit less so than their higher-income counterparts. Meanwhile, higher-income groups exhibit a more significant reduction in consumption, despite a lower share of gas expenditures. This pattern suggests that higher-income groups are more likely to engage in intertemporal substitution, possibly due to a better understanding of real versus nominal interest rates and greater savings capacity. However, we interpret these results with caution, given that the estimates are somewhat noisy.

8 Conclusion

This paper explores the impact of state-level temporary suspensions of the gas tax on inflation expectations and consumption. We leverage novel policy variation that induces sizable exogenous, but temporary, differences in retail gas prices across states during an inflationary period. We find that these temporary decreases in the gas tax result in drops in household inflation expectations, as well as decreases in overall consumption. The effects are most pronounced in states where the tax reduction was more fully passed through to prices. Our results establish new evidence of a causal link between gas prices and household inflation expectations.

Our work raises the possibility that the gas tax, or other policy measures that might impact gas prices, could be another potential lever for policymakers to impact household beliefs. We highlight several factors that influence the effectiveness of such a policy, including the degree of supply-side competition in gasoline markets and how the policy is communicated to consumers. However, we raise several important caveats in generalizing our results on a broader scale. First, the effects that we observe occur in an environment in which the gas tax changes relatively infrequently. If policymakers began to regularly use the tax rate as a policy instrument, households may place lower weight on gas prices when forming beliefs over future prices. Second, this policy was implemented during a period when gas prices were rapidly rising. Households might have paid more attention to gas prices. Third, states may have other motivations when deciding how much to tax gasoline, including correcting for environmental externalities and generating revenue to fund the construction and

11% of pre-tax income on gasoline vs. 2% for the highest quintile (Bureau of Labor Statistics, 2022).

maintenance of roads. Changes to the gas tax for other purposes, such as to affect inflation expectations, may conflict with the appropriate level of taxation for other policy goals. We believe further study of these issues is a potential avenue for future research.

However, our results also highlight potential unexpected effects of the policy. State governments enacted gas tax holidays largely as a measure to mitigate the effects of rising prices on households. We find evidence that in fact the policy may have reduced short-term consumption, particularly in service categories. This may be an important consideration for local governments given potential impacts for local employment, tax revenues, and other outcomes.

References

Aidala, F., O. Armantier, G. Koşar, J. Somerville, G. Topa, and W. van der Klaauw (2024). Gasoline price changes and consumer inflation expectations: Experimental evidence. *Journal of Economic Behavior & Organization 220*, 66–80.

Bachmann, R., B. Born, O. Goldfayn-Frank, G. Kocharkov, R. Luetticke, and M. Weber (2021). A Temporary VAT Cut as Unconventional Fiscal Policy. NBER Working Paper 29442.

Binder, C. and C. Makridis (2022). Stuck in the seventies: gas prices and consumer sentiment. *Review of Economics and Statistics 104*(2), 293–305.

Binder, C. C. (2018). Inflation expectations and the price at the pump. *Journal of Macroeconomics 58*, 1–18.

Bureau of Labor Statistics (2022). Consumer expenditure survey: Quintiles of income before taxes, table 1101. https://www.bls.gov/cex/tables/calendar-year/mean-item-share-average-standard-error/cu-income-quintiles-before-taxes-2022.pdf.

Cavallo, M. (2008). Oil prices and inflation. Technical report, FRBSF Economic Letter.

Cengiz, D., A. Dube, A. Lindner, and B. Zipperer (2019, 05). The Effect of Minimum Wages on Low-Wage Jobs*. *The Quarterly Journal of Economics 134*(3), 1405–1454.

Chetty, R., J. N. Friedman, M. Stepner, and O. I. Team (2023, 10). The Economic Impacts of COVID-19: Evidence from a New Public Database Built Using Private Sector Data*. *The Quarterly Journal of Economics 139*(2), 829–889.

Cloyne, J., J. Martinez, H. Mumtaz, and P. Surico (2023, May). Do tax increases tame inflation? *AEA Papers and Proceedings 113*, 377–81.

Coibion, O., D. Georgarakos, Y. Gorodnichenko, and M. van Rooij (2023). How does consumption respond to news about inflation? field evidence from a randomized control trial. *American Economic Journal: Macroeconomics 15*(3), 109–52.

Coibion, O. and Y. Gorodnichenko (2015). Is the Phillips Curve Alive and Well after All? Inflation Expectations and the Missing Disinflation. *American Economic Journal: Macroeconomics 7*(1), 197–232.

Coibion, O., Y. Gorodnichenko, and M. Weber (2022). Monetary policy communications and

their effects on household inflation expectations. *Journal of Political Economy 130*(6), 1537 – 1584.

Collins, D. (2022). Hogan, legislative leaders agree to one-month gas tax break amid budget surplus. https://www.wbaltv.com/article/gas-tax-maryland-emergency-suspension/39399009.

Correia, I., E. Farhi, J. P. Nicolini, and P. Teles (2013, June). Unconventional fiscal policy at the zero bound. *American Economic Review 103*(4), 1172–1211.

D'Acunto, F., D. Hoang, and M. Weber (2021). Managing Households' Expectations with Unconventional Policies. *The Review of Financial Studies 35*(4), 1597–1642.

D'Acunto, F., U. Malmendier, J. Ospina, and M. Weber (2021). Exposure to grocery prices and inflation expectations. *Journal of Political Economy 129*(5), 1615–1639.

D'Acunto, F., U. Malmendier, and M. Weber (2023). What do the data tell us about inflation expectations? In *Handbook of Economic Expectations*, pp. 133–161. Academic Press.

D'Acunto, F. and M. Weber (2020). Memory and beliefs: Evidence from the field. Technical report.

Doyle, J. J. and K. Samphantharak (2008). $2.00 gas! studying the effects of a gas tax moratorium. *Journal of Public Economics 92*(3), 869–884.

Foster, K., C. Greene, and J. Stavins (2023). 2022 survey and diary of consumer payment choice: Summary results. *Federal Reserve Bank of Atlanta, Research Data Report* (23-3).

Gelman, M., Y. Gorodnichenko, S. Kariv, D. Koustas, M. Shapiro, D. Silverman, and S. Tadelis (2023). The response of consumer spending to changes in gasoline prices. *American Economic Journal: Macroeconomics 15*(2), 129–60.

Genakos, C. and M. Pagliero (2022). Competition and pass-through: evidence from isolated markets. *American Economic Journal: Applied Economics 14*(4), 35–57.

Goodman-Bacon, A. (2021). Difference-in-differences with variation in treatment timing. *Journal of Econometrics 225*(2), 254–277.

Herb, C. (2022). Ct gas tax holiday is causing confusion for locally owned stations. https://ctmirror.org/2022/03/30/ct-gas-tax-holiday-is-causing-confusion-for-locally-owned-stations/.

Jiang, J. H., R. Kamdar, K. Lu, and D. Puzzello (2024). How do households respond to expected inflation? an investigation of transmission mechanisms. Technical report.

Kamdar, R. (2019). The inattentive consumer: Sentiment and expectations. Technical report, Working Paper.

Kilian, L. and X. Zhou (2022). Oil prices, gasoline prices, and inflation expectations. *Journal of Applied Econometrics 37*, 867–881.

