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Essays in Macroeconomics, Expectations and Prices

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Essays in Macroeconomics, Expectations and Prices

by

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Professor Christina Romer
Professor David Romer

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Abstract

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This dissertation has three chapters where I discuss new evidence on the role of expectations and price adjustment for macroeconomic policy. The first two chapters explore the role of expectations for macroeconomics. In the first chapter, I study a particular communication event and show that policy communication can have an effect on expectations and consumer behavior. The second chapter, that is join work with Olivier Coibion, Yuriy Gorodnichenko and Saten Kumar, studies more systematically the role of expectations, how to measure them and what we know about the use of expectations as a policy tool. The third chapter, that is join work with Juan Herreño, explores the distributional effect of monetary policy and how different group of population are differently affected depending on their level of income. We explore the implications of these results on real income inequality over the business cycle.

In the first chapter of this dissertation, I use regional variation in radio exposure in 1930 to analyze the impact of President Franklin D. Roosevelt's 1935 speech, in which he showcased the introduction of important economic and social policies. I document that states and cities with higher exposure to the announcement exhibited a significant increase in spending on durable goods. I transcribed weekly data on banks debits and show that cities one standard deviation more exposed to the speech increased their bank debits by 3.6 percent following the speech. I provide evidence that suggests that this result is not driven by wealth or other potentially confounding variables. I provide suggestive evidence that the effect is associate with the content of the speech and might come from a combination of economic confidence and the details of the policies announced.

In the second chapter, we assess whether central banks may use inflation expectations as a policy tool for stabilization purposes. We review recent work on how expectations of agents are formed and how they affect their economic decisions. Empirical evidence suggests that inflation expectations of households and firms affect their actions but the underlying mechanisms remain unclear, especially for firms. Two additional limitations prevent policy-makers from being able to actively manage inflation expectations. First, available surveys

of firms' expectations are systematically deficient, which can only be addressed through the creation of large, nationally representative surveys of firms. Second, neither households' nor firms' expectations respond much to monetary policy announcements in low-inflation environments. We provide suggestions for how monetary policy-makers can pierce this veil of inattention through new communication strategies. At this stage, there remain a number of implementation issues and open research questions that need to be addressed to enable central banks to use inflation expectations as a policy tool.

In the third chapter, we study the distributional effects of monetary policy. We find that prices in relatively poorer cities react more to a monetary policy shock identified with the Romer and Romer (2004) methodology. This result holds across different definitions and classifications of price indexes, including when every region has the same weights across goods. It also holds for a wide set of categories of consumer expenditure. This pattern is consistent with regional heterogeneity in real rigidities. We build a New Keynesian model where consumers have non-homothetic preferences arising from a subsistence level of consumption. In this setting, poor regions exhibit steeper Phillips Curves. This implies that regional inequality in real wages increases after expansionary monetary policy shock due to a combination of smaller increases in prices and bigger expansions in economic activity in richer regions.

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Chapter 1

Fireside Chats: Communication and Consumers' Expectations in the Great Depression

1.1 Introduction

Monetary and fiscal authorities increasingly appreciate the significance of communicating their policies to the public. Indeed, in the current environment where central banks are greatly constrained in using conventional policy tools, management of expectations about future policies can help to stabilize the economy. While these unconventional, communication-based policies can have a large effect on the economy in theory, little evidence supports the uses of such strategies in practice. This is not surprising given the numerous challenges related to identifying an exogenous communication treatment as well as measuring how the provided information is received by economic agents and how they act upon this information. This paper attempts to overcome those challenges using an important historical event with a clean identification strategy that allows measuring the causal effect of a relevant policy announcement on macroeconomic outcomes in a depressed economy.

Specifically, this paper advances understanding of the matter by measuring how changes in expectations affect economic outcomes. I show how communication from economic authorities can change consumers' behavior and have an expansionary effect in a recession. To do this, I use the uneven introduction of the radio in the United States in the 1930s and the Fireside Chat by President Franklin D. Roosevelt on April 28, 1935, as a natural experiment. I find that exposure to that speech significantly impacted consumer choices. I transcribe weekly data on bank debits, which are highly correlated with expenditure on durable goods, at the city level, and find a positive and significant increase in bank debits in more exposed cities the week after the speech. One standard deviation increase on the exposure to the speech increased bank debits by 3.6 percent two weeks after the speech, compared

with two weeks before the speech. Using more aggregated data, I find that spending on cars increased, and savings (measured by total deposits) decreased in more exposed states. I also find that the effect is not driven by other characteristics that are correlated with the use of radio. These findings suggest that effective communication, particularly during recessionary periods, can amplify the effects of countercyclical policies.

The Fireside Chats were a series of speeches that President Roosevelt (FDR) to communicate directly with the public. Aimed at the common American, the chats deliberately used informal language. FDR designed the chats to be very important events, announcing the schedule several weeks in advance, and airing them at a prime time (usually after a popular show). I focus on the speech of 1935 for several reasons. First, it was an isolated event. (No other Fireside Chat happened that year.) Second, the speech focused on boosting confidence in the economy. FDR also introduced and explained the benefits of important future social policies, such as the Works Progress Administration (WPA) and the Social Security Act (SSA). Third, because President Roosevelt had proven to be willing to increase government spending with the New Deal, the announcement was a credible. Moreover, the bills for the WPA and SSA were in Congress.

Using Census data from 1930, I construct the pre-announcement regional intensity in radio usage by households to measure exposure to the event. With this measure, I evaluate how regions behaved before and after the speech, depending on their radio share using a difference-in-difference strategy. This setting, plus the high frequency of the data that I obtain, allow me to identify the causal effect of the speech on outcomes related to expenditure and saving. In addition, I present various robustness checks, such as a placebo test and instrumental variable estimations.

The empirical evidence shows an increase in spending on durable goods after the announcement. This result with an increase in economic confidence, understood as animal spirit or expectations about future positive shocks. I show that other previous speeches that did not include announcement about future policies, do not have have a similar big and lasting effect as the speech of April 1935. This means the announcement of the policy is key. In particular, announcing social protection can work in that line, as consumers should decrease precautionary saving, but there is no evidence that regions with higher percentage of individuals affected positively by the policy react differently.

I show that the reaction of consumer is consistent with the announcement of a decrease in payroll taxes, in lines with the idea of unconventional fiscal policy. Because of intertemporal substitution, consumers anticipate the increase in taxes by increasing their stock of durable goods. In section E in the appendix, I develop a general equilibrium model where consumers have sticky information to show how more informed consumers react to the announcement of a payroll tax and the role of durable goods. This means that even the contractionary part of the announcement should produce results in line with the empirical findings at the

moment of the announcement.

This paper contributes to a growing debate on how monetary authorities and governments should communicate their present and future policies to the public, and what the potential effects of such communication may be. Should communication employ technical language and concepts targeted at those with financial expertise or should communication rely on simple words and framing to make complex information accessible to the general public? This debate becomes particularly relevant when monetary authorities use policies such as forward guidance. The literature has taken some steps to examine the ways in which the U.S. Federal Reserve communicates, and whether a target audience should primarily be households or financial markets. For example, Hernández-Murillo and Shell (2014) show that the communication of the Federal Reserve has become more complex over the years, such that only very sophisticated individuals can understand the documents they release. Coibion et al. (2018d) discuss the importance of communicating effectively to the general public as a way to help increasing the effect of policies that involve changing expectations. Nevertheless, the question of whether expectations-based policies work remains an open. For instance, policies such as forward guidance have big countercyclical effects in the New Keynesian model, but Del Negro et al. (2012) find that the empirical effects do not match the impact suggested by the model. D'Acunto et al. (2018) discuss how announcing fiscal policies that are better understood by consumers, could have a stronger effect than monetary communication-based policies.

A few recent papers study the role policy announcements may play in changing consumers' expectations. D'Acunto et al. (2016) find that an announcement of an increase in the value-added tax in Germany had a strong effect on consumers' inflation expectations and their spending decisions. Similarly, Kueng (2014) finds that spending of high-income households in the United States increased strongly in response to announcements that raised their expected after-tax lifetime permanent income. Coibion et al. (2018c) also find that changes in the inflation expectations of the firms managers affect their economic decisions at the firm level. Using an experiment, Coibion et al. (2019a) find that the Federal Open Market Committee statements are not more informative for the public, than an information treatment containing only the inflation target. This result shows that complex policy announcements might not be well understood by the general public.

This paper contributes to this debate by showing the effect of the communication of policies, exploiting the differential access to the announcement of a policy that affected equally the treated and control groups. It also provides an example of communication that aimed to convey the spirit of complex policies in an approachable way. The Fireside Chats targeted at the general public as their audience. Strategically, Roosevelt chose special dates and used simple language to communicate with regular people. I show that this communication policy produced an expansionary effect on more exposed regions. The findings of this paper have can help to develop communication strategies for governments and central banks focusing

on the general public, differing from the recent trends on monetary policy communication strategies.

To the best of my knowledge, this paper is the first to use this identification strategy to study the effect of communication outcomes in a macroeconomic context[1]. Previous work in other fields has used a similar strategy to study the effect of communication on other outcomes, such as conflict and election turnout, showing that media exposure has a substantial impact on people's behavior in term of political participation and choice.[2] These results are not surprising; many politicians in the United States and other countries use the mass media and new social media to communicate policies. Roosevelt is well-known for his radio talks, others have also used similar tools. President Ronald Reagan, for instance, used the television to explain his tax plans, and, Presidents Barack Obama and Donald Trump used Facebook and Twitter to communicate.

Other works have also studied the role of expectations and communication in the Great Depression. Romer (1990) discuss how the Great Crash of 1929 produced uncertainty about future income. According to that work, that uncertainty generated a reduction in consumers' spending on durable goods. This could be associated with the start of the Great Depression. Eggertsson (2008) discuss how the election of FDR shifted expectations about the fiscal policy that was being implemented. Using a general equilibrium model, he shows that a change in expectations about fiscal policies can produce an economic expansion as the one that started in 1933. In this same line, Eggertsson and Pugsley (2006) show that at the zero lower bound, even small changes in consumers belief about the governments' policies can produce big changes in output and inflation. They discuss the implication of that model in the context of the recession of 1937. Then, using a narrative approach they show that poor communication from economic authorities, in particular the confusing communication about the price targets from President Roosevelt that year, can produce the a recession like the one in 1937. This event is known as the *Mistake of 1937*. These papers show the importance of communication in the context of the Great Depression, which can explain the size of the results that I find.

The remainder of this paper is organized as follows: Section 1.2 discusses the historical context of the paper. Section 1.3 presents the data used in the empirical part. Section 1.4

[1] A related work in the field of political economy is Strömberg (2004), who uses radio exposure in the same period studied in this paper. He finds that resources of the Federal Emergency Relief Program (FERA) were allocated to areas where a larger share of the population had radios between 1933 and 1935. In this paper I look at the differential effect after the event; by contrast he looks at the cross-sectional allocation of FERA. In any case, any systematic differences in government expenditure will be captured by zone fixed effects, as explained in the empirical section.

[2] a similar identification strategy to estimate the effect on political outcomes has been used by Enikolopov et al. (2011) DellaVigna and Kaplan (2007), González and Prem (2018), DellaVigna et al. (2014), and Yanagizawa-Drott (2014), among others. In general, they find high effects.

presents the main empirical strategy and main results. Section 1.5 shows the effects at the state level. Section 1.6 shows the consistency of the results using instrumental variables. Section 1.7 discusses the effect of the event in other relevant variables. Section 1.8 discusses the effect of other speeches made by Roosevelt. Section 1.9 discusses possible mechanisms. Section 1.10 concludes.

1.2 Context

In 1932, Franklin Delano Roosevelt was elected president of the United States. At the time of his Inauguration, in March 1933, the country was reaching the deepest point of the Great Depression. On the morning of Inauguration Day, both the New York Stock Exchange and the Chicago Board of Trade suspended trading. The Roosevelt administration started with a banking holiday that lasted a full week. In this context, Roosevelt passed a series of policies that aimed to reactivate the economy. First, he cut $500 million from the federal government spending budget because he considered that was "on the road to bankruptcy." Then, he signed the Economy Act and the Beer-Wine Revenue Act, which anticipated the end of Prohibition. These bills gave the government new sources of revenue.

With the objective of stabilizing the economy, Roosevelt sent several bills to Congress with policies that came to be known as the New Deal, which were rapidly implemented a period known as the "Hundred Days." Policies included the creation of unemployment relief and the Civilian Conservation Corps, which sought to employ a quarter of a million young people to develop the National Park System, among other projects. He also created the Federal Emergency Relief Administration (FERA) to coordinate unemployment assistance and established the Tennessee Valley Authority (TVA). The government also launched the National Industrial Recovery Act (NIRA), which included labor regulation such as minimum wages and maximum hours. The Public Works Administration (PWA) oversaw public construction programs. Finally, the NIRA created the National Recovery Administration (NRA) to regulate competition and workers' bargaining power.

All these new agencies and bills are the core of the New Deal and sought to increase production in a context in which the country mired in the depths of the Great Depression amid a turbulent world. Roosevelt was able to do this thanks to the Democratic party majority in Congress. However, as Kennedy (1999) and Chester (1969) point out, Roosevelt faced a communication problem. As conservatives owned many of the newspapers, Roosevelt's message was not able to reach the audience in the way that he wanted. This fact was particularly relevant considering the upcoming midterm elections in 1934 and Presidential elections in 1936.

To resolve this issue, Roosevelt used the radio, a relatively new technology at the time, to communicate with the public. In contrast to newspapers, radio gave Roosevelt the oppor-

tunity to speak directly to the American people. Even though the invention of the radio had happened decades before, and its presence in the United States dated back to the beginning of the 20th century, broadcasting was mainly an amateur that lacked widespread outreach. The first-ever scheduled, pre-advertised radio program in the United States occurred in Pittsburgh in November 1920, with the announcement of the results of the Presidential Election.

According to the 1930 Census of Population, only 36 percent of households had at least one radio. This relatively small number did not prevent politicians from using this new communication instrument. In 1924, the Democratic National Convention was broadcast; in 1928, both presidential candidates, Herbert Hoover and Al Smith, used the radio for campaigning. By 1932, many local candidates used the radio. Roosevelt himself communicated through the radio as governor of New York. Many historians (e.g., Chester (1969)) highlight that President Roosevelt had great oratory skills; after the speech of April 28th, 1935 The New York Times said that "He (the President) confirmed that no politician of his time equals him in the adroit use of this means of approach to his fellow-citizens all over the land." During his presidency, he used the radio extensively. Just days after his inauguration, he launched the first of a series radio talks. This was a way of communicating directly with the audience, bypassing the editors of newspapers that opposed his presidency.

According to Lenthall (2008), prior to Roosevelt, President Hoover also used the radio to deliver speeches and communicate. Though his speaking skills were considered subpar, Hoover used the radio many times and this "overexposure" seems to have affected Hoover's popularity negatively. Armed with this knowledge, Roosevelt pursued a different strategy: he limited his exposure to a few, well-announced appearances that commemorated important occasions. Lenthall (2008) describes how Roosevelt's press secretary Stephen Early worked to establish the Fireside Chats as major events. They were announced several weeks in advance and were scheduled after popular evening shows to ensure a high audience.