Kim, G. and C. Binder (2023, April). Learning-through-survey in inflation expectations. *American Economic Journal: Macroeconomics 15*(2), 254–78.

Levin, L., M. S. Lewis, and F. A. Wolak (2017, August). High frequency evidence on the demand for gasoline. *American Economic Journal: Economic Policy 9*(3), 314–47.

Montag, F., R. Mamrak, A. Sagimuldina, and M. Schnitzer (2023). Imperfect price information, market power, and tax pass-through. *George J. Stigler Center for the Study of the Economy & the State Working Paper* (337).

Moomaw, G. (2022). Va. senate committee votes down youngkin's gas-tax holiday plan. https://virginiamercury.com/blog-va/va-senate-committee-votes-down-youngkins-gas-tax-plan/.

Pfäuti, O. (2024). The inflation attention threshold and inflation surges. *Working Paper*.

Powell (2022). Fomc meeting(june 14-15, 2022), press conference transcript. https://www.federalreserve.gov/mediacenter/files/FOMCpresconf20220615.pdf.

Reisman, N. (2022). New york attorney general: Gas stations must honor tax holiday. https://virginiamercury.com/blog-va/va-senate-committee-votes-down-youngkins-gas-tax-plan/.

Shirek, J. (2022). Georgia gas tax-cut | will gas stations pass along the savings to customers? https://www.11alive.com/article/traffic/gas-prices/georgia-gas-tax-cut-customer-savings/85-8c1b6947-2ed6-4621-b867-48049403b2cf.

Trehan, B. (2011). Household inflation expectations and the price of oil: It's deja vu all over again. Technical report, FRBSF Economic Letter.

US Department of the Treasury (2022). The price impact of the strategic petroleum reserve

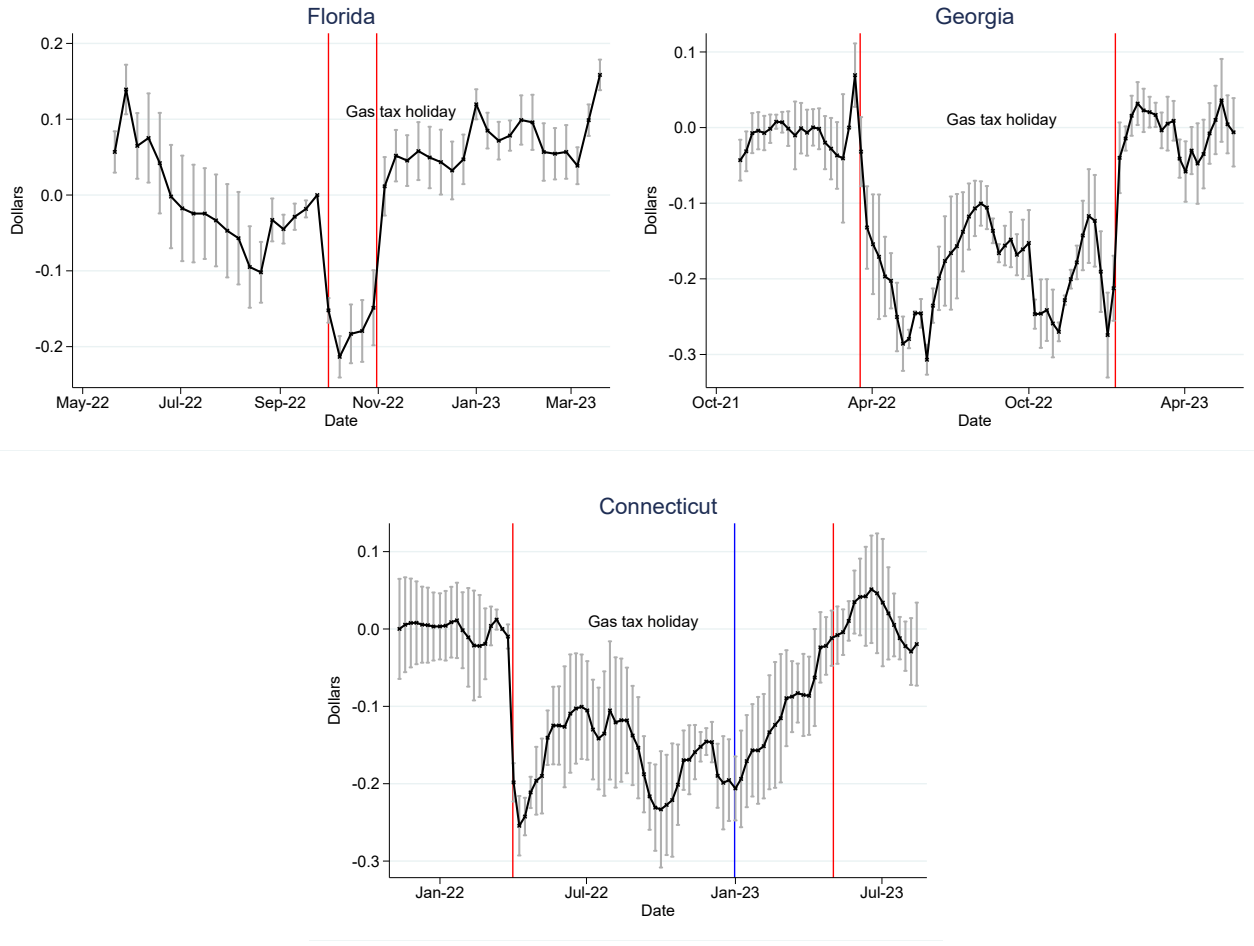
release. https://home.treasury.gov/news/press-releases/jy0887.

Wehrhöfer, N. (2023). Energy prices and inflation expectations: Evidence from households and firms. Discussion paper 28, Deutsche Bundesbank.

Online Appendix

A.1 Additional Figures

Figure A.1: Gas Prices in Gas Tax Holiday states vs. neighboring states (FL, GA, and CT)



Notes: The figures plot the estimates $\widehat{\lambda}_{st}$ from the regression equation (1), along with a 95% confidence interval for Florida ($0.16 cut), Georgia ($0.291 cut), and Connecticut ($0.25 cut). In the upper left panel, the treated state is Florida, with North Carolina, South Carolina, Virginia, Tennessee, Alabama, and Mississippi serving as control states. In the upper right panel, the treated state is Georgia, with Tennessee, Alabama, and South Carolina chosen as control states. In the bottom panel, the treated state is Connecticut, with Massachusetts, Rhode Island, Pennsylvania, and New Jersey serving as control states. The periods between the red vertical line indicate the period of gas tax holiday. In Connecticut, the tax holiday was phased out gradually by 5 cents a month beginning in January 2023 (marked by the blue line) and ending in May 2023 (red line). Standard errors are clustered at the state level.

A.2 Additional Tables

Table A.1: States that Discussed Gas Tax Holiday but Did Not Implement

State	Legislative Action	Duration	Tax Reduction (per gallon)	Outcome/Status
Alaska	HB 104 (Partisan Bill (R))	June 1, 2022[a] - June 30, 2023	8 cents	Passed House but did not advance in Senate
Arizona	S.3609 (Partisan Bill (D))	February 9 - January 1, 2023	18.4 cents	Died in Senate Committee
California	AB1638 (Partisan Bill (R))	6 months	18 cents	Stricken from file
Maine	Rep. Libby (R) proposed	A year	30 cents	Did not advance in House
Massachusetts	Gov. Baker (R) proposed	March 22 - September 5, 2022	24 cents	Senate rejected
Michigan	HB 5570 / SB972 (Partisan Bill (R))	June 15 - September 15, 2022	27.2 cents	Passed both House and Senate but vetoed by Gov. Whitmer (D)
Mississippi	Lt. Gov. Hosemann proposed	6 months	18.4 cents	State legislature remained focused on income tax reform efforts
New Hampshire	Gov. Sununu (R) proposed	A couple of month	22 cents	Alternative proposal is proposed
New Jersey	Sen. Turner (D) proposed	60 days	42.4 cents	Gov. Murphy (D) opposed
Ohio	SB 277 (Partisan Bill (R))			Died in House Committee
Pennsylvania	SB10 (Partisan Bill (R))	March 21[b] - December 31, 2022	20 cents	Died in Senate Committee
Rhode Island	Senate Republicans proposed		35 cents	Opposed by Gov. Dan McKee (D)
Tennessee	Democratic lawmakers proposed	90 days		Refused by Gov. Lee (R)
Virginia	Gov. Youngkin (R) proposed	May 1 - July 31, 2022	26.2 cents	Senate rejected
Washington	SB5897 (Partisan Bill (R))	January 18 [c] - December 31, 2022	49.4 cents	Died in Senate Committee
West Virginia	Democrats proposed			Gov. Justice (R) did not proceed

Notes: Every state engaged in some level of discussion regarding a Gas Tax Holiday in 2022 when the Biden Administration was considering a federal gas tax holiday. This table presents a list of states that formally proposed legislative actions to reduce the gas tax but did not implement the policy (many additional states discussed these policies more informally without a legislative proposal). To the best of our knowledge, the following states did not formally propose a Gas Tax Holiday in the state legislature: Alabama, Arkansas, Colorado, Delaware, Hawaii, Illinois, Indiana, Idaho, Iowa, Kansas, Kentucky, Louisiana, Minnesota, Missouri, Montana, Nebraska, Nevada, New Mexico, North Carolina, North Dakota, Oklahoma, Oregon, South Carolina, South Dakota, Texas, Utah, Vermont, Wisconsin, and Wyoming.

[a] HB104, proposed on May 16, 2022, suggested a Gas Tax Holiday beginning on the first day of the month following the effective date of this section and ending on June 30, 2023.

[b] SB10, proposed on MARCH 21, 2022, suggested a gas tax holiday from effective date of SB10 through the end of the 2022

[c] SB5897 on 2022-01-18 notes that no taxes may be imposed beginning on the effective date of this section through December 31, 2022.

Table A.2: Scope of Online Survey

State	Wave	Observation	Survey Period	Gas Tax Holiday Implementation
Maryland	1	119	2022/4/14-2022/4/17	Yes
	2	108	2022/6/1-2022/8/21	
Virginia	1	170	2022/4/14-2022/4/17	
	2	149	2022/6/1-2022/8/21	
Georgia	1	177	2022/5/26-2022/5/27	Yes
Alabama	1	70	2022/5/26-2022/5/27	
New York	1	520	2022/5/26-2022/5/31	
	2	414	2022/7/5-2022/8/19	Yes
Pennsylvania	1	421	2022/5/26-2022/5/31	
	2	325	2022/7/5-2022/8/19	
Florida	1	898	2022/9/18-2022/9/30	
	2	867	2022/10/13-2022/10/31	Yes
	3	819	2022/11/14-2022/12/31	
Florida-control	1	948	2022/9/18-2022/9/30	
	2	939	2022/10/13-2022/10/31	
	3	881	2022/11/14-2022/12/31	

Notes: The table outlines the extent and timing of the online survey we conducted on the Prolific platform. Data were collected from the treated states—Maryland, Georgia, New York, and Florida—and their neighboring states. The data exhibits a panel structure for those states with multiple survey waves. For the Maryland-Virginia pair, samples were collected during and after the gas tax holiday in Maryland. In the case of Georgia and Alabama, the sample was collected in only one wave during the gas tax holiday in Georgia. For New York and Pennsylvania, responses were solicited before and during the gas tax holiday in New York. Lastly, for Florida and its control states, data were collected before, during, and after the gas tax holiday. The control states for Florida include South Carolina, North Carolina, Tennessee and Virginia. The last column indicates whether the survey timeline overlapped with the gas tax holiday, providing a snapshot of the coverage of online survey relative to the policy's implementation.

Table A.3: Demographic composition from ACS, SCE, and Prolific

	(1) ACS	(2) Prolific	(3) SCE	(4) Combined Prolific and SCE
	Weighted	Unweighted	Unweighted	Weighted
Female	0.51	0.56	0.50	0.52
White	0.70	0.70	0.81	0.75
18-34	0.30	0.52	0.21	0.28
35-54	0.33	0.34	0.41	0.33
55+	0.37	0.14	0.39	0.40
Bachelor's degree (e.g. BA, BS)	0.31	0.55	0.57	0.31
Observations	12,453,498	3,654	4,749	8,297

Notes: column (1) reports the weighted aggregate state-level demographic characteristics using data from the American Community Survey (ACS). Columns (2) and (3) present the unweighted demographic characteristics from the Prolific and SCE samples, respectively. Finally, column (4) displays the weighted demographic characteristics for the combined data, including both the Prolific and SCE datasets. This combined data is weighted using individual-level weights constructed for this paper.

Table A.4: Comparison of Inflation Expectation between Prolific and SCE data

	1-year ahead Inflation Expectations during Gas Tax Holiday					
	Prolific			SCE		
State	Mean	Standard Deviation	Observation	Mean	Standard Deviation	Observation
Maryland	7.1	3.4	99	6.1	3.6	16
Virginia	7.5	3.4	140	5.8	3.6	34
Georgia	8.0	3.4	164	6.2	4.7	314
Alabama	9.4	4.3	62	7.4	3.8	109
New York	7.9	3.8	392	5.8	5.3	455
Pennsylvania	8.4	3.3	310	6.0	4.4	404
Florida	7.5	4.0	815	5.4	5.7	65
Florida-Control	7.4	4.0	887	5.7	4.9	122

Notes: The table presents the average and standard deviations of 1-year ahead inflation expectations (computed as the expected value from the density forecast) during the gas tax holiday. The data from the Prolific survey are displayed in the left panel, while the SCE data are shown in the right panel.