Roosevelt's communication style differed from the speeches of other politicians at the time. He used less formal language, and aimed his rhetoric squarely at the common man. With this unique approach, he used this platform to answer critiques of his policies, and to explain how his government was working to solve issues, particularly through the New Deal. He used the radio as an educational news agency and shaped his style to explain and inform about his policies, in a context were the other sources of information, notably newspapers, were mostly in opposition. Consequently, Roosevelt became a radio celebrity. After these speeches, he received as many letters and telegrams as president Wilson during World War I. According to Lenthall (2008), many people reported that by listening to the president speech, they felt better about their "Depressions troubles," indicating how he shaped expectations about the economy. In a 1933 letter to the White House, for example, a citizen who had listened to a fireside chat wrote:

"[...] I feel that he walked into my home, sat down and in plain and forceful language

explained to me how he was tackling the job I and my fellow citizens gave him."

Roosevelt delivered a total of 28 "Fireside Chats" on the radio. In the first one, Roosevelt addressed the end of the banking holiday of 1933. That same year he used the radio on three more occasions. These speeches were, in general, between the hours of 8 p.m. and 10 p.m. Eastern Time, in order to reach the whole country. After that, he gave two more speeches in 1934, and one in April 1935.

President Roosevelt gave a speech on the radio in which he discussed the general motivation of the policies that were being discussed in the Congress in April 28th, 1935. He emphasized on the approval of the Works Progress Administration (WPA) and the Social Security Act (SSA). The speech[3] focused on confidence and its importance for the recovery:

"Never since my Inauguration in March, 1933, have I felt so unmistakably the atmosphere of ***recovery****. But it is more than the* ***recovery*** *of the material basis of our individual lives. It is the* ***recovery of confidence*** *in our democratic processes and institutions. We have survived all of the arduous burdens and the threatening dangers of a great economic calamity. We have in the darkest moments of our national trials retained our faith in our own ability to master our destiny. Fear is vanishing and confidence is growing on every side,* ***faith is being renewed*** *in the vast possibilities of human beings to improve their material and spiritual status through the instrumentality of the democratic form of government. That faith is receiving its just reward. For that we can be thankful to the God who watches over America."*

In the speech he explained the objective of policies that gave security about the future. The main message was that provisions of the SSA (Unemployment Insurance and aid for retirement) and the WPA (jobs through public work programs), would give households more certainty about the future. Among the letters that President Roosevelt received, Thos. J. Vernia said that the speech "created a further feeling of confidence." In his speech, FDR said that the objective of the legislative agenda was to create "wise provisions for the protection of the weak."

The press reacted to the speech in the following days, focusing on the legislative program that the President emphasized. The press also noticed that this speech was different in nature. While other Fireside Chats had focused on answering critiques in this speech the President "ignored the critics," as the *Washington Post* put it on April 29, 1935. He used particular chat to explain future projects and how they would bring progress as a whole. On April 30, 1935, *The New York Times* reported that the speech contained "nothing new to any fairly close reader of the metropolitan press." However, the same newspaper later observed "The Metropolitan press is numerically small in proportion to the citizenship of the country. Many readers do not remember the news of the previous day, and he (Roosevelt) thought

[3]The transcript of the full speech can be found in Appendix F

it both wise and necessary to tie everything together." The paper's analysis concluded that Roosevelt had employed a different strategy: to use the radio to explain the objectives of his agenda a at a time when Congress seemed poised to delay its progress. In that sense, the speech can be understood as increasing the probability that those policies will occur. The bills were in Congress and many probably had an idea of them. The fact that Roosevelt emphasized on the approval of those policies, given the majority that Democrats had in Congress after the midterm election of 1934, increase the likelihood that those policies will actually be approved soon.

Congress had already approved the WPA earlier in April. The objective of the WPA was to create government jobs for 3.5 million Americans. Newspapers of the time said that President Roosevelt had $4 billion available to spend. The program eventually employed more than 8.5 million workers on 1.4 million public projects. Roosevelt himself had provided more in detail about the WPA in January 4th, 1935, in the State of the Union Address. He also had described details of the Social Security Program in a message to the Congress that was read by some radios. Nevertheless, his main audience on these previous occasions was not the general public, but the members of Congress. Furthermore, the State of the Union Address took place on a Friday at 12:15 p.m. and the message to Congress was read at that same time on a Thursday - times that precluded many working people from listening to these speeches.

The WPA was signed into law on May 6, 1935, and the SSA bill was signed into law on August 15, 1935. The SSA introduced unemployment insurance and old-age pensions. It also included help for indigent elderly as well as child and health services. In the Fireside Chat of April 28th, 1935, Roosevelt recognized that, even if reducing unemployment was important, the government "cannot continue to create government deficits for that purpose year after year." To finance the unemployment plan, the act relied on a 1 percent on employers' contributions (firms with eight or more workers), which increased to 2 percent in 1937. The pension plan was financed by a 1 percent employee contribution. Finally, payroll taxes were instituted in a range from 4 percent for lower incomes to 79 percent for incomes larger than $5 millions (a tax that was specifically used to target Rockefeller's own fortune). Because of the minimum taxable income, less than 5 percent of Americans paid this tax.

The SSA also provided an important source of income for retirees. Many of them stayed in the labor force, as they didn't have any other source of income for retiring. According to Costa (1998), even if some states had a pension system, retirees depended on their own savings and family support. Haber and Gratton (1993) estimate that by the 1920s, the median household had saved between $2,500 and $5,000 by the retirement age. This means that 40 to 50 percent of households could finance a ten-year annuity of $616 in 1917 dollars. These numbers indicate that people close to retirement had significant savings that could be spent if the SSA gave them some income in the future. Additionally, as a part of that population could retired with this policy (they would not need to work if given an SSA income), the SSA

could have opened new opportunities to younger workers in the labor force. In Roosevelt's words, the SSA could "help those who have reached the age of retirement, to give up their jobs and thus give to the younger generation greater opportunities for work and to give to all a feeling of security, as they look toward old age."

The benefits of these federal programs targeted a considerable proportion of the country's population. In particular, social insurance could have improved consumers' confidence and reduced the amount of precautionary saving, increasing expenditure. However, the communication effort did not necessarily reach the whole country evenly. In the next sections, I use the geographical heterogeneity of the introduction of the radio to evaluate the impact of Roosevelt's communication. This heterogeneity can help to understand the effect of changes in expectations, given that this particular policy that affects the saving-consumption decisions of consumers. The next section explains the data used to estimate this effect.

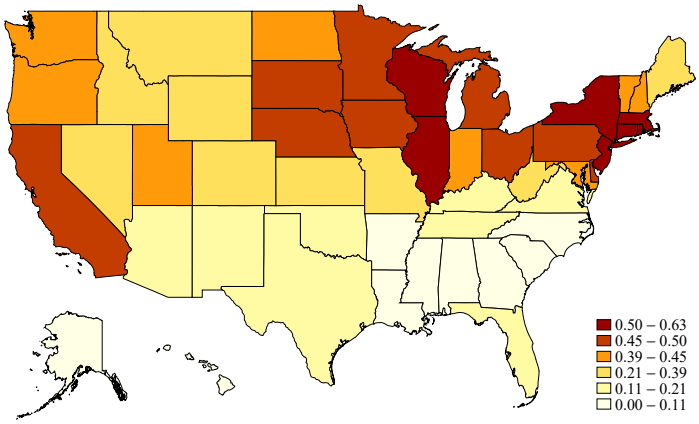
1.3 Data

This paper tries to estimate the effect of a communication treatment on economic behavior. In order to estimate that effect a measure of how many people listened to the speech is needed. One of the challenges is that there is not a variable that measured how many people listened to the speech or the geographical distribution of listeners. In addition, listening to the speech is not exogenous. That is why, I use the share of households in a given area that had a radio at the time as a proxy for having listened to the speech.

I use the 1930 Census of Population data to determine the average number of houses with radio in each region. Throughout this paper I will use different level of aggregation. The share of households in a given area with radio is used as exposure to the speech[4]. The radio usage data are from 1930, two years before Roosevelt's election, and five years before the speech analyzed. Therefore, the measure of radio usage is not related with the actual event that I will analyze. Table A.1 shows the high degree of heterogeneity in radio adoption, ranging from 5.3 percent of households with radio in Mississippi to 62.5 percent in New Jersey. In general, southern states had fewer radios compared with northern states. This measure is gathered half a decade before the event, so it is not influenced by the event itself. Figure 1.1 shows the geographical heterogeneity by state:

[4]I obtain the percentage of households that have a radio, using the 5 percent representative sample available online. I use households' expansion factors

Figure 1.1: Share of Households with radio by state in 1930



Note: The graph shows the share of households with at least one radio in 1930 at the state level, according to the 1930 Census of Population. This graphs uses the same numbers used in table A.1

The differences in distribution of radios might correlate with other economic variables, such as income. To prevent contamination from systematic differences at the state or city level, I control by those fixed effects. Through the paper, I use different sources of information and data. I estimate the effect of communication on spending on durable goods and savings. Table 1.1 shows the different sources of data, frequency and aggregation:

Table 1.1: Variable Level, Frequency and Source

Variable	Level	Frequency	Source
Radio Share	State, County and City	1930	1930 Population Census
Demographic Characteristics	State, County and City	1930	1930 Population Census
Share of Woodland	State, City and County	1930	1930 Agricultural Centus
House Ownership	State, City and County	1930	1930 Population Census
Cars per capita	State	Annual	Hausman (2016)
State income per capita	State	Annual	BLS
State Income Growth	State	Annual	BLS
Deposits (logs)	State	Annual	Flood (1998)
Inflation	City	Annual	BLS
Public help per capita	City	Annual	Fishback et al. (2005)
Retail sales per capita	City	Bi-Annual	Fishback et al. (2005)
Building permits per capita	City	Annual	Hausman (2016)
Bank Debits	City	Weekly	G.6. Federal Reserve Board

Note: This table presents the main data used in the paper. For each variable I present the level of aggregation, frequency that the data is available and the source of the data.

The frequency of the data and aggregation depends on the availability. I use data from 1930 to 1939 at a state level. Hawaii and Alaska don't have data, as they became state in

1959. Because of this, I will use yearly data for 48 states plus the District of Columbia. Table 1.2 shows some summary statistics for the state-level data:

Table 1.2: State-level Variables

Full Sample	Obs	Mean	Std. Dev.	Min	Max
Radio Share	49	35.00%	16.69%	5.29%	62.50%
Cars per capita	490	0.018	0.009	0.003	0.056
State income per capita	490	462.2	203.9	122.0	1314.0
State Income Growth	490	-0.61%	15.40%	-36.69%	70.61%
Deposits per capita (logs)	490	-1.42	0.73	-3.51	0.50
Variable in 1935	Obs	Mean	Std. Dev.	Min	Max
Cars per capita	49	0.022	0.008	0.009	0.051
State income per capita	49	443.8	169.7	174	1031
State Income Growth	49	15.53%	13.30%	1.29%	61.38%
Deposits per capita (logs)	49	-1.49	0.710	-2.83	0.30

Note: The Table displays summary statistics for state level variables. The variable cars per capita comes from Hausman (2016). State income per capita and income growth come from the BLS and deposits come from Flood (1998).

As the table shows, the number of cars per capita was relatively low, averaging one car for every 50 persons, but reaching levels as high as one per 20 persons in some states, depending on the year. Substantial heterogeneity emerges in income per capita, which was almost six times higher on some states than others in 1935 between states. In addition, income growth rates varied enormously from -36 percent to 70.61 percent. However, in 1935 all states were growing, which mitigates some concern about negative shocks hitting some areas, even if there is heterogeneity in growth rates. The data also show a high degree of heterogeneity in deposits. In per capita terms, these numbers range from a minimum of $0.029 to a maximum of $1.6.

In the main results, I use city-level data. For this level of aggregation, I obtain the radio usage variable from the 1930 Census of population as with the state level data. I have data on building permits from Hausman (2016). CPI data is available for a few cities and obtained from the BLS. Data on Federal aid and local sales come from Fishback et al. (2005). I obtain weekly data on bank debits from the report G.6., weekly published by the Federal Reserve Board. The radio share is obtained for the county where the city is located. The following table gives some descriptive statistics of those variables:

Table 1.3: City-level Variables

Full sample	Obs	Mean	Std. Dev.	Min	Max
Radio Share	261	39.16%	15.52%	4.19%	71.91%
Bank Debits (logs)	6,749	9.055	1.462	5.723	15.97
Inflation	154	-1.56%	4.93%	-13.42%	7.14%
Public help per capita	1,130	33.38	26.27	0.00	125.90
Building permits per capita	979	4.29	5.68	0.00	51.23
Variable t=event	Obs	Mean	Std. Dev.	Min	Max
Bank Debits (logs)	270	9.062	1.482	5.927	15.969
Inflation	14	2.86%	1.79%	-0.80%	6.25%
Public help per capita	113	41.02	18.36	6.08	85.09
Building permits per capita	100	2.39	2.75	0.00	15.21

Note: The Table displays summary statistics for city level variables. The first part of the table shows the statistics for each variable for the whole sample that it is available. In the case of the Radio Share, the data is only available for 1930. In the case of Bank Debits for all 1935. Inflation, public help and building permits are available from 1930 to 1940 at a yearly basis. The second part shows the statistics at the moment of the speech. For the yearly variables is in 1935 and for the bank debits is the week ending on April 24th, 1935.

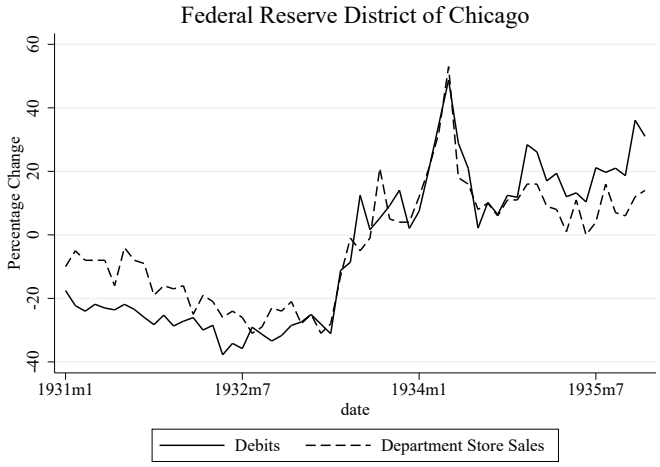
The table shows that the average percentage of households with radio is higher in cities than in states. This can be explained by the fact that radio infrastructure was developed to target more populated areas, which were concentrated in counties with the cities listed in the reports. This might have created an incentive to obtain radios in those cities, where signals were more reliable.

The table also shows a high heterogeneity in inflation over time. On average inflation is negative, which is characteristic with this period, when the U.S. economy was hit by the Great Depression. On average, inflation was higher in 1935, which indicates the recovery underway at that time, even as some cities still exhibited negative inflation rates. The table also indicates that the level of federal fiscal aid was higher in 1935, with high levels of heterogeneity. There is also heterogeneity on building permits and on retails sales per capita.