Table A.5: State-level effects on inflation expectations using SCE data

	(1)	(2)	(3)	(4)	(5)
	Expected inflation rate (density)				
Gas Tax Holiday (dummy)	-0.514	-1.364*	-1.768*	-0.687	-0.945
	(1.239)	(0.708)	(1.003)	(0.448)	(1.040)
State	MD	GA	CT	NY	FL
Sampling Weight	Yes	Yes	Yes	Yes	Yes
Individual Fixed Effect	Yes	Yes	Yes	Yes	Yes
Time Fixed Effect	Yes	Yes	Yes	Yes	Yes
Survey Tenure Fixed Effect	Yes	Yes	Yes	Yes	Yes
Data	SCE	SCE	SCE	SCE	SCE
Observations	816.00	1,313.00	1,698.00	1,768.00	1,462.00
R^2	0.71	0.59	0.63	0.65	0.66

Notes: The table presents the weighted regression results based on the regression equation (3), utilizing SCE data with individual and monthly-time fixed effects. Control states are defined as neighboring states to the treated states. The control states for Maryland are Pennsylvania, Delaware, Virginia, and West Virginia. For Georgia, the control states are Tennessee, South Carolina, and Alabama. Connecticut's control states are Massachusetts, Rhode Island, Pennsylvania, and New Jersey. The control states for New York include Pennsylvania, Delaware, New Hampshire, and New Jersey. Lastly, the control states for Florida are North Carolina, South Carolina, Virginia, Tennessee, Alabama, and Mississippi. Individual-level clustered standard errors are indicated in parentheses.

Table A.6: Impact of the Gas Tax Holiday on Inflation Expectations: Pooled Effects using SCE data

	(1)	(2)	(3)	(4)
	Control Group: All states			
	1-year ahead Inflation Expectation Rate (Density Forecast)			
Gas Tax Holiday	-0.720***	-0.274	-0.747***	-0.369
(dummy)	(0.271)	(0.271)	(0.273)	(0.285)
Gas Tax Holiday		0.131		0.111
× Percent Gas Price Change		(0.0922)		(0.0940)
Sampling Weight	Yes	Yes	Yes	Yes
Experiment × Individual FE	Yes	Yes	Yes	Yes
Experiment × Time FE	Yes	Yes	Yes	Yes
Experiment × Survey Tenure FE	Yes	Yes	Yes	Yes
State-level controls	No	No	Yes	Yes
Data	SCE	SCE	SCE	SCE
Observations	51,048	51,048	51,048	51,048
R^2	0.66	0.66	0.66	0.66

Notes: The table details the impact of the Gas Tax Holiday on inflation expectations, utilizing the stacked DID specification outlined in Equation (4) using SCE data. The percent change in gas prices indicates changes in gas prices during the holiday compared to previous 3 month average gas prices. The control group comprises all states except the ones treated. Columns (1) and (2) report the regression results incorporating the experiment interacted with both individual, time, and survey tenure fixed effects but without including state-level control variables. In contrast, Columns (3) and (4) incorporate these fixed effects as well as state-level control variables – the unemployment rate and growth rates of nominal and real GDP. Individual-level clustered standard errors are provided in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

Table A.7: Impact of the Gas Tax Holiday on Inflation Expectations: Pooled Effects except Florida

	(1)	(2)	(3)	(4)
	Control Group: All states			
	1-year ahead Inflation Expectation Rate (Density Forecast)			
Gas Tax Holiday	-0.631***	0.139	-0.686***	0.0606
(dummy)	(0.240)	(0.218)	(0.242)	(0.232)
Gas Tax Holiday		0.253***		0.244***
× Percent Gas Price Change		(0.0723)		(0.0738)
Sampling Weight	Yes	Yes	Yes	Yes
Experiment × Individual FE	Yes	Yes	Yes	Yes
Experiment × Time FE	Yes	Yes	Yes	Yes
Experiment × Survey Tenure FE	Yes	Yes	Yes	Yes
State-level controls	No	No	Yes	Yes
Data	Combined	Combined	Combined	Combined
Observations	56,579	56,579	56,579	56,579
R^2	0.66	0.66	0.66	0.67

Notes: The table details the impact of the Gas Tax Holiday on inflation expectations, utilizing the stacked DD specification outlined in Equation (4). This regression table features data from four treated states—Maryland, Georgia, Connecticut, and New York—along with their corresponding control states. The control group comprises all states except the ones treated. Columns (1) and (2) report the regression results incorporating the experiment interacted with both individual, time, and survey tenure fixed effects but without including state-level control variables. In contrast, Columns (3) and (4) incorporate these fixed effects as well as state-level control variables – the unemployment rate and growth rates of nominal and real GDP. Individual-level clustered standard errors are provided in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

Table A.8: Heterogeneous effects of Gas Tax Holiday

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	1-year ahead expected inflation rate(density)										
	Gender		Race		Age			Education		Awareness	
	Male	Female	Non-white	White	18-34	35-54	55+	$\leq$ College	$\geq$ College	Not Aware	Aware
Gas Tax Holiday	0.291	0.205	1.007**	-0.176	0.504	0.292	-0.0695	0.119	0.429**	1.006**	1.647**
(dummy)	(0.272)	(0.358)	(0.437)	(0.235)	(0.406)	(0.358)	(0.423)	(0.345)	(0.213)	(0.486)	(0.834)
Gas Tax Holiday	0.126*	0.0926	0.437***	-0.0615	0.158*	0.198**	-0.00905	0.102	0.110**	0.135	0.369**
$\times$ Percent Gas Price Change	(0.0683)	(0.0904)	(0.104)	(0.0560)	(0.0875)	(0.0885)	(0.115)	(0.0838)	(0.0511)	(0.106)	(0.182)
Sampling Weight	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Experiment $\times$ Individual	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Experiment $\times$ Time	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State-level controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Data	Pool	Pool	Pool	Pool	Pool	Pool	Pool	Pool	Pool	Pool	Pool
Observations	35,417	36,726	13,975	58,168	19,052	30,000	23,091	31,600	40,543	68,122	67,264
R^2	0.69	0.66	0.67	0.67	0.66	0.66	0.70	0.68	0.67	0.67	0.67

Notes: The table presents the heterogeneous impacts of the gas tax holiday on inflation expectations among different demographic groups, employing the stacked DID specification as outlined in Equation (4). Columns (1) and (2) compare the results for male and female respondents, respectively. Columns (3) and (4) focus on non-white and white respondents. Columns (5), (6), and (7) categorize the results based on age groups. Columns (8) and (9) differentiate between respondents with less than a college education and those with a college education or higher. Finally, Columns (10) and (11) compare respondents who were not aware of the gas tax holiday with those who were. Standard errors are provided in parentheses.

Table A.9: Awareness and Expected Pass-through of Gas Tax Holiday in treated states

	(1) MD	(2) NY	(3) FL (Sep)	(4) FL (Oct)
Survey Implementation	During	Before	Before	During
	Gas Tax Holiday			
Awareness of treatment (%)	70.53	31.36	19.21	21.59
Expect gas prices to increase (%)	8.27	4.55	8.94	5.63
Expect no changes in gas prices (%)	23.40	38.42	28.29	39.06
Expect gas prices to decrease (%)	68.32	57.03	62.77	55.31
Expected passthrough (cents)	-16.70	-6.30	-15.02	-22.17
Expected passthrough (rates)	0.46	0.39	0.59	0.88
Observations	88	223	443	436

Notes: This table summarizes the awareness and expected pass-through of the gas tax holiday among information-treated respondents in treated states.