The main results look at the effect of the communication event on bank debits. Bank debits represent the amount of money that exits the bank, so an increase in this variable is related to a decrease in deposits. Note that bank debits only represent one side of the equation, as I do not have the flow of income entering to the bank or the stock of deposits. Nonetheless, this variable is highly correlated with other variables that represent economic activity. For instance, the U.S. Federal Reserve, Report G.7.2 presents monthly percentage changes in department store sales at the Federal Reserve district level. Department store sales represent mostly expenditure on durables and semi-durable goods (Romer (1990)). I compare these data with bank debits aggregated monthly and at the Federal Reserve district

level. Figure 1.2 shows the correlation for the Federal Reserve district of Chicago:

Figure 1.2: Yearly Percentage Change in Bank Debits and Department Store Sales in the Federal Reserve District of Chicago



Note: The solid line represents monthly debits in the Federal Reserve district of Chicago between 1931 and 1935. The dashed line shows the monthly department store sales in the Federal Reserve district of Chicago. Department store sales comes from the Federal Reserve Report G.7.2 and Debits from the Federal Reserve Report G.5.

The figure displays a high correlation not only in levels but also in changes. In particular, the variables coincide in periods of big changes. This feature is present in all the Federal Reserve districts. To undertake a more systematic analysis, I run a regression with different fixed effects and lags. The results are presented in Table A.2 in Appendix A. Current and past values of the changes in debits correlate with the changes in department store sales. These results are robust to including many lags of debits. Three lags of the changes in debits explain current changes in sales. These results are robust to the inclusion of time and zone fixed effects[5]. Thus, bank debits provides a good proxy for department store spending, (i.e. the spending on durable goods).

I use data from city-level bank debits, which were collected weekly by the Federal Reserve for 270 cities[6]. I then examine whether a reaction surfaces in this measure right after the speech. I aggregate these data bi-weekly to address cyclically noisy data for some cities.[7]

[5]Also, I find similar results if I include lags of the retail sale variable

[6]The number varies over time. Clean data are available for 270 cities. Dropping cities with incomplete data and considering the state fixed effects reduces the total number of cities to 263.

[7]This could be because some individuals were paid every two weeks. Results hold with weekly data

The speech took place on a Sunday; the Federal Reserve reports weekly data from Thursday to Wednesday, meaning that incorporating a full week of time before the speech requires aggregation of two weeks of data. Therefore, in all the estimations, the first point estimate considers data collected from the Thursday before the speech to Wednesday a week after the speech (10 business days).

I have weekly data on bank debits at the city level, which is helpful because I can identify the effect the week after the speech. Bank debits are a good proxy for spending on durable goods. Nevertheless, I also show the effect of the speech at the state level using yearly data with more direct variables of consumption.

1.4 Estimation and City-level Results

1.4.1 Empirical Strategy and Main Results

To estimate the effect of being exposed to the speech on economic variables, I run a difference-in-difference regression. This specification includes a post-treatment dummy interacted with the regional ownership of radio in 1930. I run the following regression:

$$y_{ct} = \beta I(1\ if\ week > t_0) * RadioShare_{c,1930} + \gamma_c + \kappa(c)_{s,t} + \kappa(c)_{f,t} + \varepsilon_{ct} \tag{1.1}$$

Where c is the city, s the state, f the Federal Reserve district, and t the time that corresponds to two weeks. $y_{ct} = log(BankDebits)_{c,t}$ is the log of bank debits in a given city and time. As explained in the previous section, this is the sum of two weeks of bank debits. With the city fixed effect, I control for any systematic demographic and economic characteristics that might affect the results. State-time and Federal Reserve district-time fixed effects are important because the WPA and Social Security Act targeted some demographic characteristics (the unemployed, children, pensioners, veterans), and as a result, those demographics characteristic could explain part of the results. These results are robust to controls for some characteristics of the population affected by the policy (see Section 1.4.2). Because the effect could interact with the expectation of the policy reaction from any economic authority at the state or Federal Reserve district levels, incorporating time-variant fixed effects is important to incorporate variation at that level. As a result, findings should be interpreted as the within state (state-Fed in case a state is spited by a Federal Reserve district) difference in expenditure. The convergence of the data is also at that level.

I take the share of households that own a radio for the county where the city is located.[8] These data also come from the Census of Population of 1930. I run regressions, including

[8]I use county, because the rural population would use the city bank. In case there is more than one city by county I use the city level radio share. I do the same in the case of cities that do not depend on counties

state-time fixed effect, Federal Reserve district-time fixed effect and city fixed-effect. I also control for the share of urban population specific trends, share of black population and the share of population with a population aged 55 or older. I have a total of 266 cities. After excluding cities that present changes in logs bigger than 1 or -1 at one point of the period in some specifications,257 cities remain. The average debit by city is $58,415 with a standard deviation of $444,784. Big financial cities such as New York influence this number. Results are presented in Table 1.4.

Table 1.4: Difference-in-difference Results at the City Level

	(1)	(2)	(3)	(4)	(5)
Radio Share ($t > t_0$)	0.181***	0.182***	0.209***	0.218***	0.229***
	(0.042)	(0.063)	(0.063)	(0.073)	(0.079)
City FE	Yes	Yes	Yes	Yes	Yes
State-Time FE	No	Yes	Yes	Yes	Yes
FRD-Time FE	No	No	Yes	Yes	Yes
Outliers	Yes	Yes	Yes	No	No
Controls	No	No	No	No	Yes
Observations	1,052	1,024	1,024	916	916

Note: The table shows the results for running specification 1.1. Column (1) shows the results for the specification without controls. Column (2) add state week fixed effect. Column (3) is (2) plus Federal Reserve District Fixed effects. Columns (4) is (3) and drops outliers. Outliers are cities with weekly changes greater than |1| in logs and drops 5% of the bigger and smaller cities. Column (5) is (4) plus controls. Controls are trends interacted with the share of urban population, African American population and share of population older than 55 years old. Standard errors are clustered at the city level.

There is a significant effect in more exposed cities. The month after the speech, more exposed cities increased their bank debits by between 18.1 percent and 22.9 percent. These results are significant at the 1 percent for all the specifications. Taking into consideration the relevant variation on the radio share, one standard variation in the measure of exposure is about 15.52%. This means that the effect is between 2.8% and 3.55% on one standard deviation on the exposure. Taking into consideration the correlation between the change in debits and the change in department store sales, this means a increase in expenditure close to 2% depending on the specification.

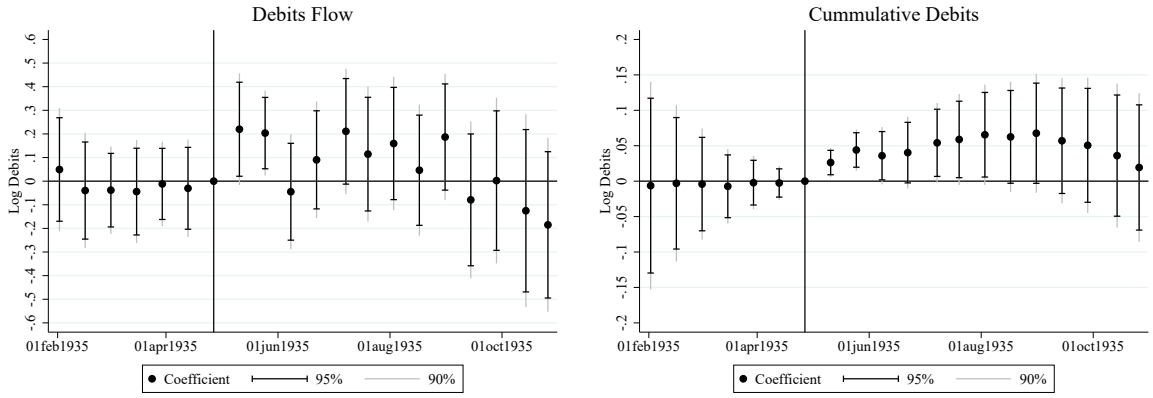
The identification assumption relies on the fact that nothing relevant happened related with the radio usage in the periods previous to the speech. In this sense, the previous results could be taking some previous higher growth of bank debits in cities with more radios. Then, I have to test whether the point estimates of the bank debits are similar to the baseline period before the speech. This means to show whether the coefficients of the pre-treatment are not

statistically different from the period before the speech. To evaluate this, I run the following specification:

$$y_{st} = \sum_{t \neq t_0} \beta_y I(1\ if\ week = t) * RadioShare_{c,1930} + \gamma_c + \kappa(c)_{s,t} + \kappa(c)_{f,t} + \varepsilon_{ct} \tag{1.2}$$

Tables A.3 and A.4 in Appendix A shows the results for this and other specifications for the flows and cumulative bank debits respectively.[9] The left panel of Figure 1.3 presents the results for column (6) in Table A.3, that includes controls and excludes outliers in changes and levels. The right panel presents the results for column (6) in table A.4. Standard errors are clustered at the city level. In addition to that result, the right panel shows the results for the cumulative city debit over the year 1935:

Figure 1.3: Bi-weekly Debits



Note: Left panel of the figure represents results of column (6) in table A.3. The dependent variable of the regression is bi-weekly sum of debits in logs and the dots represents the point estimate of a bi-week dummy interacted by the county share of radio. In the right panel there is the same specification, but with the sum over 1935 of the city's bi-weekly debits. Figure shows the results of column (6) in table A.4.The vertical dark lines represent confidence intervals at a 90 percent. The vertical gray lines represent confidence intervals at 95 percent. Standard errors are clustered at the county level.

The vertical line represents the week of FDR's speech[10]. We can see an increase in bank debits after the first two weeks. This effect is positive and statistically significant at the 95

[9]Results are consistent when controls are excluded. I also show results excluding big financial centers (defined as cities with a regional Federal Reserve) and excluding cities that are between the 5% with more and less debits on average during the period. I also present results excluding New York City.

[10]The speech was given a Sunday, so the vertical line indicates the week right before the speech, if we consider Sunday the first day of the week.

percent level. After that period, we still see a positive impact, but not statistically significant at a 95 percent level. Overall, there is a positive effect.

The estimated effect is large: The coefficient reports an increase of 23 percent in bank debits if the city has full exposure compared with a region with no exposure to the speech the two-weeks after the speech. This means that a city with one standard deviation more radio usage increased their bank debits by 3.6 percent. There is no evidence of a pre-trend. Three months before the event, the effect is approximately zero and not significantly different to the baseline period. This result can be interpreted as an increase in the flow of spending of durable durables, that is significantly higher in more exposed cities a month after the speech. This doesn't mean that there is convergence after two weeks. After a month, less exposed cities will have a lower stock of durable goods.

In order to evaluate when convergence occurs, the right panel shows the results for the annual sum of bank debits, in order to have a measure of the stock of spending in durable goods. We can see that the effect lasts for many more periods. After the initial post-speech increase, the stock of debits remains positive for 26 weeks, or six month. The effect is also statistically different from zero at a 90 percent for 14 weeks. Then it slowly converges to zero. This convergence is at the state level, as the regression includes state-time fixed effects. As Figure 1.3 shows, there are no pre-trends in this specification.

1.4.2 Robustness

The results presented above show an effect of the communication treatment on consumers' behavior that produced an increase in spending. The variable used to estimate the exposure is the share of households with radio in 1930. Even after controlling for local fixed effects and other variables, other omitted variables could bias the measure of exposure to the speech and affect the interpretation of the results. Different group of people could have reacted to the announcement and the regional importance of a group could be correlated with the share of radio ownership. The objective of this section is to clarify that the mechanism is listing to the speech through the radio and not a particular group reacting, independently of the share of radio.

The radio was not the only way to obtain information about the content of the speech. As in any communication treatment, individuals can get information by other sources as newspapers or talking with informed people. The information treatment in this case is the use of an homogeneous speech using a new technology. This mean that individuals exposed to the radio speech got the same information in a more efficient way. In that case, newspapers is also a relatively efficient way of getting information.

In the sample, I have the 263 relatively big cities. In those cities, access to newspapers was relatively high. But, there might be some heterogeneity in the access. In order to see if Newspapers played a role, I use a measure of newspaper circulation and control by it. Newspaper circulation can also be problematic. For instance, if I can access to the newspaper circulation the next day, that measure can be contaminated by the treatment. Some people that listened to the speech might decide to read the debate the day after. This problem does not happen with the radio, once the speech is delivered, there is no other opportunity to listened to it. Because of that an ex-post measure of newspaper circulation will measure interest on the speech, in particular in cities with high homogeneity in the access. In order to address that concern I will use a measure of newspaper circulation previous the event.

I obtain data from Gentzkow et al. (2011), where they have information on newspaper circulation for elections in the US. I obtain the data from 1934. With this, I run specification 1.1, but controlling by a time dummy interacted by that level of newspaper circulation at the city level. Table 1.4.2 present the results:

	(1)	(2)	(3)	(4)
Radio Share ($t > t_0$)	0.164***	0.175***	0.195***	0.208***
	(0.044)	(0.063)	(0.066)	(0.075)
City FE	Yes	Yes	Yes	Yes
State-Time FE	No	Yes	Yes	Yes
FRD-Time FE	No	No	Yes	Yes
Outliers	Yes	Yes	Yes	No
Observations	1,004	972	972	872

Note: The table shows the results for running specification 1.1. Column (1) shows the results for the specification without controls. Column (2) add state week fixed effect. Column (3) is (2) plus Federal Reserve District Fixed effects. Columns (4) is (3) and drops outliers. Outliers are cities with weekly changes greater than |1| in logs and drops 5% of the bigger and smaller cities. Standard errors are clustered at the city level.

The results show similar effects, but smaller. The effects are between 1.4% to 0.7% the results found in the main results, with similar standard errors. This means that most of the variation found is not coming from newspapers and even controlling by that variable the results survive. This shows that the radio share did deferentially affected people behavior.

Another concern is that there is a potential correlation between wealth and radio ownership. Wealthy consumers could have a differential effect on outcomes after the policy announcement. Even if I control by zone characteristics with the city fixed effect, richer groups could react more strongly to the announcement. The fact that richer groups possibly react more is not a threat to my identification strategy per se because they nonetheless react to the announcement. What could be problematic is if only rich people reacted that day; in

that case, my measure of exposure would capture the reaction of wealthy, rather than the reaction to the wide range of people listening to the announcement. I address this potential issue by using another variable in the census that is related to wealth, but that is not related to the exposure to the speech. This measure is the share of households that owned a house in 1930 in a given county. As we can see in the first column of Table 1.5, this variable is highly correlated with the use of radio.

Table 1.5: Correlation with Radio Share

	House Owners	Unemployed	Older	African Am
Radio	0.763***	0.826**	2.285***	-0.711***
	(0.080)	(0.326)	(0.252)	(0.036)
Observations	263	263	263	263
R-squared	0.290	0.029	0.246	0.485

Note: *** p<0.01, ** p<0.05, * p<0.1. Column (1) shows the correlation between radio share by county, and the share of houses owned by households in 1930. Column (2) shows the correlation with the unemployment rate in 1930. Column(3) shows correlation with the share of the population 55 and older and column (4) shows the correlation with the share of the African-American population. All variables are from the Census of Population of 1930. Robust standard errors are shown in parentheses.

In addition to this correlation, the policies announced in the speech benefited certain groups of people more. Thus, these groups could be reacting to the announcement. For example, the WPA offered benefits to counties with higher shares of unemployed people. Therefore, I also run robustness with the share of unemployed workers according to the Census of 1930. The SSA disproportionately benefited older population. I use the share of population in the county aged 55 and older. African American were disproportionately excluded of the SSA. Then, I use the share of African American population in the county.

The strong correlation that emerges suggests that the share of radio ownership is potentially correlated with wealth and with the populations that most benefited from the policies. To see if the effect is driven by one of these measures (and not from the exposure to listening to the speech), I run specification 1.1, but instead of using the radio ownership share, I use each of these variables interacted by the dummy of post treatment. The results are presented in the first row of Table 1.6.

Table 1.6: Other Variables as Placebo and Control

	(1) House Owners	(2) Unemployment	(3) Older	(4) African Am
Placebo	0.138	-0.187	-0.254	0.208
	(0.105)	(0.208)	(0.281)	(0.130)
Radio	0.205***	0.213***	0.229***	0.225***
	(0.073)	(0.073)	(0.073)	(0.072)

Note: The table shows the results for running specification 1.1 in the version of column (4) in Table 1.4. In the row placebo, I run specification 1.1, but instead of using the radio share, I use the variable that is in the top of the column. In the row Radio, I run specification 1.1, but controlling by the variable of the top of the column interacted by the treatment dummy. Standard errors are clustered at the city level.

The table shows that none of these variables have a significant effect after the communication treatment. Looking at the first row, the results indicate that the groups of people who were more likely to benefit from the policies have point estimate in the opposite direction than the expected sign. In the case of house ownership, the reaction goes in a similar direction, but is smaller and non-significant. This means that these groups of population did not react after the speech of April 28th, 1935 differently, independent of the share of radio. Next, I estimate if these variables have an influence on the coefficient found in the previous section. In the second row of table 1.6, I run specification 1.1, but controlling by the variables indicated at the top of the column, interacted by the treatment dummy variable.

The table shows that the results are not affected by those variables, even if they are highly correlated with the share of radio ownership. The point estimates are similar, moving from 0.205 to 0.229. Standard errors are similar, so the precision of the estimation doesn't change much. In all these cases the results are significant at the 99 percent confidence level. These results confirm that the effect is coming from the share of radio ownership, (i.e. from exposure to the speech). Even when controlling with variables that are correlated with the share of radio and of population affected by the policy, the results do not change.

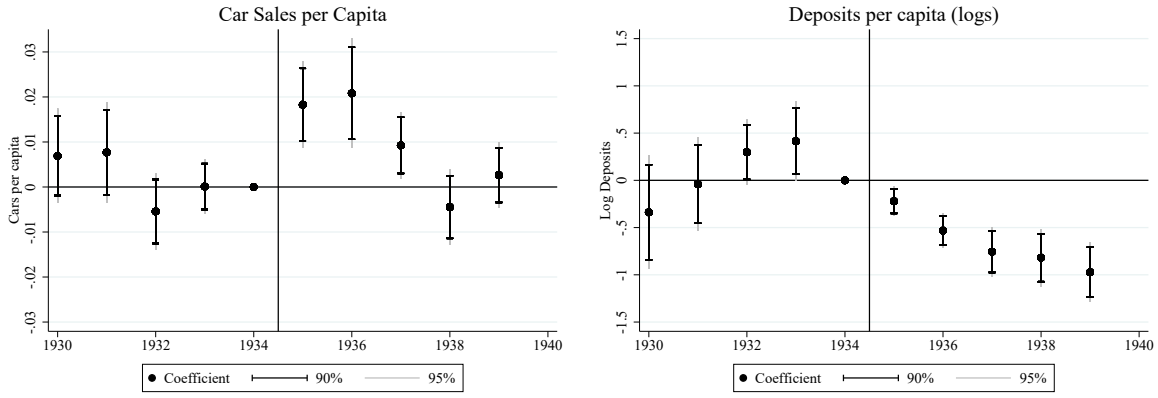
1.5 State-level Results

Previous results show a significant effect at the city level the week after the speech was made. The variable used correlated with expenditure on durable goods, which means that it can be a good proxy. In this section I run a similar specification, but with more direct measures in order to see if these results are consistent. One of the problems is that the aggregation

will be higher in the number of individuals and periods. This section looks for consistency, as the identification is weaker.

I run specification 1.2 for two variables. The first is the expenditure on car per capita and the second is the log of deposits per capita. Instead of using state-time fixed effects, because of the variation that I have, I use geographical zone where the state is located. I use the eight Census zones: North East, Middle Atlantic, East North Central, West North Central, South Atlantic, East South Central, Mountain, and Pacific.[11] I use income per capita growth and the income per capita in $t-1$, and their interaction with trends as controls. All regressions have state fixed effect and standard errors clustered at the state level. The set of results are presented in Appendix A in Table A.5 for cars per capita and Table A.6 for deposits in logs. The left panel of Figure 1.4 displays graphically the results of column (6) in Table A.5.

Figure 1.4: Results for Cars Sales per capita and Deposits (log)



Note: The left panel of this figure shows the results of column (6) in Table A.5. The dependent variable of the regression is the sales of cars per capita, and the dots represents the point estimate of a year dummy interacted by the state share of radio ownership. The right panel of this figure shows the results of column (6) in Table A.6. The dependent variable of the log of deposits and the dots represent the point estimate of a year dummy interacted by the state share of radio ownership. The vertical black lines and gray lines represent confidence intervals at a 90 percent and 95 percent respectively in both panels. Standard errors are clustered at the state level.

For all the specifications reported in Appendix A, there is a positive and significant effect at the 99 percent level in 1935 compared with 1934, the year before the policy and the speeches. In particular shifting from no exposure (no households with radios) to full exposure, increases the number of cars sales per capita by approximately in two standard

[11] Results hold with a North-East, South, West and Midwest zoning

deviations (0.018 versus a standard deviation for cars of 0.009). However, considering the actual variation of radio ownership, one standard deviation increase in radio usage, increases per capita spending on cars by 0.37 standard deviations. This result is also persistent: the estimated impacts in 1936 are similar; impacts in 1937 are smaller, but significant.

In the following exercise, I run specification 1.2, but with y as log of deposits per capita. Data for deposits was obtained using Flood (1998) and considers all the deposits of the state, including commercial banks and national banks. I run the regression in logs to see the percentage change in the stock. I use the same controls than in the specification for cars. Table A.6 and the right panel of Figure 1.4 presents the results.

I find that deposits per capita fall in exposed states for all the periods after the speech. This effect is small during the year of the event, (28.7 percent of a standard deviation in 1935), but grows over time. By 1938 the coefficient is higher than one standard deviation. This result is consistent with the expected impact of the policy. If individuals expect social protection against a negative state of the economy, saving for precautionary reasons should decrease. For these results there is some evidence of pre-trends: I fail to reject the null hypothesis that the coefficients before the treatment are zero in some specifications. This finding changes depending on the controls added. The coefficients after the speech are big compared with the effects found before the event, and they are consistently significant.

These results suggest an effect of communication on consumers' economic behavior. Regions that were more exposed to the speeches had higher levels of spending and reduced their deposits after the speech in states with a higher level share of households with radios. In addition to the state level results, I include more yearly evidence at a city level. I use information about new house building permits from Hausman (2016). This variable is related to spending of durable goods, and it is an indicator of economic activity. In that sense, this variable is related with results related to the purchase of cars. In this part, I use data 106 cities in 36 states.

I use specification 1.2. One of the problems of using city-level data is that there are not many controls available related to economic activity. Furthermore, I am controlling more precisely for specific regional shocks in a given year. As a result, I use state-time fixed effects to control more precisely for local policies and local shocks. I also add controls, including the one-year-lagged retail sales[12] and Federal financial aid, which are related to the level of economic activity and targeted federal policies. I also include city fixed effects, that control for systematic characteristics of the city. Table A.7 in Appendix A show the results of the regressions with and without the controls. Figure B.1 in Appendix B show the results for specification (4).

[12]This variable is measured every two or three years. As a result, I do not use it as a dependent variable. Nevertheless, it helps to control for changes in economic activity in the city.

There is also a positive effect of the speech in cities more exposed to it. There is a positive and significant effect at 90 percent confidence level in 1936. The fact that these are slow and big investments could explain why a significant effect surfaces only a year after the speech and policy. Moving from no radio to full exposure increases the building's permits per capita by more than one standard deviation two years after the speech. These results confirm the state level results, but at a lower level of aggregation and with more controls.

One concern that might influence the result is that Roosevelt may have targeted public expenditure to cities with more radios. Strömberg (2004) shows that cities with more radios received more federal funds during the 1930s. The results presented above do not contradict his findings as I am estimating the differential effect after 1935. So, if there is a systematic targeting to the regions with more radios, that should be captured by the city fixed effect. To see if the results are influenced by government expenditure, I run specification 1.2, but with federal aid as the independent variable. Table A.8 in Appendix A and Figure B.2 in Appendix B present the results. The results show that cities more exposed to the radio received lower federal aid after the event. This finding could be due to countercyclical expenditure from the federal government. These results do not say that regions with more radio shares received less help, but that, after the speech they received relatively less compared to cities with higher radio share.

1.6 Instrumental Variables

One of the concerns on the results presented above is the potential correlation of the measure of exposure - the share of radio ownership - with some specific economic characteristic that makes individuals of those states or counties spend more after the announcement of the reform. Because of this, I try to find a variable that is correlated with the usage of radio, but not with the variable of interest. I use as an instrument for radio usage the state percentage of woodland in 1930 as in Strömberg (2004). The reason for this choice is that transmission through the air is affected by physical obstacles. So, households in a states or counties with many obstacles (such as forests) should have fewer incentives or opportunities to use radio because the signal, if available, will be distorted or of the poor quality.

The data that I use to construct the woodland area and the total area for each state and county come from the Agricultural Census of 1930. To divide the total woodland area of the state or county by the total area. County variables are used in the city level results, I obtain the share of woodland in the county, where the city is located. For cities that are independent from a county (some in Virginia, for example), I only consider the city data. This measure is not perfect because, the forests can be in places where there is no human population. However, it serves as a good approximation. Economic activity can affect the

share of woodlands in a state or city, but part of the heterogeneity in woodlands area and some patterns should not be affected by the economic characteristics of the state or city. In particular, there are more woods in the east compared with the west, as this area has dryer weather. In addition, northern states and counties have more woods. States and counties along the Mississippi River also have in general a higher share of woodland.

I will run the change of the dependent variable in a cross-section regression, as in specification 1.1. I use two years changes in the case of the annual cars sales and deposits per capita (1936 versus 1934) and the sum four weeks after the speech, compared with the previous four months in the case of bank debits. The results for the first stage, OLS and IV regressions are presented in the following table. Standard errors are clustered at the city level.

Table 1.7: IV Regressions

	State-Year					City-Bi week		
	First Stage	Cars		Deposits		Bank Debits		
Woodland	-0.832***					-0.597***		
	(0.228)					(0.273)		
Radio		0.030***	0.048***	-0.277***	-0.368*		0.356***	0.523*
		(0.006)	(0.025)	(0.005)	(0.199)		(0.087)	(0.273)
F-Test	13.171					27.290		
		OLS	IV	OLS	IV		OLS	IV
Observations	49	49	49	49	49	266	266	266

Note: *** p<0.01, ** p<0.05, * p<0.1. This table shows the results of the instrumental variable regression at the state level. Share of radio ownership is instrumented by the share of woodlands. The first column displays the results for the first stage. The second column shows the OLS result for car sales per capita and the third column shows the IV regression. The fifth and sixth columns display results for the log of deposits.

The first stage shows in both cases, at state and city levels, that the instrument is good at predicting the share of radio ownership. The F-stats are also high in each specification. The results of the regressions using instrumental variables are similar for the case of cars sales per capita. With the instrument the effect for cars is slightly higher. In the case of deposits, the results are bigger in absolute value, and significant at a 90 percent level of confidence. These findings confirm the previous results. I find a significant and causal effect of being exposed to the speeches through the radio on variables related to an increase in spending.

The city-level results tell a similar story. The coefficients in the previous table confirm the results found in the baseline specification. The IV results present a higher, but less significant result for the month after Roosevelt's speech. The effects are big. A city with complete exposure increases its change in debits nearly 50 percent more compared with a

city with no exposure. This confirms the previous results. [13]

1.7 Other Variables

If President Roosevelt convinced people to consume more, effect should also emerge in the subsequent election result. Of course, Roosevelt went on to win reelection in 1936. I can then show how the change in votes for Roosevelt between the 1932 and 1936 elections correlate with the exposure to the speech. Even though the election happened a year after the announcement and many politicians had access to the radio, this treatment should have affected other variables as well. The following specification shows the regression estimated in this section:

$$\Delta DemShare_{z,1936-1932} = \alpha + \beta RadioShare_{z,1930} + \gamma_s + \delta X'_{s,1935} + \varepsilon_z \tag{1.3}$$

where z is state or county (or city if there is more than a city in a county), depending on the regression run. $\Delta DemogratsShare_{z,1936-1932}$ is the percentage change in the presidential election votes of the Democratic Party. $RadioShare_{z,1930}$ is the radio share according to the 1930 Population Census. $gamma_s$ are state-level fixed effects used in the city-level regressions, and $X'_{s,1935}$ is the income growth in 1935, the year before the election. I cluster standard errors at the county level in the case of the city level regressions. Table 1.8 shows the results for specification 1.3 at state and city level.

[13] In table A.9 I also show another instrument for the city level that is the distance to the closest radio tower. In that case, the coefficient is significant at a 5 percent confidence level and the coefficient reaches a value of 0.758.

Table 1.8: 1936 Election Results and Radio Share

	State		City	
Radio share	0.153**	0.214***	0.250***	0.218**
	(0.063)	(0.060)	(0.048)	(0.102)
State income per capita growth		0.636***		
		(0.120)		
Constant	-0.013	0.019	.000	
	(0.017)	(0.015)	(0.016)	
Observations	48	48	269	263
State Fixed Effect			No	Yes
R-squared	0.079	0.315	0.074	0.439

Note: *** p<0.01, ** p<0.05, * p<0.1. This table shows results for regressions, where the independent is the regional share of radio ownership. The dependent variable is the change in the percentage of the vote won by Roosevelt between the 1932 election and the 1936. State income per capita in 1935 growth comes from the BLS. City-level data include state fixed effect in the last specification. Standard errors are clustered at the state level for the first two columns and at the city level in columns 3 and 4.

The results at the state and city level are similar. Having full exposure to the speech increased the percentage of the vote won by Roosevelt in 1936 by more than 20 percent compared to the share of vote won in state or cities with no exposure. This evidence suggest that the use of the radio speeches by President Roosevelt could have influenced voters.

In Appendix D I show the results for other macroeconomics variables: growth, employment and inflation. They are in line with the results shown above. There in an increase in economic activity, non-manufacturing employment and inflation, consistent with an aggregate demand shock.

1.8 Other Speeches

The Fireside Chat of April 28th, 1935 provides a logical point of analysis communication-based policies for a number of reasons. President Roosevelt used it to announce important future expansionary fiscal policies and taxes to finance them.[14]. It also was an isolated event in a period during which other policies did not stress financial variables; this allows bank debits to be used as a proxy for consumer spending, which grew. Nonetheless, Roosevelt gave other speeches via radio. In this section, I explore the characteristics and the effects of

[14]Section E, describes more about the implications of that type of announcement

other speeches.