Table A.10: Immediate Revisions in Consumption Sentiment

	(1)	(2)	(3)
	Revisions in Good Time to Purchase		
	House	Car	Durables
Information treatment	-0.152	-0.306***	-0.104
	(0.105)	(0.117)	(0.0960)
Sample Fixed Effect	Yes	Yes	Yes
Control for demographics	Yes	Yes	Yes
Observations	471	473	438
R^2	0.05	0.08	0.05

Notes: The table examines the effect of information treatment on consumer sentiment towards purchasing durable goods. It captures the immediate adjustments in consumption sentiment, represented by the differential between sentiments before and after receiving information treatment. Specifically, respondents were surveyed on their current outlook towards acquiring durable goods like houses, apartments, vehicles, and large appliances or electronics, both prior to and following the information treatment. To articulate their sentiment, participants selected from a five-point scale: "Very Good" (coded as 5), "Good" (coded as 4), "Neither Good Nor Bad" (coded as 3), "Bad" (coded as 2), and "Very Bad" (coded as 1). Control variables include age, gender, race, income, employment status, level of education, political orientation, housing status, and gas consumption. Standard errors are provided in parentheses.

Table A.11: Consumption During Gas Tax Holiday by Income Quartiles

	(1)	(2)	(3)	(4)
	Log Spending × 100			
	Income Quartiles			
	Quartile 1	Quartile 2	Quartile 3	Quartile 4
Gas Tax Holiday	0.340	0.672**	0.889*	1.588***
(Dummy)	(0.743)	(0.314)	(0.510)	(0.375)
Gas Tax Holiday	0.179	0.260***	0.344***	0.404***
× Percent Gas Price Change	(0.189)	(0.0592)	(0.101)	(0.0634)
Experiment × State FE	Yes	Yes	Yes	Yes
Experiment × Time FE	Yes	Yes	Yes	Yes
State-level Controls	Yes	Yes	Yes	Yes
Observations	11,438	12,236	12,236	12,236
R^2	0.79	0.86	0.86	0.80

Notes: The table shows regression results based on equation (7) categorizing data based on the median income levels of ZIP codes. The income quartile groups range from 1 to 4, with group 1 denoting ZIP codes with the lowest median income and group 4 representing those with the highest. Experiment-level state and monthly fixed effects have been incorporated. State-level controls encompass monthly state-level real and nominal GDP. State-level clustered standard errors are provided in parentheses.