On January 4th 1935, Roosevelt spoke to the Congress in the State of the Union Address, setting out the policy agenda that he expected to pursue, in particular the WPA and the SSA. Most of the details about the SSA followed in a written message to the Congress on January 17th, 1935. Some radio stations broadcast a reading of the written message on that same day. Both messages were broadcast at noon (ET) on a weekday. These messages didn't have the characteristics of the Fireside Chats. The main intented audience was the members of Congress. The broadcast of the message occurred on a business day during working hours, and, thus, was not scheduled to reach a big audience. As a result the message was much less salient[15]

FDR gave four Fireside Chats in 1933 and two in 1934. I disregarded those Fireside Chats from the main results for many reasons. The 1933 events were in the middle of uncertainty about the currency. Roosevelt was ending the gold standard, so the banking statistics had a lot of volatility at that time. In addition to this, the Mach, 1933 banking holiday means that there are no data on bank debits at that time. As a result, is not possible to evaluate the Fireside Chat of March 12, 1933 with these data. The other Fireside Chats of 1933 can be used in principle, but they have important limitations.

Two of the 1933 events that relate to the changes in the value of currency, and, therefore, to changes in bank debits. The speech of May 7th, 1933 preceded the end of the gold standard, therefore it is difficult to interpret changes of bank debits as a consequence of the speech and not from reactions regarding the value of the currency. The speech of October 22th, 1933 announced some policies regarding the value of the dollar that were not subsequently implemented. Because of that, the interpretation of any potential change is also problematic. In his speech of July 24th, 1933, FDR talked about a code sent to employers to agree to reduce hours worked, and increase employment. The rest of the speech focused on the Farm Act and the Industrial Act, which had both been approved and implemented at that time. The press didn't highlight any particular policy. Thus, the chat largely described policies that were already in place (i.e., the speech was backward-looking). During that speech, Roosevelt admitted that he didn't want to talk on the radio before seeing "the first fruits of our careful planning."

In 1934 he gave two Fireside Chats, focusing on answering critics and defending the NRA. In June 28th, 1934, the Chicago Daily Tribune headline "President Hits at Critics," and the Los Angeles Times headline said "Roosevelt Raps Critics in Defending New Deal."

[15]I evaluate the effect of the State of the Union and the Message to the Congress using specification 1.2 as before, but taking a sample that goes from July 1934 to May 1935. I drop January 2th, that is the week before both speeches. The next week ends in January 16th, that is before the message to the Congress in January 17th 1935. Results are described in table. C.5. There is a positive effect after the events, but it is small and statistically significant only in some specifications.

On September 30th, 1934, he talked more about general ideas about the New Deal and continued defending the NRA. He illustrated with the case of England and how that country managed the Great Depression. He also called for a "truce," according to the Chicago Daily Tribune and the New York Times. The Los Angeles Times highlighted that Roosevelt's speech urged "harmony" between capital and labor. Those speeches also focused on past policies, rather than policies that were going to be implemented. Table 1.9 summarizes the characteristics of those speeches.

Table 1.9: List of Fireside Chats and Speeches Before April 1935

Speech	Main Topic	Other Topics
12-Mar-33	Banking Crisis	End of bank holiday
07-May-33	New Deal Program	Gold Standard
24-Jul-33	Workers & employers code	Farm act and Industrial Acts
10-Oct-33	Currency control	Defend NRA
28-Jun-34	Legislative achievements	Policies approved
30-Sep-34	Defend the NRA	Comparison with England
04-Jan-35	State of the Union	WPA

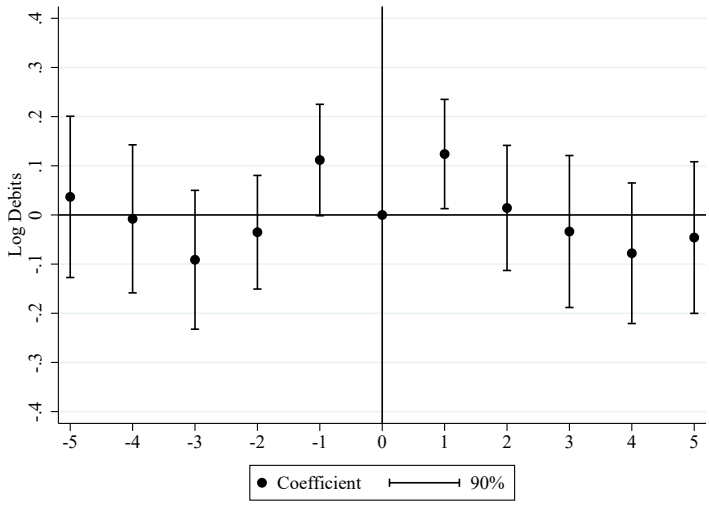
Note: The table shows the main speeches that Roosevelt gave prior the 1935 speech. It includes the date that the speech was made, the main topic and other topics that were included in the speech.

The results for each speech are presented in Appendix C. There effects are mixed, depending on which speech is analyzed. In order to make my analysis of other speeches more comparable to the analysis of the 1935 Fireside Chat, I conduct an events study with speeches that focused on some type of announcement. These events are the State of the Union Address of January 4, 1935, were President Roosevelt announced to the Congress the WPA. The speech of July 1933 and the announcement of currency measures in the Fireside Chat of October 22, 1933. The State of the Union was not salient because of how it was broadcast as explained before, so I do not expect big effects from it. Though Fireside Chat of 1933 did not include policy announcements, the fact that FDR promoted the labor-employers code to increase wages and reduce working hours could have an expansionary effect, given it was voluntary. Finally, the currency policies could have various effects. From one side, it could give confidence on the storage value of the currency and reduce withdraws, preventing a bank run, but also that confidence could have increased spending and the use of financial instrument. Therefore, the expected effect and its interpretation is not clear. Despite of all these caveats, I run the following events study pooling all these events:

$$y_{s,c,t} = \delta_{s,c} + \kappa_{s,t} + \sum_{i=-F}^{F} \beta_i \times 1(t = i) \times RadioShare_{c,1930} + \varepsilon_{s,c,t} \tag{1.4}$$

where s is a given speech, c is a city and t is the time around the speech. $\delta_{s,c}$ are city-event fixed effects, $\kappa_{s,t}$ is a week fixed effect and $Radio_share_c$ is the radio share ownership in a city c. I pick $F = 5$. The results are presented in figure 1.5.

Figure 1.5: Event Study Around Other FDR Speeches



Note: The graph shows the results of specification 1.4 with $F = 5$. Standard errors are clustered at the city-event level.

The figure shows a significant effect after the communication events. Effects are smaller than those following the speech of 1935, and they are less persistent. Two weeks after these events, bank debits increase by 10 percent. This finding confirms that the speeches in which Roosevelt announced policies had, in general, relatively expansionary effects in regions more exposed to the speeches. These events are, however, noisier: in the period before the speech bank debits are higher than the baseline, which could indicate other confounding factors. With all these differences, the effect is smaller. This indicates the importance of the effect of 1935. That announcement had a high and persistent effect. In the next section, I explore in greater detail some features of the event that can explain that big effect.

1.9 Discussion

The empirical results indicate that cities more exposed to the speech reacted by spending more on durable goods. Roosevelt's speech had several features that could have produced a similar effect. In this section I evaluate different mechanism that can be behind the results found.

One of them is the effect on confidence. Barsky and Sims (2012) define two different type of confidence shock. One is related with *animal spirits* it produces a temporary effect on consumption. The second is related with news about future positive productivity shock. In terms of the animal spirit shock, it could be associated by the oratory skills that Roosevelt (Kennedy (1999)). If this is a main driver, a similar effect should have happened in all the speeches that Roosevelt gave. In Section 1.8, I document that this effect is not present in all the speeches that Roosevelt gave and that it is associated with the announcement of policies. In particular, the big effect found in the speech of April 1935 should be related with the policy announcement, related with the WPA and the SSA. Because of that, it is not likely that the speech would be associated with a productivity shock. As the main message was related with transfers from the government, financed with an taxes.

A boost in confidence can still be related with the listening to the President announcing a fiscal instrument to boost aggregate demand in a recessive environment. Eggertsson (2008) shows, in the context of the recovery of 1933, that a shift in expectation related with the election of FDR and his economic plan, can explain the recovery of the U.S. economy. In particular, he shows that the elimination of the policy dogmas of the Hoover administration, shifted expectations and, because of that mechanism, increased economic activity. The speech of April 1935 could have the same effect, as it increased the probability that the WPA and the SSA would passed, and then created a increase in spending in areas more exposed to the speech. The convergence of the cities occur when there are more certainty about those policies, as in August 1935, the SSA is signed as law. If that is the case, the announcement could have created an expansionary effect in the direction of the results of this paper through an increase in confidence, in this case, confidence that the government would perform expansionary policies.

Also on the fiscal side. The WPA and SSA represented future increases in government expenditures that were financed with a future permanent income tax. This policy mix, which has recent incarnations in the United States and other countries, has been the subject of examination in the economics literature. For example, D'Acunto et al. (2018) examine how announcements of future increases in consumption taxes stimulate spending through intertemporal substitution without increasing government debt. D'Acunto et al. (2016), find that an increase in spending on durable goods accounts for one the mechanism underpinning the increase in spending after a VAT announcement in Germany. Their measure in comparison to the measure used in this paper, is less direct; it relies on a binary survey question

about specific durable goods. Johnson et al. (2006), Parker et al. (2013) and Sahm et al. (2012) document increases in non-durable spending after tax rebates in 2001 and 2008 in the United States. Parker (1999) and Kueng (2014) find increases in non-durable spending after announcements of decreases in income taxes. Hence, my analysis of the 1935 Fireside Chat has the potential to inform us not only about a particular episode, but also about recent experience.

In section E, I introduce a model to explore the reaction of an announcement of a payroll tax on spending in durable goods. I build a general equilibrium model, where consumers live in a multi-region monetary union. Households consume non-durable and durable goods, as in Barsky et al. (2007) and Engel and Wang (2011). The only friction in the model is that households adjust their information set infrequently. Households' consumption decision depends on the probability of adjusting information as in Reis (2006a), Coibion (2006) and Mankiw and Reis (2007). The model seeks to incorporate the cost of information acquisition, and to show more radios usage reduce that cost (by having the opportunity to listen to the speech).

The model shows that, because of intertemporal substitution, the announcement of an increase in payroll tax increase spending of durable goods today. The model highlights the importance of durable goods in explaining the empirical results. With only non-durable goods, consumers react similarly to the announcement of the policy across regions. When the model incorporates the durable goods, differences emerge as more attentive consumers can anticipate the shock sooner. They increase their purchases of durable goods to have a higher stock of durable at the moment at the shock, where they decrease their spending on durable goods. This allows them smooth consumption of non-durable goods. The model shows that the main mechanism that consumers have to anticipate the shock is the adjustment in the stock of durable goods.

In this case, even if it would be the announcement of a contractionary policy, the expected effect would be similar. One way to test this effect is to show that at the moment of the implementation of the policy, we should see a reduction in durable spending, measured as bank debits. One of the problems is that there is not a good counterfactual, as at that point everybody got the information about the policy, but Figure B.9 shows that there a decline in bank debits in January 1937, exactly when the payroll tax was implemented. This suggest that the empirical result found might have been driven by a reaction about an increase in the future cost of labor. Overall, there is not clear test to disentangle the particular driver of the effect and probably was a combination of confidence and information about the actual policy. The model shows that even the contractionary part of the policy should produce an effect in lines with the empirical results.

1.10 Conclusions

Blinder et al. (2008) observed that "It may be time to pay some attention to communication with the general public." This paper explores the effects that communication to the general public can have. Using a quasi natural experiment and historical data from the Great Depression, I show that regions with better access to the source of information increased their spending substantially compared with regions less exposed to the information treatment. Using weekly data on bank debits at a city level. I find an increase spending the week after the event. I also show that this effect is not permanent: there is convergence at the state level after approximately six months.

This result is relevant considering the increase interest on the use of "unconventional" policies by economic authorities: in a world with constraint fiscal and monetary instruments, the use of communication-based policies could be an effective alternative. Nevertheless, there is little evidence on the use of this type of policies, in particular exploring variation on individuals treated or not by the communication event. This paper shows that communication from economic authorities can produce a reaction on consumers behavior, even if no policy is being implemented at the moment of the speech. This result shows that expectations are important and they could be influenced by economic authorities.

These results are in a context that should be analyzed. Roosevelt conducted fireside chats at times intended to draw large audiences, following popular programs, at times when most people might be at home, and with advanced notice. He innovated by using a very simple language, which was not common from authorities at that period of time, to explain complex policies. He also used a new technology, the radio, to receive more attention and being more approachable. This strategy is different, for example, from the one that has been used by many central banks, such as the U.S. Federal Reserve, in the last decade.

Historians have described how Americans were impressed by the speeches. Having the President explaining directly important issues opened a new way of communication that took people's attention. This paper also provides evidence that they reacted to the speech spending more. The lessons from this particular event could help to develop effective communication strategies from economic authorities. This paper is not conclusive about the use of these particular strategies. Further studies could try to understand better how this type of innovation could help in terms of having a bigger reaction from economic agents. This paper shows that communication can be used as a policy tool.

The main driver of the results might come from confidence or information about the particular policy. There is evidence from the Great Depression that the confidence channel might play a role. I also show that even the contractionary part of the policy, i.e. the increase in taxed, can produce a similar results, as consumers intertemporal substitute. I also show that the role of durable goods in that case is key, as they work as a saving mechanism. In

that sense, better measure of durable goods could be useful to measure the effect of shocks related with expectations.

Overall, this paper shows the importance of communication for consumer behavior. The empirical results show that it is possible to effectively communicate to consumers and expect a reaction from them. The paper also shows the mechanism behind this reaction. Finally, it opens the discussion if communication should be used as a policy tool, especially in context of recessions, where usual fiscal and monetary tools can be restricted.

Chapter 2

Inflation Expectations as a Policy Tool?

2.1 Introduction

Policy-makers have long understood the importance of communication strategies and the management of economic expectations[1]. Since the early 1990s, central banks have become increasingly open in discussing their actions, objectives and views about the economy. This shift was motivated by the idea that clear communication can help reduce financial and economic volatility in response to central banks' decisions as well as augment the tool set of monetary policy (Blinder et al. 2008). For example, statements about the expected path of future short-term interest rates can affect contemporaneous long-term interest rates and therefore influence current economic conditions even in the absence of any immediate policy change.

The onset of the Great Recession and the constraints imposed by the zero-lower-bound (ZLB) on interest rates have brought these less traditional tools to the forefront of policy-making. Along with quantitative easing policies, forward-guidance about the path of future interest rates has become one of the primary tools through which central bankers try to affect economic outcomes. Discussion has also focused on alternative policies that can affect the economy contemporaneously through expectational channels, such as raising the inflation target or adopting nominal-GDP/price-level targets. At the heart of these policies lies a mechanism hinging on the inflation expectations of agents: convincing them that inflation will be higher in the future should, in the absence of interest rate policy offsets due to the zero bound, lower their perceptions of current real interest rates and therefore induce households and firms to increase their spending today. Higher expected inflation can also lead firms to immediately raise their prices in anticipation of rapidly declining relative prices, and workers may similarly bargain for larger nominal wage increases. Thus, policies directly impacting agents' inflation expectations can be used to stabilize economic conditions when

[1]This Chapter comes from a join work with Olivier Coibion, Yuriy Gorodnichenko and Saten Kumar. They gave their permission to use this material as a chapter of this dissertation.

traditional policy tools are limited.