A.3 Information Treatment

Figure A.2: Information treatment in Maryland

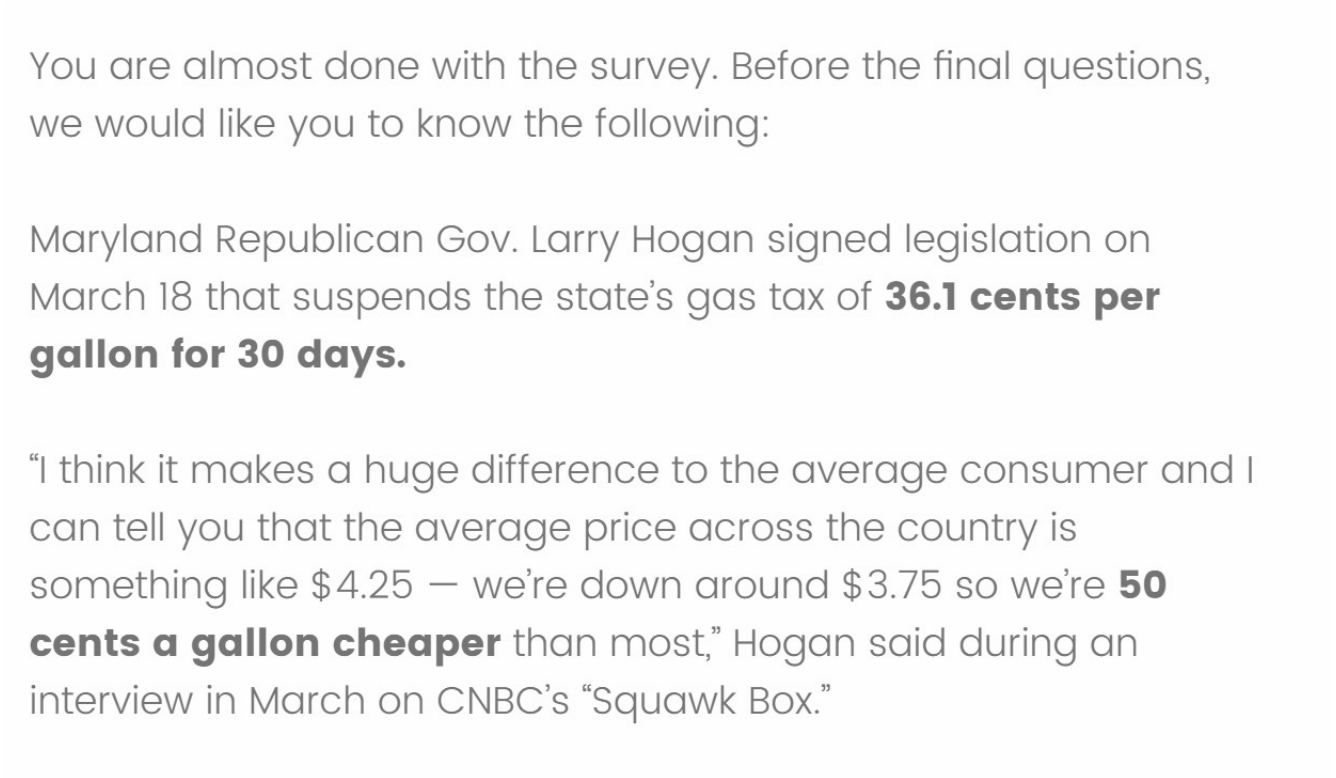


Figure A.3: Information treatment in New York

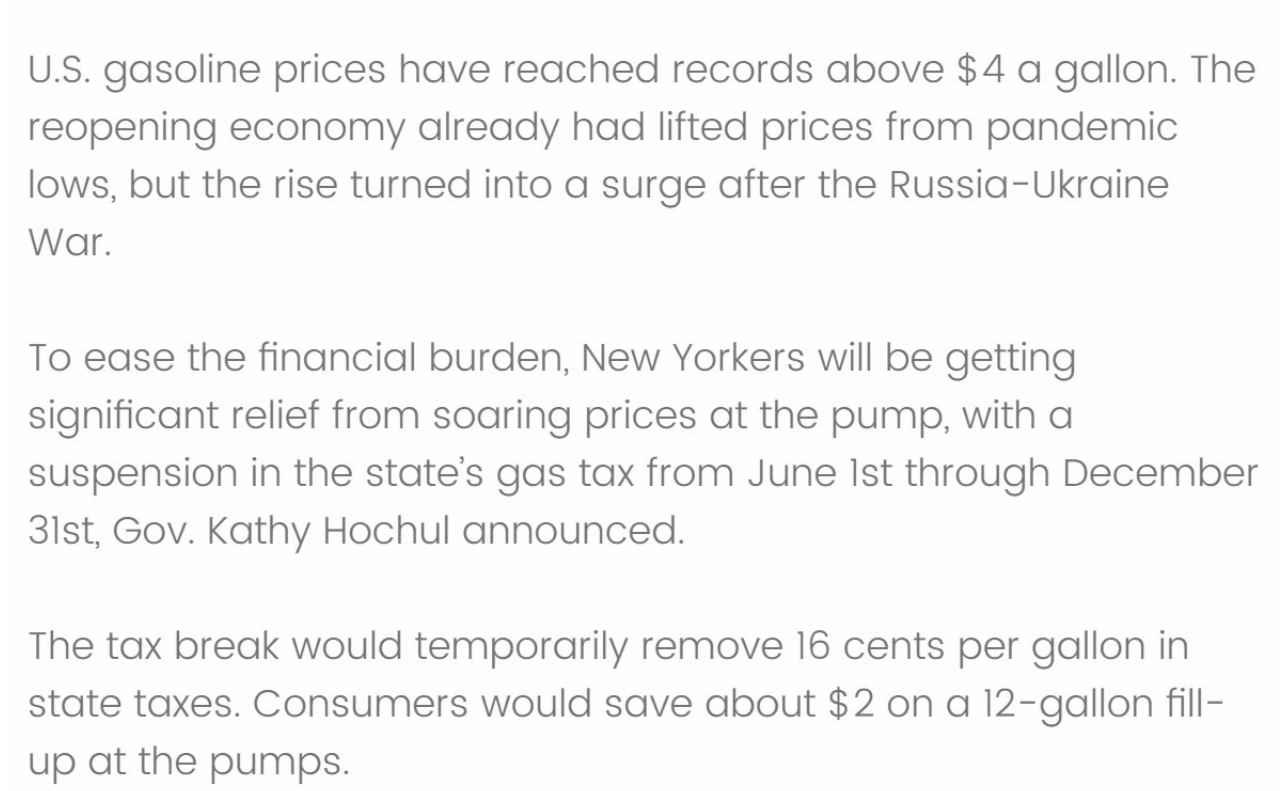
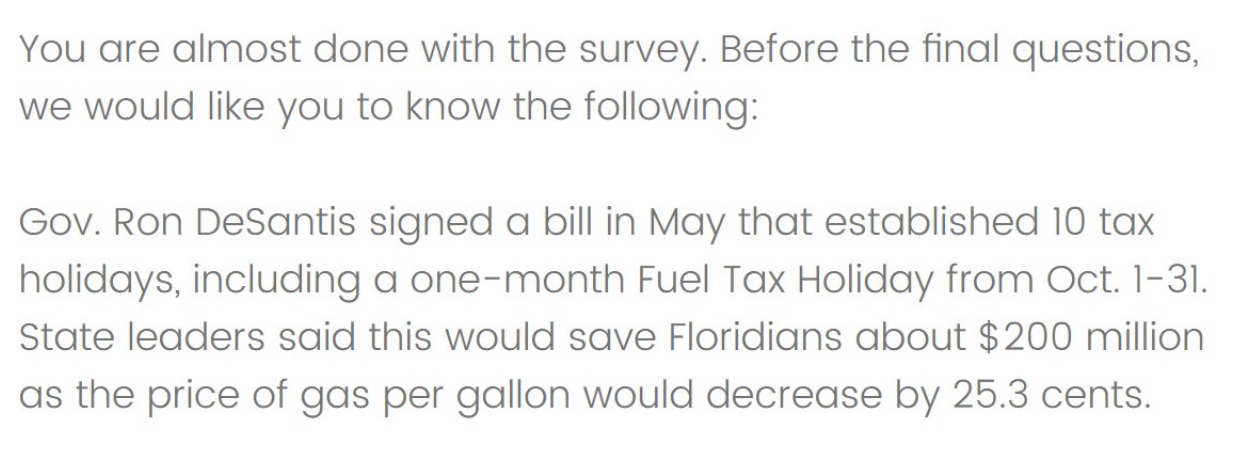


Figure A.4: Information treatment in Florida



A.4 A Sample of Survey Questions

Gas tax holiday - Florida

Start of Block: Information consent

information_consent You are invited to participate in this study because we are trying to learn more about your opinions about the economy. The survey is designed to measure consumer expectations and economic sentiments.

It will take about *15 minutes expected to complete survey or test*.

Your participation in this study is voluntary. You can decide not to participate in this research and it will not be held against you. You can leave the study at any time.

There are no sensitive questions in this survey that should cause discomfort. However, you can skip any question you do not wish to answer, or exit the survey at any point.

You may view the Prolific's confidentiality policy at https://researcher-help.prolific.co/hc/en-gb/articles/360009094594-Data-protection-and-privacy.

Qualtrics's privacy statement is available at https://www.qualtrics.com/privacy-statement/.

Your information will be kept confidential to the extent allowed by law. The results of the research study may be published but your identity will remain confidential.

Once you submit your responses, I will review and approve your submissions. Upon successful responses, you will be paid $3 by Prolific. Your reward will automatically be credited to your Prolific account. The payment will be made in 3 days. More details about the compensation are available here (link).

Please feel free to ask questions regarding this study. You may contact me later if you have additional questions or concerns at yoonjo@tamu.edu *or 1-979-845-7340.*

You may also contact the Human Research Protection Program at Texas A&M University (which is a group of people who review the research to protect your rights) by phone at 1-979-458-4067, toll free at 1-855-795-8636, or by email at irb@tamu.edu for: additional help with any questions about the research voicing concerns or complaints about the research obtaining answers to questions about your rights as a research participant concerns in the event the research staff could not be reached the desire to talk to someone other than the research staff

If you want a copy of this consent for your records, you can print it from the screen. If you wish to participate, please click the **"I Agree"** button and you will be taken to the survey.

If you do not wish to participate in this study, please select **"I Disagree"** or select **X** in the corner of your browser

- ○ I agree. (4)
- ○ I disagree. (5)

End of Block: Information consent

Start of Block: Demographics

prolific_id What is your Prolific ID?

_____

Page Break

gender What is your gender?

- ○ Male (1)
- ○ Female (2)
- ○ Other (3)

Page Break

b_year What is your birth year? Enter your 4 digit birth year.

_____

Page Break

ethnicity How would you describe yourself? Please select all that apply.

- [ ] White (1)
- [ ] Black or African American (2)
- [ ] American Indian or Alaska Native (3)
- [ ] Asian (4)
- [ ] Native Hawaiian or Pacific Islander (5)
- [ ] Hispanic or Latino Origin (6)
- [ ] Other (7)

Page Break

education What is the highest degree or level of school you have completed?

- ○ Less than a high school diploma (1)
- ○ High school degree or equivalent (e.g. GED) (2)
- ○ Some college, no degree (3)
- ○ Associate degree (e.g. AA, AS) (4)
- ○ Bachelor's degree (e.g. BA, BS) (5)
- ○ Master's degree (e.g. MA, MS, MEd) (6)
- ○ Doctorate or professional degree (e.g. MD, DDS, PhD) (7)

Page Break

marital_status What is your marital status?

- ○ Single (never married) (1)
- ○ Married, or in a domestic partnership (2)
- ○ Widowed (3)
- ○ Divorced (4)
- ○ Separated (5)

Page Break

zip_home Where is your primary residence? Please enter the 5 digit zip code.

_____

Page Break

zip_work Where is your work place? Please enter the 5 digit zip code.

_____

Page Break

party Which political party do you lean towards?

- Democratic party (1)
- Republican party (2)
- Green party (3)
- Libertarian party (4)
- Other (5)
- Prefer not to answer (6)

Page Break

grocery Who typically does the grocery shopping in your household?