Many policy-makers have been resistant toward this approach, likely because a central tenet of monetary policy-making over the last thirty years is that they should strive to "anchor" inflation expectations, rather than vary them for stabilization purposes. Yet many theoretical models suggest that communications policies that move expectations can be very powerful at the zero-bound, helping policy-makers stabilize both prices and output. Should policy-makers therefore reconsider their trepidation toward these types of policies? Can they work? Do households and firms really respond to changes in their inflation expectations? If so, is it feasible for policy-makers to affect these expectations in a way that enables them to treat expectations management as another policy tool? This paper provides a synthesis of what we know about these questions.

Our starting point is that it is important to draw a distinction between the inflation expectations of professional forecasters or financial market participants and those of households and firms. Central bank discussions and communications often focus on the former, and with good reason. How financial markets perceive the path of future monetary policy drives contemporaneous long-term interest rates and therefore provides a direct transmission mechanism of monetary policy actions to households' and firms' decisions, even at the zero bound on short-term nominal interest rates. The new communications strategies pioneered by central banks since the 1990s have largely been successful in anchoring the long-run inflation expectations of financial markets in advanced economies. Descriptions of policy-makers' views of the economy and their expectations of future policy decisions through policy statements, speeches, and post-meeting press briefings have helped reduce financial market volatility.

However, theory suggests that the primary mechanism whereby inflation expectations affect households' decisions is through their perceived real interest rate, which depends not just on the nominal interest rates faced by agents but also on their expectations of future inflation. Similarly, firms' expectations of inflation should matter not only for their pricing and wage-setting decisions but also for their investment and hiring decisions via the role of perceived real interest rates and more broadly because of the relationship between inflation and real economic activity. Because our interest is in evaluating the scope for using the inflation expectations channel as a policy tool, our focus must be on the expectations of households and firms.

Importantly, the inflation expectations of these different agents are not interchangeable. We document a number of dimensions along which they differ. For example, while professional forecasters and financial market participants have inflation expectations that appear well-anchored (close to the inflation target on average with little cross-sectional variation), this is unambiguously not the case when it comes to households and firms. To shed light on whether the expectations channel can be a useful policy tool, it is therefore important to un-

derstand how the inflation expectations of households and firms are formed and how/whether they affect their economic decisions.

We review evidence on how various forces (shopping experience, salience of prices, informational interventions, etc.) influence the inflation expectations of households and firms. In contrast to professional forecasters and financial markets who seem to track macroeconomic developments closely and respond to policy shocks relatively quickly, households and firms are remarkably inattentive to inflation dynamics in developed countries that have experienced low inflation rates for several decades. In contrast, economic agents in high-inflation environments (e.g., Iran, Ukraine, Uruguay, Argentina, Israel) seem to pay considerable attention to inflation, indicating that the inattention to inflation and monetary policy conditions on the part of households and firms in advanced economies is likely a result of the successful monetary policies of the last thirty years. In the absence of much aggregate variation in inflation, these agents appear to have become reliant on the prices of goods they observe on a frequent basis, such as gasoline and food prices, to make inferences about broader price movements. As a result of the volatility in these prices and the heterogeneity of people's consumption baskets, we observe much more volatility in the inflation expectations of households and firms than we do for more informed agents like professional forecasters, more disagreement both in terms of their beliefs about future as well as past inflation, and more uncertainty in their forecasts. In short, their expectations look anything but anchored.

This inattention to inflation and monetary policy on the part of households and firms in advanced economies could imply that their inflation expectations simply do not matter for their economic decisions, thereby rendering the inflation expectations channel ineffectual. This is, however, demonstrably incorrect. We review the burgeoning literature on inflation expectations and economic decision-making and argue that the evidence strongly suggests that there is indeed a causal and economically significant effect of inflation expectations on the economic choices of both households and firms. In the case of households, the evidence supports theoretical predictions that, at least at the ZLB, an exogenous increase in the inflation expectations of households leads them to increase their consumption, which should ultimately lead to higher inflation as well through general equilibrium effects.

For firms, inflation expectations clearly affect economic decisions but the mechanism through which this effect operates is not fully established yet. For example, evidence from New Zealand where there was no ZLB suggests that when firms raise their inflation expectations, they then tend to raise their employment and investment with little change in their prices. Newer evidence from Italy during a ZLB period suggests instead that raising the inflation expectations of firms there leads them to raise their prices but reduce their employment. Further work that clarifies both the direct effects of changes in inflation expectations on economic decisions, as well as their general equilibrium consequences, will be necessary before they can effectively be used as a direct policy tool.

Furthermore, there are two additional important issues that need to be addressed before the active management of inflation expectations is added to the roster of policy-makers' stabilization tools. The first is a simple measurement issue: do we know what agents' inflation expectations are? We discuss available surveys of inflation expectations of households and firms from many countries, focusing on how the surveys are conducted and how we can interpret their results. While household surveys are widely available and generally of high quality, surveys of firms' expectations are much more limited in availability, scope, and quality. We document a number of dimensions along which different surveys of firms depart from ideal survey design and argue that these limitations make the current measurement of firms' inflation expectations a binding constraint for their use in policy-making: if we cannot measure the policy instrument, it is unlikely to be a good candidate as a tool for economic stabilization. Because of the unique challenges associated with surveying firms, this constraint is unlikely to be relaxed without a concerted effort on the part of statistical agencies and/or central banks to implement new, large-scale surveys of firms in their countries.

The second major challenge to the use of inflation expectations as a policy tool is the abysmal track record of the typical communication strategies of central banks in affecting households' and firms' inflation expectations. We document this record in a number of ways, building on recent work that studies the inattention of economic agents, and in particular their lack of knowledge about inflation dynamics and monetary policy. We document, for example, that large policy change announcements in the U.K., U.S. and eurozone seemed to have only limited effects on the beliefs of households and firms, despite widespread news coverage. Only financial market participants and professional forecasters seem to pay much attention to the actions of monetary policy-makers. While this inattention to aggregate inflation and monetary policy in advanced economies may itself be a reflection of the success of policy-makers in keeping inflation low and stable over the last thirty years, it nonetheless presents a challenge for any policy-maker that now seeks to break through this veil of inattention.

Despite this inattention to monetary policy on the part of households and firms, recent evidence suggests that when households and firms are provided with explicit information about inflation or monetary policy, their inflation expectations respond very strongly. This indicates that there is scope for new and improved communication strategies on the part of policy-makers to use inflation expectations as a more direct policy tool for stabilization purposes. Furthermore, the magnitudes of the changes in inflation expectations from the provision of simple messages about recent inflation rates or the central bank's target dwarf the estimated effects of other policies like quantitative easing or forward guidance on nominal interest rates. This suggests that communications focused on the inflation expectations of households and firms should lead to much larger changes in perceived real interest rates -and therefore effects on economic activity- than policies that are currently used. A layered communication strategy, i.e. one that treats households/firms and financial markets differently, could therefore serve as a useful complement to current strategies that are almost exclusively

targeting the latter.

Policy-makers can also vary the type of information provided depending on what the desired effect on expectations may be. Because households and firms adjust their beliefs in response to new information like Bayesians (i.e. putting some weight on the provided signal), policy-makers can emphasize different facts depending on whether they would like expectations to rise or fall. For example, providing information about the inflation target systematically moves agents' forecasts toward that target value. But policy-makers can emphasize other numerical values (e.g., recent inflation rates or price movements of specific goods) if they want to push expectations in a different direction. Because providing households and firms with these types of information has only short-lived effects on expectations (they generally die off within six months), policy-makers can generate transitory effects on expectations through short-lived communications campaigns or longer-lived effects through repeated exposure of agents to news. Central banks have employed similar methods with financial markets (e.g. doing vs not doing forward guidance, changing the expected duration of zero interest rates, changing the nature of the guidance from time-dependent to state-dependent, etc.). The same principles of altering communications to the circumstances can be applied to a new layer of communications targeting households and firms.

Finally, we recommend that policy-makers exploit new ways of transmitting information to the public besides the traditional news media, and more in the spirit of public health campaigns that target specific subsets of the population. Much as corporate marketers and politicians are now exploiting new means of targeting narrower groups of individuals with messages tailored for specific groups, central banks could also target their information treatments more precisely through social media, targeted ad campaigns, etc. Such a targeted strategy can help generate larger movements in expectations by identifying and concentrating on populations that are relatively less informed or whose expectations tend to respond more to new information.

More targeted information treatments by monetary policy-makers could also help address one of the fundamental challenges associated with currency unions: the one-size-fits-all nature of traditional monetary policies. Consider, for example, a union in which the "North" is booming while the "South" is in recession. The central bank cannot accommodate both through changes in its interest rate instrument. However, targeted and differentiated communications strategies within each region could be used to try to lower inflation expectations in the North while raising them in the South, thereby generating lower perceived real interest rates in the region that needs monetary accommodation (South) while raising perceived real rates in the region that needs contractionary policy (North). Precise communications strategies could also be used to target specific industries or subgroups of the population. Layered communications strategies could therefore be used not only during zero bound periods but as a more general tool to address geographic or other economic imbalances within a common currency area. Indeed, Hayo and Neuenkirch (2014) and Ehrmann et al. (2013) find that

subjective and objective knowledge about the ECB is positively correlated with the central bank's trust and credibility.

Because communication strategies that directly affect inflation expectations could ultimately provide policy-makers with a new and powerful stabilization tool during ZLB periods, address regional divides within currency areas even outside the ZLB, and enhance central bank credibility, their potential usefulness is high. We still lack a nuanced understanding of the mechanism through which inflation expectations affect decisions, clear measures of these expectations, and proven strategies to change them, so this policy tool is not yet ready for prime-time. But now is the time to make progress on all three fronts so that it can be deployed in the next crisis. With it, monetary policy-making may finally become more like a scalpel and less like a hammer.

The paper is structured as follows. Section 2.2 documents differences in the properties of inflation expectations across different types of agents, like households, firms, professional forecasters and financial market participants, to illustrate how they are not interchangeable. It also provides stylized facts on how the inflation expectations of households and firms are formed. Section 3 discusses recent empirical evidence on the effect of inflation expectations on households' and firms' economic decisions, which provides the basis for the potential use of inflation expectations as a policy tool but also illustrates the limitations to our current knowledge about the transmission of expectations to economic decisions. Sections 4 and 5 discuss two additional challenges that potentially limit the scope of such policies: measurement issues due to limited survey availability/quality (section 4) and the general insensitivity of households' inflation expectations to monetary policy decisions and announcements (section 5). Section 5 then proposes guidelines for new communication strategies that address these limitations. Section 6 concludes.

2.2 Characteristics and Determinants of Inflation Expectations

How are inflation expectations formed? Whose expectations should we care about? These have been perennial questions in macroeconomics and they do not have a simple answer. But they arise regularly in monetary policy discussions, as well as in many other settings.[2]

[2]See for example Fed Chairwoman Janet Yellen's (2016) speech: "Another gap in our knowledge about the nature of the inflation process concerns expectations... Yet another unresolved issue concerns whose expectations - those of consumers, firms, or investors - are most relevant for wage and price setting, a point on which theory provides no clear-cut guidance. More generally, the precise manner in which expectations influence inflation deserves further study. Perhaps most importantly, we need to know more about the manner in which inflation expectations are formed and how monetary policy influences them". ECB Vice-President Vitor Constancio (2017) has expressed a similar view: "For policy-makers, this [recent research] seems to suggest that there is an important role of the central bank in shaping the expectations of the general

Whose expectations matter depends, of course, on the context. In the case of pricing decisions, it is the expectations of firms that are at stake. For consumption and savings decisions, household expectations are more relevant. In the determination of financial asset valuations, marginal investors are likely those whose expectations are most important. If the expectations of these different agents are the same, as they are in standard macroeconomic models, this distinction becomes moot. But in practice, this is very unlikely to be the case.

To illustrate these differences, Panel A of Figure 2.1 plots the time series of mean inflation 1-year ahead expectations in the U.S. for households (Michigan Survey of Consumers), professional forecasters (CPI forecasts from the Survey of Professional Forecasters (SPF) run by the Federal Reserve Bank of Philadelphia) and financial markets (Federal Reserve Bank of Cleveland). While these three measures of expectations tracked each other closely through the early 1990s, we can observe large wedges appearing between household expectations and those of professionals and financial market participants thereafter. For example, household expectations have averaged around 3.5% since the early 2000s while those of professionals averaged around 2%.

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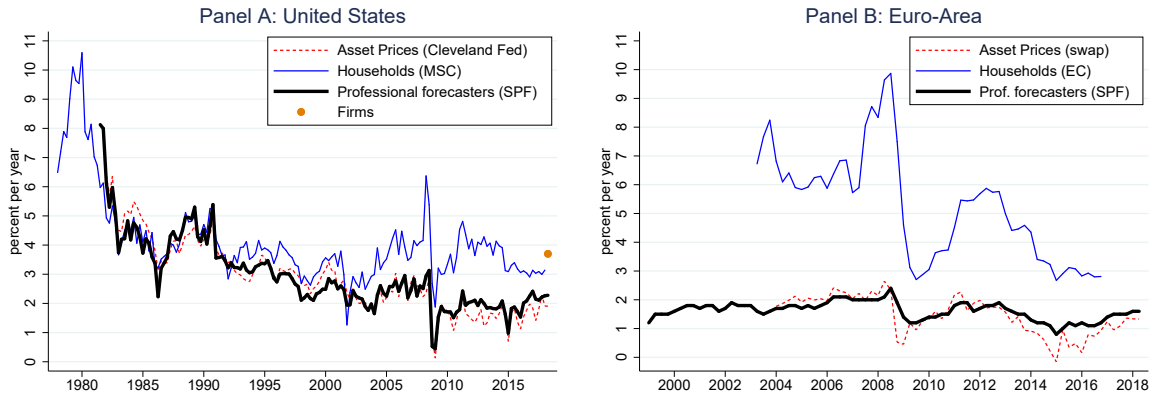
public, not only that of financial markets. It also suggests that more research is needed to understand the different factors that shape the inflation expectations of individual households..." See Coibion et al. (2018b) for a survey.

Figure 2.1: One-Year-Ahead Inflation Expectations for Different Agents



Note: Panel A reports U.S. time series for expectations of financial markets (reported by the Federal Reserve Bank of Cleveland), households (Michigan Survey of Consumers), professional forecasters (Survey of Professional Forecasters run by the Federal Reserve Bank of Philadelphia), and firms (run on an established panel of firms). Panel B reports eurozone time series for expectations of financial markets (inflation swaps, ICAP and Thompson Reuters), households (European Commission, reported in Duca et al. (2017)), and professional forecasters (Survey of Professional Forecasters run by the European Central Bank).