- I do all of the grocery shopping in the household. (1)
- I share the grocery shopping with others in the household. (2)
- Someone else does the grocery shopping in the household. (3)

Page Break

Display This Question:

If grocery = I do all of the grocery shopping in the household.

Or grocery = I share the grocery shopping with others in the household.

f_grocery How often do you go grocery shopping?

- ○ Once per month (1)
- ○ Twice per month (2)
- ○ Once per week (12)
- ○ Twice per week (3)
- ○ 3 times per week (4)
- ○ 4 times per week (5)
- ○ More than 5 times per week (6)

Page Break

consumption In the last month, how much did your household spend (**per month**) on goods and services in total and for each of the individual components listed below?

Please enter a number between 1 and 10,000 for each category. The sum of the expenditures for the individual categories should add up to the total amount.
Food (including groceries, dining out, take-out food, and beverages) : _____ (1)
Debt and rent payments (mortgages, rent, auto loans, student loans, etc.) : _____ (2)
Everything else : _____ (3)
Total : _____

Page Break

means_of_payment In the last month, what is your means of payment for purchasing goods and services?

Please enter a number between 1 and 100 for each payment method. The sum of the expenditures for the individual categories should add up to 100%.
Credit/Debit Card : _____ (1)
Check : _____ (2)
Cash : _____ (3)
Total : _____

Page Break

credit Suppose that you had to make an unexpected payment equal to one month of your after-tax income, would you have sufficient financial resources (access to credit, savings, loans from relatives or friends, etc.) to pay for the entire amount?

- ○ Yes (1)
- ○ No (2)
- ○ Don't know/prefer not to answer (3)

Page Break

ha Which of the following best characterizes your household:

- ○ Own our house/apartment without a mortgage (1)
- ○ Own our house/apartment and have a fixed-rate mortgage (2)
- ○ Own our house/apartment and have a variable-rate mortgage (3)
- ○ Rent our house/apartment (4)
- ○ Other (5)

Page Break

Display This Question:

If ha = Own our house/apartment and have a fixed-rate mortgage

Or ha = Own our house/apartment and have a variable-rate mortgage

mortgage How much does your household pay for the monthly mortgage?

_____

Page Break

Display This Question:

If ha = Rent our house/apartment

rent How much is your monthly rent?

_____

Page Break

durable_c In the last month, did you buy a new home, car, or other major big-ticket items (TV, fridge, furniture, and similar items)?

- ○ Yes (1)
- ○ No (2)

Page Break

Display This Question:

If durable_c = Yes

durable_c2 How much did you spend on the following?
A house/apartment : _____ (1)
A car or other vehicle : _____ (2)
A large home appliance, electronics, or furniture : _____ (3)
Total : _____

Page Break

durable_ec Do you plan/expect to purchase a new home, car or other major big-ticket items (TV, fridge, furniture, and similar items) over the next month?

- ○ Yes (1)
- ○ No (2)

Page Break

Display This Question:

If durable_ec = Yes

durable_ec2 How much do you plan/expect to spend on the following?
A house/apartment : _____ (1)
A car or other vehicle : _____ (2)
A large home appliance, electronics, or furniture : _____ (3)
Total : _____

Page Break

saving Saving is income that is neither spent nor used to make payments on debt. Methods of saving include putting money aside in, for example, a deposit account, a pension account, an investment fund, or as cash.

What percentage of your monthly income, on average, did you save during the last 12 months?

(Please enter a percentage of your income. Your answer should be greater than 0% if you saved money during the last year. If you did not save any money, please enter “0%”. If you went into debt, enter a negative value.)

_____

End of Block: Demographics

Start of Block: Labor block

emp Do you have a paid job?

- ○ Yes (1)
- ○ No (2)

Page Break

Display This Question:

If emp = Yes

job_duty In your current job, do you…
(Please select all that apply)

- ☐ Supervise 1 to 10 other people (1)
- ☐ Supervise 11 to 50 other people (2)
- ☐ Supervise more than 50 other people (3)
- ☐ Make decisions about hiring/firing workers (4)
- ☐ Make decisions about what prices to set (5)
- ☐ Make decisions about capital expenditures (6)
- ☐ Make decisions about wages/salaries (7)
- ☐ Make decisions about marketing or sales (8)
- ☐ None of the above (9)

Page Break

Display This Question:

If emp = Yes

Q24 How much do you make before taxes and other deductions at your main/current job, on an annual basis? Please include any bonuses, overtime pay, tips or commissions

_____

Page Break

Display This Question:

If emp = Yes

Q27 How many total hours per week do you work in a typical week these days?

_____

Page Break

Display This Question:

If emp = No

Q28 Are you actively looking for a job?

- ○ Yes (1)
- ○ No (2)

Page Break

Display This Question:

If Q28 = No

Q29 Here are a number of possible reasons why people who are not working choose not to look for work. Please select all that apply to you.

- ☐ Homemaker (1)
- ☐ Raising children (2)
- ☐ Student (3)
- ☐ Retiree (4)
- ☐ Disabled, health issues (5)
- ☐ Couldn't find a job (6)
- ☐ On break (7)
- ☐ No financial need (8)
- ☐ Temporarily laid-off (expect to be recalled with the next 6 months) (9)
- ☐ Temporarily laid-off (do not expect to be recalled with the next 6 months) (10)
- ☐ Other (11)

End of Block: Labor block

Start of Block: Inflation/wage/price expectations

Q18 We would like to ask you about the rate of inflation/deflation.

Note: inflation is the percentage rise in overall prices in the economy, most commonly measured by the Consumer Price Index and deflation corresponds to when prices are falling.

Page Break

perceived_inf **Over the last 12 months,** what do you think the overall rate of inflation/deflation has been in the economy?

If you think there has been inflation, please enter a positive number. If you think there has been deflation, please enter a negative number. If you think there has been neither inflation nor deflation, please enter zero.

_____

Page Break

inf_exp_den In THIS question, you will be asked about the probability (**PERCENT CHANCE**) of something happening. The percent chance must be a number between 0 and 100 and the sum of your answers must add up to 100, where 0 means there is absolutely no chance, and 100 means that it is absolutely certain.

What do you think is the **percent chance** that, **over the next 12 months**…
the rate of inflation will be 12% or more : _____ (1)
the rate of inflation will be between 8% and 12% : _____ (2)
the rate of inflation will be between 4% and 8% : _____ (3)
the rate of inflation will be between 2% and 4% : _____ (4)
the rate of inflation will be between 0% and 2% : _____ (5)
the rate of deflation (opposite of inflation) will be between 0% and 2% : _____ (6)
the rate of deflation (opposite of inflation) will be between 2% and 4% : _____ (7)
the rate of deflation (opposite of inflation) will be between 4% and 8% : _____ (8)
the rate of deflation (opposite of inflation) will be between 8% and 12% : _____ (9)
the rate of deflation (opposite of inflation) will be 12% or more : _____ (10)
Total : _____

Page Break

exp_12_inf **Over the next 12-month,** what do you think the overall rate of inflation/deflation will be?

_____

Page Break

es How would you rate business/economic conditions in this country as a whole **today**?

- Excellent (4)
- Good (3)
- Only fair (2)
- Poor (1)

Page Break

es2 **In a year from now,** do you think that business/economic conditions in this country, as a whole, will be better than they are at present, will be worse, or will be about the same?