This difference is not unique to households. In April 2018, we conducted a survey of firms in the U.S., using panelists from a prominent nationally-representative survey of firms in manufacturing and services. Hundreds of top executives were asked to report their point forecasts for CPI inflation over the next twelve months. 55% reported that they simply did not know. Of the remaining respondents, the average forecast was 3.7%, well above what professional forecasters and financial market participants were expecting but close to the forecasts of households.[3]

Panel B reports equivalent forecasts of one-year-ahead inflation expectations as for the U.S. but now for households in the euro area (the European Commission survey of households, see Duca et al. (2017)), professional forecasters (Survey of Professional Forecasters run by the European Central Bank (ECB)) and financial markets (1-year inflation swaps, ICAP and Thompson/Reuters). As in the U.S., household inflation expectations deviate systematically from the expectations of professionals and financial market participants. A similar feature can also be found in New Zealand (see Coibion et al. (2018b); henceforth

[3]While our analysis focuses on one-year-ahead inflation expectations of households and firms, long(er)-run inflation forecasts of these agents are strikingly similar to short-term inflation forecasts of these agents (e.g., Armantier et al. (2013), Coibion et al. (2018d), Kumar et al. (2015)). In a typical case, if a firm (household) expects inflation to be X% next year, it has approximately X% expectation for inflation 3 or 5 year into the future.

CGK), the first country to adopt inflation targeting over twenty-five years ago and in which inflation has remained relatively low and stable since. One might expect individuals there to provide an upper bound on how anchored inflation expectations can be, yet as can be seen in Table 2.2, households and firms in New Zealand still have expectations which deviate dramatically from those of professional forecasters. Households at the time, for example, were predicting inflation of well above 3% while firms in New Zealand surveyed in CGK displayed even higher mean forecasts of inflation. In contrast, professional forecasters were predicting inflation around only 2%.

Table 2.1: Comparison of inflation forecasts across economic agents

		Central Bank	Professional Forecasters	Households	Firms
Panel A. Inflation expectations in the USA					
2018Q1	Mean	1.9	2.2	3	3.7
St.Dev.		(0.2)	(0.4)	(2.6)	(2.6)
Panel B. Inflation expectations in New Zealand					
2016Q4	Mean	1.7	1.6	2.8	2.7
	St.Dev.		(0.2)	(2.6)	(2.4)
2016Q2	Mean	1.6	1.3	2.3	2.8
	St.Dev.		(0.2)	(2.1)	(2.3)
2014Q4	Mean	1.1	1.7	3.1	4.5
	St.Dev.		(0.3)	(2.0)	(2.8)
2014Q3	Mean	1.6	1.9	3.5	4.1
	St.Dev.		(0.2)	(2.4)	(2.5)
2014Q1	Mean	1.9	2	3.7	6.1
	St.Dev.		(0.3)	(2.1)	(2.7)
2013Q4	Mean	1.3	2	3.6	5.3
	St.Dev.		(0.2)	(2.4)	(3.2)
Panel C. Inflation perceptions in New Zealand					
2016Q4	Mean			2.4	n.a.
	St.Dev.			(2.4)	n.a.
2016Q2	Mean			1.8	2.6
	St.Dev.			(1.5)	(2.1)
2014Q4	Mean			2.9	3.9
	St.Dev.			(2.2)	(2.4)
2014Q3	Mean			2.9	n.a.
	St.Dev.			(2.0)	n.a.
2014Q1	Mean			2.9	5.5
	St.Dev.			(1.8)	(3.3)
2013Q4	Mean			3.1	4.4
	St.Dev.			(2.0)	-(3.5)

Note: Data source for Panel A are: "Central bank" are from FOMC Projections materials (March 21, 2018; PCE deflator), "Professional Forecasters" are from the Survey of Professional Forecasters (CPI; 2018Q1), "Households" are from the Michigan Survey of Consumers ("prices in general"; 2018Q1), and "Firms" are from the PMI Market Survey ("prices in general"; April 2018). Panels B and C are from Kumar et al. (2015). "Central Bank" forecasts (CPI) are from Monetary Policy Statements of the Reserve Bank of New Zealand (RNZ). "Professional Forecasters" are from Consensus Economics (CPI). "Households" are from the RNZ's Survey of Households. "Firms" are from the survey run in Kumar et al. (2015). St.Dev. reports the cross-sectional standard deviation of forecasts. St.Dev. for Central Bank in Panel A reports the difference

between the upper and lower ends of central tendency.

Differences across groups are not limited to mean forecasts. As is well-known, disagreement about inflation among households dwarfs that among professional forecasters (e.g. Mankiw et al. (2003)). For example, in the U.S. in March 2018, the cross-sectional standard deviation of inflation forecasts across households in the Michigan Survey of Consumers was 3.0% but was only 0.4% in the SPF. Again, surveys of firms yield similar results as for households. In the April 2018 survey we ran of U.S. firms, we found a cross-sectional standard deviation of 4.1% in inflation forecasts. Table 2.2 illustrates the same feature for New Zealand: disagreement among households and firms is an order of magnitude larger than it is among professional forecasters. Hence, along either metric, it is clear that one should not expect the inflation expectations of professional forecasters or those of financial market participants to be representative of the beliefs of households and firms. This does not imply that the expectations of the former are unimportant or irrelevant to monetary policy-making, but simply that if the channel we are interested in stems from the decisions of households and firms as well as their expectations -as in the case of the inflation expectations channel- then it is important to focus specifically on the expectations of these agents and not assume that they are well-represented by more readily-available measures. In this section, we consider a number of factors that, based on previous research, play an important role in how households and firms form their expectations.

2.2.1 Priors and Perceptions of Inflations

A particularly striking feature of household and firm beliefs over inflation, and one that was documented as early as Jonung (1981), is that they not only disagree about future inflation but they display almost the same amount of disagreement about recent inflation dynamics. Indeed, the strongest predictor of a household's inflation forecast is typically what they believe inflation has been over the recent past, something which is in principle readily available and which some other types of agents, like professional forecasters, do not disagree about. This finding has been documented in detail for households (see Ranyard et al. (2008) for a survey of this literature) and more recently for firms (e.g., CGK, Kumar et al. (2015)). Table 2.2, for example, shows that the beliefs of households and firms in New Zealand about recent rates of inflation are disconnected from actual values and subject to similar disagreement among these agents, despite widespread availability of data on inflation. In a survey of German consumers in 2015, Dräger (2015) find that approximately 50% of respondents believed that inflation over the previous twelve months had been 5% or above, at a time when actual inflation was 0.3%. Duca et al. (2017) document a similar finding for the entire euro area: in 2015, the average perceived inflation rate among surveyed households across all euro-member countries was just under 5%.[4]

[4]The perceived inflation rate stays high even after removing outliers, see Arioli et al. (2017).

This inattention to recent inflation dynamics, however, varies with the economic environment. Households in high-inflation countries, like in Argentina, tend to be much better informed than households in low-inflation countries about inflation (Cavallo et al. (2017)). A similar result obtains for firms: while firms in low-inflation environments tend to appear quite uninformed about recent inflation dynamics, this is much less the case in higher-inflation countries like Uruguay (Frache and Lluberas (2018)), Iran Afrouzi et al. (2018)), or Ukraine (Coibion and Gorodnichenko (2015a)). This suggests that a full understanding of how households and firms form their expectations requires models that explicitly formalize how agents endogenously choose to allocate their attention to different variables in light of their economic circumstances (e.g., Reis (2006a), Reis (2006b), Gorodnichenko (2008), Afrouzi Khosroshahi (2018))).

The economic environment that agents perceive to have experienced can shape their views in very long-lasting ways. For example, Ehrmann and Tzamourani (2012) and Malmendier and Nagel (2016) document that people who lived through a high inflation have systematically higher inflation expectations and stronger dislike for inflation than people who did not have this experience[5]. This gradual adjustment of beliefs to new economic settings carries over to how they respond to economic shocks and various informational treatments. For example, Armantier et al. (2016), Cavallo et al. (2017), and Binder and Rodrigue (2018) run experiments on households in which they are provided with new information and find that the adjustment of beliefs to new information is consistent with Bayesian updating. That is, economic agents update their beliefs depending on the strengths of their priors and signals. This behavior is consistent with economic agents being rational but facing informational rigidities. A particularly important source of signals about aggregate price levels emphasized by households and firms is the set of prices that they observe in their daily lives.

2.2.2 Shopping Experience

Shopping naturally offers people an opportunity to observe prices. Because prices and inflation rates can vary widely across households (e.g., Coibion et al. (2015), Kaplan and Schulhofer-Wohl (2017), Johannsen (2014)), people may extrapolate their own experiences to the aggregate economy. Consistent with this view, Bryan et al. (2001), D'Acunto et al. (2019) and others document that women tend to have higher inflation expectations than men because women tend to do grocery shopping more frequently: once one conditions on exposure to frequent prices changes in stores, the systematic differences in inflation expectations between men and women disappear. In a similar spirit, Cavallo et al. (2017) found that recent shopping experience has a strong influence on inflation expectations: people

[5]More generally, there is a large literature (e.g., Souleles (2004), Ehrmann et al. (2015)) relating inflation expectations/perceptions and various demographic characteristics of households.

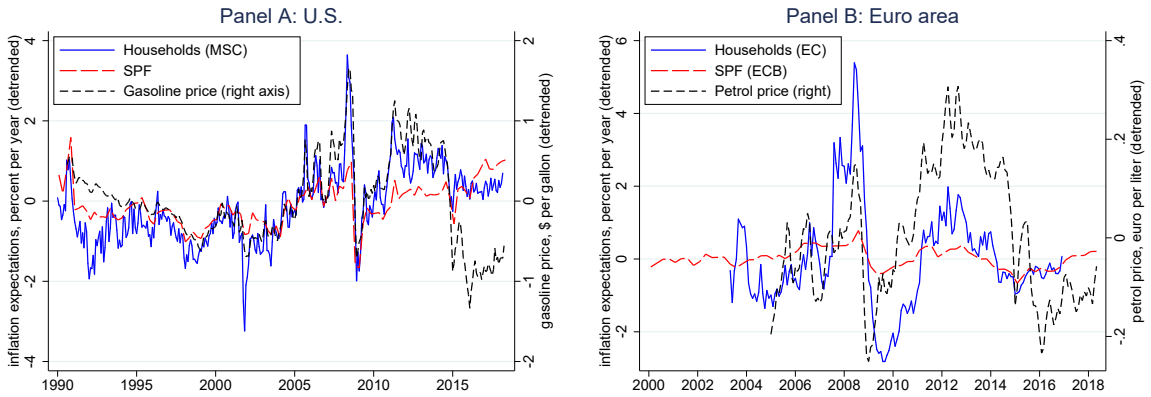
tend to assign high weights to goods that they just purchased. Kumar et al. (2015) also find that shopping experience is a major source of information for firm managers in New Zealand when these managers form their inflation expectations. Johannsen (2014) reports that groups which experience more dispersed rates of inflation also tend to disagree more about inflation, consistent with shopping experiences parlaying into the inflation expectations of individuals.

Although consumers' inflation expectations appear to display excess sensitivity to price changes of products in their consumption baskets, consumer prices are not equal in influencing inflation expectations. For example, Harris et al. (2009), Coibion and Gorodnichenko (2015b), Wong (2015), and others find that U.S. consumers are sensitive to gasoline prices above and beyond what is justified by the share of expenditures on gasoline.[6] Panel A of Figure 2.2 illustrates this excess sensitivity of U.S. household inflation expectations relative to professional forecasters by plotting the two against the level of gasoline prices. There is a striking correlation between movements in the level of gasoline prices and the households' inflation expectations. On the other hand, the relationship between gasoline prices and predictions of professional forecasters is much weaker. The same pattern holds in the euro area, as illustrated in Panel B of Figure 2.2.[7]

[6]Central bankers are aware of this sensitivity. Yellen (2016): "[T]he longer-run measure of inflation expectations from the Michigan Survey has historically exhibited some sensitivity to fluctuations in current gasoline prices..." and "[A] monthly survey conducted by the Federal Reserve Bank of New York shows a noticeable decline over the past two years in household expectations for inflation three years ahead. However, these readings on shorter-term expectations may also be influenced by current gasoline prices." Carney (2013) made a similar observation, "[W]e've seen a bit in the past when you have a coincident survey [of the general public's inflation expectations] with something as obvious and important to people as energy prices move, you get these spikes."

[7]One would expect a weaker relationship between gas prices and household inflation expectations in the euro area than in the U.S. for at least two reasons. First, gasoline taxes are much higher in Europe, so a $1 increase in oil leads to a smaller percentage increase in gasoline prices in Europe than in the U.S. In addition, diesel is much more common in Europe than the U.S. (as is public transportation), making the price of basic gasoline less of a common price signal to households than in the U.S.

Figure 2.2: Household Inflation Expectations and Gasoline (Petrol) Prices



Note:The figure reports time series of inflation expectations of households and professional forecasters as well as gasoline (petrol) prices. All series are linearly detrended.

Relatedly, food prices also appear to have a disproportionately significant effect on inflation expectations of households (e.g., Clark et al. (2008)). Coibion and Gorodnichenko (2015a) document that Ukrainian households' and firms' inflation expectations react strongly to changes in the exchange rate of the hryvnia (Ukrainian currency) and the U.S. dollar. Afrouzi et al. (2018) document a similar finding in Iran. A common theme across these studies is that salient prices of frequently-purchased, homogenous goods appear to strongly influence inflation expectations. One may rationalize this influence by appealing to costs of collecting and processing information: economic agents use easy-to-collect/digest prices correlated with inflation to inform themselves about aggregate inflation.

2.2.3 Media

Another natural source of information about inflation is media coverage of inflation. For example, Carroll (2003) documents that more intensive newspaper coverage of inflation dynamics closes the gap between the inflation expectations of households and those of professional forecasters. Subsequent work (e.g., Dräger (2015), Lamla and Maag (2012)) finds similar effects for other countries. Using in-depth interviews of firm managers, Kumar et al. (2015) document that media is the main source of information for managers when they form inflation expectations. The available evidence, however, suggests that, in low-inflation countries, media coverage may be a relatively weak force in moving inflation expectations.[8]

[8]Haldane (2017) made a similar observation: "Studies have examined the factors that influence how the media intermediate central bank messages. There is mixed evidence on how well the media performs this task. There is evidence the media leads to a better understanding of the ECB's monetary policy. But in the

For example, Pfajfar and Santoro (2013) find that exposure to news about inflation leads consumers to a more likely revision of inflation expectations but a revised forecast is not systematically closer to a professional forecast.

2.2.4 Knowledge about Monetary Policy

An additional factor that can affect agents' forecasts is their understanding of monetary (and fiscal) policy. While there is an extensive literature studying how monetary policy affects the economic expectations of financial market participants and professional forecasters, evidence for the effects on households and firms is more limited.[9] Previous work has found that households who are more informed about the central bank's objectives or who have greater trust in the central bank tend to have better behaved inflation forecasts (e.g. Kamada et al. (2015), Christelis et al. (2020)). But informed/trusting households seem to be in short supply. Binder (2017), for example, uses a variety of polling data to show that most U.S. households are unaware of the Federal Reserve's leadership and objectives. In a similar spirit, Kumar et al. (2015) document that, among firm managers in New Zealand, only thirty percent can correctly identify the name of the Reserve Bank Governor (out of four choices) and 31% can identify the central bank's main objective as being to keep inflation low and stable (out of five choices). This result also extends to Europe. For example, Van der Cruijsen et al. (2015) find that just over half of Dutch survey respondents correctly identified as a true statement (out of only two options) that the ECB targets a rate of inflation of close to but just below 2%.