- Better a year from now (3)
- About the same (2)
- Worse a year from now (1)

Page Break

End of Block: Inflation/wage/price expectations

Start of Block: good_time_to_buy

c_house Generally speaking, do you think that now is a good time or a bad time to buy **a house or apartment**?

- Very good (5)
- Good (4)
- Neither good nor bad (3)
- Bad (2)
- Very bad (1)

Page Break

c_car Generally speaking, do you think that now is a good time or a bad time to buy **a car or other vehicle**?

- Very good (5)
- Good (4)
- Neither good nor bad (3)
- Bad (2)
- Very bad (1)

Page Break

c_durable Generally speaking, do you think that now is a good time or a bad time to buy **a large appliance (e.g. refrigerator, stove), furniture, or electronics**?

- ○ Very good (5)
- ○ Good (4)
- ○ Neither good nor bad (3)
- ○ Bad (2)
- ○ Very bad (1)

End of Block: good_time_to_buy

Start of Block: Unemployment

current_unemp What is your best guess about what the **current** unemployment rate in the U.S. is?

_____

ex1_unemp What is your best guess about what the unemployment in the U.S. will be **in 12 months**?

_____

exp35_unemp What is your best guess about what the unemployment in the U.S. will be over the **next 3-5 years**?

_____

End of Block: Unemployment

Start of Block: Gas consumption

Q35 Now we would like to ask you about your personal car's gasoline consumption.

Page Break

f_gas How often do you fill your car's tank?

- ○ None (1)
- ○ Once per month (2)
- ○ Twice per month (3)
- ○ Once per week (4)
- ○ Twice per week (5)
- ○ 3 times per week (6)
- ○ 4 times per week (7)
- ○ more than 5 times per week (8)

Page Break

Display This Question:

If f_gas = None

f_gas_0 Here are a number of possible reasons why you are not filling your car's gas tank. Please select all that apply to you.

- ○ I drive a electricity car. (1)
- ○ I do not own a car. (2)
- ○ Others. (3)

Page Break

Display This Question:

If f_gas != None

job_driving Do your job duties include driving?

- Yes (1)
- No (2)

Page Break

p_gas What is your best guess on the current price of regular unleaded gas (dollars per gallon) in your primary residence?

Dollars per gallon

2 3 4 5 6 7 8 9 10

Gas price ()



Page Break

exp_gas What do you expect the price of regular unleaded gas in 12 months (dollars per gallon) in your primary residence?

Dollars per gallon

2 3 4 5 6 7 8 9 10

Gas price ()



Page Break

willingness_to_drive Suppose you learn that a gas station further away is 10 cents per gallon cheaper gasoline than the closest station. How many extra minutes are you willing to drive?

_____

Page Break

capacity_gas_tank What is the capacity of your car's gas tank?

_____

Page Break

gas_consumption How much do you spend on buying gasoline per month?

_____

End of Block: Gas consumption

Start of Block: Information treatment

Page Break

Control You are almost done with the survey.

Page Break

Treatment You are almost done with the survey. Before the final questions, we would like you to know the following:

Gov. Ron DeSantis signed a bill in May that established 10 tax holidays, including a one-month Fuel Tax Holiday from Oct. 1-31. State leaders said this would save Floridians about $200 million as the price of gas per gallon would decrease by 25.3 cents.

End of Block: Information treatment

Start of Block: Post treatment

Display This Question:

If Treatment Displayed

ps_aware Were you aware of this policy - gas tax suspension?

- ○ Yes (1)
- ○ No (2)

Page Break

Display This Question:

If Treatment Displayed

ps_p1 How do you think this policy - gas tax suspension- will affect the gas prices in your primary residence?

- ○ Increase (3)
- ○ No change (4)
- ○ Decrease (5)

Page Break

Display This Question:

If ps_p1 = Decrease

ps_p_cut How much do you expect gas prices to fall as a result of the gas tax suspension in your primary residence?

_____

Page Break

Display This Question:

If ps_p1 = Increase

ps_p_rise How much do you expect gas prices to rise as a result of the gas tax suspension in your primary residence?

_____

Page Break

Display This Question:

If Treatment Displayed

ps_c How do you think this policy - gas tax suspension- will affect your spending on gas?

- ○ Increase (3)
- ○ No change (4)
- ○ Decrease (5)

Page Break

Display This Question:

If ps_c = Decrease

ps_c_cut How much do you expect your gas spending to fall as a result of the gas tax suspension?

_____

Page Break

Display This Question:

If ps_p1 = Increase

ps_c_rise How much do you expect your gas spending to rise as a result of the of gas tax suspension?

_____

Page Break

ps_inf What do you think the inflation/deflation rate (as measured by the Consumer Price Index) is going to be **over the next 12 months**? Please provide an answer as a percentage change from current prices.

If you think there will be inflation, please enter a positive number. If you think there will be deflation, please enter a negative number. If you think there will be neither inflation nor deflation, please enter zero.

_____

Page Break

ps_unemp_1 What do you think the unemployment rate will be at the end of 2022?

_____

Page Break

Display This Question:

If c_house = Very good

Or c_house = Good

Or c_house = Neither good nor bad

Or c_house = Bad

Or c_house = Very bad

ps_good_a house Generally speaking, do you think that now is a good time or a bad time to buy **a house or apartment**?

- ○ Very good (1)
- ○ Good (2)
- ○ Neither good nor bad (3)
- ○ Bad (4)
- ○ Very bad (5)

Page Break

Display This Question:

If c_car = Very good

Or c_car = Good

Or c_car = Neither good nor bad

Or c_car = Bad

Or c_car = Very bad

ps_good_a car Generally speaking, do you think that now is a good time or a bad time to buy **a car or other vehicle**?

- Very good (1)
- Good (2)
- Neither good nor bad (3)
- Bad (4)
- Very bad (5)

Page Break

Display This Question:

If c_durable = Very good

Or c_durable = Good

Or c_durable = Neither good nor bad

Or c_durable = Bad

Or c_durable = Very bad

ps_good_durable Generally speaking, do you think that now is a good time or a bad time to buy **a large appliance (e.g. refrigerator, stove), furniture, or electronics**?

- Very good (1)
- Good (2)
- Neither good nor bad (3)
- Bad (4)
- Very bad (5)

Page Break

post_es How would you rate business/economic conditions in this country as a whole **today**?

- Excellent (1)
- Good (2)
- Only fair (3)
- Poor (4)

Page Break

pose_es2 **In a year from now,** do you think that business/economic conditions in this country, as a whole, will be better than they are at present, will be worse, or will be about the same?

- ○ Better a year from now (1)
- ○ About the same (2)
- ○ Worse a year from now (3)

Page Break

attention_check Now you have completed the first part of the study. We thank you so much for your time spent taking this survey. We will reach out to you again in a month. The next part will be shorter. The expected completion time is 10 minutes, the reward will be $2. We wish you to participate in the survey again.

Based on the text you read above, how much reward will you be paid for participating in the second part of the survey? This is an attention check.

- ○ $1 (4)
- ○ $2 (5)
- ○ $3 (6)
- ○ $4 (7)

the end Please click next to record your responses.

End of Block: Post treatment