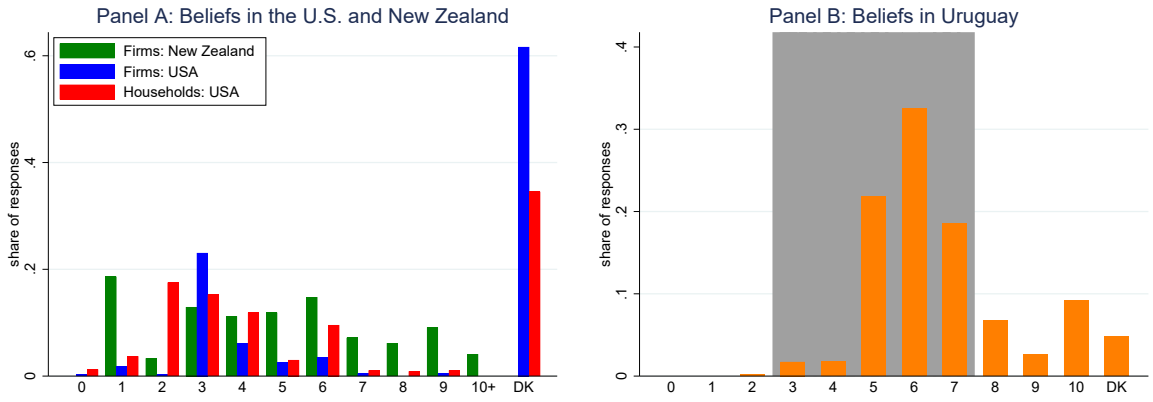
In parallel surveys of U.S. firms and households in April 2018, we asked respondents what inflation rate the U.S. Federal Reserve was trying to achieve in the long run. The survey of firms was done through the same nationally-representative panel of executives in manufacturing and services in the U.S. as described in section 2.2 (i.e. from a pre-existing private survey of firms). The survey of households is described in more detail in Coibion et al. (2019b) but reflects a pilot study with about 1,500 responses from U.S. households participating in the AC Nielsen Homescan project. In each case, respondents were asked to report a point value as their answer but had the option to decline to answer. For comparison, we also report the distribution of beliefs about the RBNZ's inflation target from the survey of firms in New Zealand described in Kumar et al. (2015).

US and Germany, there is evidence the media may sometimes impair communication and bias opinion."

[9] In evaluating effects of central banks' policies on inflation expectations, the literature has largely focused on whether inflation targeting makes inflation expectations of financial markets and professional forecasts less sensitive to macroeconomic news shocks (e.g., Beechey et al. (2011), Gürkaynak et al. (2010)). More recent studies examine how forward guidance changed expectations of these agents (e.g., Campbell et al. (2012), Andrade et al. (2019)). Other work has sought to establish whether inflation targeting regimes have more anchored expectations of professional forecasters (Pierdzioch and Rülke (2013), Dovern et al. (2012)).

The resulting distributions of answers from each survey are plotted in Figure 2.3. In both U.S. surveys, respondents had the ability to select "I don't know" as a possible answer. In the case of U.S. firms, over 60% of respondents selected this option. Around 25% correctly selected 2% as the Federal Reserve's inflation target, with the vast majority of remaining respondents providing an answer greater than 2%. U.S. households yielded a similar distribution: around 20% correctly picked 2% while over 50% responded that they did not know or thought that the Fed's inflation target was 10% or more per year. These results reflect even less knowledge about monetary policy than in New Zealand, where around 35% answered 2% and approximately 50% were in the correct range of the RBNZ's inflation target range of 1-3% per year.

Figure 2.3: Beliefs about Central Bank's Inflation Target



Note:The figure shows the distribution of how households and firms perceive inflation targets of central banks. DK means "do not know". 10+ includes responses of 10% or more. Inflation target in the U.S. is 2% (light shaded area, Panel A). Inflation target in New Zealand is 1% to 3% (dark shaded area, Panel A). Inflation target in Uruguay is 3% to 7% (shaded area, Panel B).

In Panel B, we also report results from a survey in Uruguay (described in Coibion et al. (2018a)) in which a representative sample of firms were asked about the central bank's inflation target, which is currently a range of 3% to 7%. Uruguay has experienced relatively high inflation in recent decades[10] and, as reported in Frache and Lluberas (2018), firms there are relatively more informed about inflation than firms in New Zealand. Consistent with this view, we find that firms in Uruguay are relatively well informed about the inflation target there: only about 5% report that they don't know the target and less than 20% picked a value for the target outside the target range. This provides further support for the notion that economic agents in higher and more volatile inflation environments are more informed

[10]According to the Uruguayan National Institute of Statistics, Uruguay had an annual inflation rate of 6.6% in 2017. Between 2008 and 2018, the average inflation rate was 8.2% and the range was 6.6% to 9.8%.

about inflation and monetary policy.

2.2.5 Summary and Discussion

Different agents face different incentives and costs to acquiring and processing information. It should therefore not be surprising to find systematic differences across agents in terms of how they form their expectations. The inflation expectations of households and firms, in particular, deviate in systematic ways from those of professional forecasters and financial market participants. As a result, those interested in identifying economic mechanisms that rely on the decisions and beliefs of households and firms should focus on the expectations of these agents and not assume that they are well-approximated by other more readily-available survey measures. They are not.

The inattention of households and firms to inflation and monetary policy in advanced economies is likely a reflection of policy-makers' success in stabilizing inflation around a low level for decades. This stability has reduced the benefit to being informed about aggregate inflation, leading many to rely on readily available price signals to make inferences about aggregate inflation. This inattention to aggregate information about inflation and monetary policy, however, need not imply that their beliefs do not affect their decisions. The channels running from expectations to actions are what we now turn to.

2.3 Do Inflation Expectations Affect Economic Decisions?

For inflation expectations to be useful as a policy tool, it is essential to know whether they affect economic decisions, as suggested by theory. In this section, we summarize and extend recent empirical evidence on the ways in which inflation expectations affect the economic decisions of both households and firms.

2.3.1 Consumers' Decisions and their Inflation Expectations

The standard (and primary) channel through which inflation expectations are expected to affect households' economic decisions is via a consumption Euler equation, which relates the expected growth in consumption to the expected real interest rate:

$$c_t = E_t c_{t+1} - \sigma \left[i_t - E_t \pi_{t+1} \right] = E_t c_\infty - \sigma \sum_{j=0}^{\infty} E_t \left(i_{t+j} - \pi_{t+1+j} \right)$$

or equivalently that current deviations of consumption from long-run levels (c_t) depend on whether current and future real interest rates ($i_t - E_t\pi_{t+1}$) are expected to be above or below normal. An increase in expected inflation $E_t\pi_{t+1}$ lowers the perceived real interest rate (for a fixed nominal interest rate i_t, as would be the case at the ZLB), thereby reducing the incentive to save and raising current consumption.

A large body of work now exists which tests this mechanism using household surveys of consumption and expectations. While early work on this found little evidence that high inflation expectations were associated with higher desired consumption (Bachmann et al. (2015) using the Michigan Survey of Consumers), subsequent work has found much more positive evidence. For example, using inflation expectations from the New York Fed's Survey of Consumer Expectations, Crump et al. (2015) estimate a value of 0.8 for intertemporal elasticity of substitution σ. Dräger and Nghiem (0) find similar results for German households using a survey developed by the University of Hamburg. D'Acunto et al. (2016) use survey data from the harmonized Survey of Consumers for German households and find that households with higher inflation expectations are more likely to report that now is a good time to buy. Ichiue and Nishiguchi (2015) find evidence consistent with the Euler equation using household survey data in Japan during the ZLB period. Pooling data from seventeen European countries, Duca et al. (2017) also find when households expect inflation to go up, they tend to be more positive toward spending on consumer durable.[11] Finally, Armantier et al. (2015) use an incentivized experiment to show that households act upon their reported inflation expectations which is consistent with Malmendier and Nagel (2016) documenting that inflation experiences shape not only inflation expectations but also financial choices of consumers (e.g., consumers who have lived through high inflation tend to invest less in nominal bonds and tend to borrow through fixed-rate mortgages).

One limitation faced by this literature is that causality from higher inflation expectations to higher desired levels of consumption does not automatically follow from the positive correlations between the two. A particularly striking paper therefore is by D'Acunto et al. (2016), who use the pre-announced increase in the VAT in Germany in 2005 as a source of exogenous variation in inflation expectations of German households relative to those of other European countries. They find that the rise in inflation expectations of German households relative to comparable households in neighbouring countries was associated with higher reported willingness to spend by these households, despite no differences in their expectations of future income and other forces. Jointly, these results therefore suggest that there is a causal chain running from higher inflation expectations to higher consumption levels, at least in the absence of offsetting interest rate responses such as during the zero-bound.

[11] Related work has studied how inflation expectations affects other decisions they face, for example the composition of their assets (Vellekoop and Wiederholt (2017).

2.3.2 Firms' Decisions and their Inflation Expectations

With respect to how inflation expectations affect firms' decisions, empirical evidence is significantly more limited. This primarily reflects the fact that survey data on firms' inflation expectations is less readily available, as discussed in more detail in section 2.4. Nonetheless, recent work has begun to systematically exploit existing surveys of firms' expectations.

Particularly relevant is CGK. They implement a sequence of nationally representative surveys of firm managers in New Zealand starting in 2013. These surveys inquire as to managers' expectations of future inflation as well as other macroeconomic and firm-specific expectations, such as their expected hiring, pricing and investment decisions over the next six months. To assess the causal effect of inflation expectations on firms' decisions, they conduct the following experiment. In one of the waves of the survey, some managers were provided with information about the Reserve Bank of New Zealand's (RBNZ) inflation target while others -the control group- were provided no such information. Six months later, a follow-up survey was done to assess what actions firms had taken over the previous six months in terms of their prices, wages, hiring and investment. In addition, firms were asked again about their inflation expectations. Because the provision of information about the RBNZ's inflation target strongly affected inflation expectations but did not lead to changes in managers' expectations of other macroeconomic variables, this treatment (being provided information about the RBNZ's inflation target) can be interpreted as generating exogenous variation in inflation expectations which can then be used to assess the causal effect of these expectations on firms' economic decisions.

CGK document several findings from this experimental design. First, the provision of information led to a large and immediate downward revision of inflation expectations for firms who were initially uninformed about the target (i.e. those who thought the target was 4% or more). Second, this effect had almost completely dissipated within six months, suggesting that the provision of this type of information affects beliefs only for a limited duration. Cavallo et al. (2017) document a similar short-lived effect for consumers. Third, treated firms did not change their prices or wages in ways that were statistically or economically different from firms in the control group, despite the pronounced difference in their beliefs about inflation. Fourth, treated firms significantly reduced their hiring and investment relative to the control group. In other words, the exogenously generated reduction in inflation expectations led to a significant decline in firms' use of inputs into the production process, providing direct evidence of a causal mechanism running from firms' inflation expectations to their economic decisions.

A closely related paper that also provides evidence of a causal link from inflation expectations to firms' decisions is Coibion et al. (2019c) (CGR henceforth). These authors exploit a quasi-experiment in a survey of firm expectations in Italy. In 2012Q3, the survey randomly divided firms into two groups. One group (1/3 of respondents) was asked about

their inflation expectations at different horizons, before being asked the remaining questions in the survey. The other group (2/3 of respondents) were first told what the most recent rate of inflation was in both Italy and the eurozone before being asked about their inflation expectations. Importantly, this split of firms was sustained over the next five years and firms in the treatment group were told the most recent values of inflation in each quarter of the survey. Unlike the one-time experimental provision of information considered in CGK, the Italian case provides an example of a repeated and long-lived information treatment that generates significant and persistent differences in inflation expectations across firms over time. Because firms are asked about their economic decisions in each wave (price changes and employment), this design can be used to study how exogenous variation in inflation expectations affects prices and employment decisions over time. The sample covers a ZLB period thus providing a direct assessment of how firms can respond to attempts to raise inflation expectations.

This alternative quasi-experiment generates a number of results that mirror those found by CGK in New Zealand. First, the selective treatment of some firms with information about recent inflation is a strong instrument for inflation expectations of firms, generating pronounced exogenous variation in inflation expectations. Second, the effects of the information treatment are again short-lived: information treatments die out after about six months, very similar to that found in CGK. Hence, persistent differences between the beliefs of the two groups of firms only happen because of the repeated treatment of firms with new information. Third, CGR find a limited effect of inflation expectations on prices: firms with higher inflation expectations charge higher prices over the first few months but these effects dissipate rapidly and the passthrough is limited (for a one percentage point increase in inflation expectations, firms raise prices by at most 0.2 percentage points). Andrade et al. (2018), using inflation expectations data from a representative survey of manufacturing firms in France, similarly document that higher inflation expectations are followed by rising prices on the part of firms.

Despite these similarities, CGR find a dramatically different effect in how inflation expectations translate into the employment decisions of firms: firms with higher inflation expectations reduce their employment over the next year, the opposite reaction from that found in New Zealand. They also report reduced plans for future investment plans over the same horizon. These results apply to various subsamples based on firms' size, location, sector, and export status.

One possible explanation for why this difference occurs suggested by CGR is that, unlike in New Zealand, changes in the inflation expectations of firms in Italy are associated with changes in their other economic expectations: higher inflation expectations from the treatment lead Italian firms to become more pessimistic about the overall economy both contemporaneously and in the future, more pessimistic about the business conditions facing their specific firm, more pessimistic about their ability to access credit, and more uncertain

about the future. Firms with exogenously higher inflation expectations also report that they feel a greater need to raise prices because they foresee higher prices for raw materials but a need to reduce prices because of lower demand for their products. In short, an increase in inflation expectations from the information treatment in Italy is perceived like a negative supply shock to the economy and the firm, whereas firms in New Zealand do not materially change their expectations of other macroeconomic variables when they exogenously change their inflation expectations.

These results suggest several important policy implications. First, the mapping from inflation expectations to firms' actions appears to depend on context (e.g. macroeconomic conditions, the ability of the central bank to stabilize the economy, etc.) and may have unintended effects. For example, CGR estimates indicate that raising inflation expectations at the ZLB can result in lower employment and investment, which is counter to predictions of standard macroeconomic models. Second, shaping inflation expectations can influence inflation directly: if a firm can be convinced that inflation will be higher in the future, it may raise prices in response thus generating a higher inflation now. Again, the link between inflation expectations and pricing decisions of firms should be explored further, but results in CGR imply that such direct effects on inflation may be possible and thus management of inflation expectations can offer a new tool to control inflation and more broadly the economy.

2.3.3 Summary and Discussion

The previous two sections show that there is clear empirical evidence supporting causal effects from inflation expectations to economic decisions of households and firms, although the specific channels and mechanisms remain in doubt for firms. Furthermore, we have focused only on the direct effects of these policies on each type of agent and abstracted from the general equilibrium effects each of their responses would subsequently induce. Despite these caveats, these results suggest that, in principle, there is scope for policy-makers to affect inflation expectations for stabilization purposes. For this to be successful, however, requires two additional ingredients. First, policy-makers must be able to measure inflation expectations of these agents to gauge how much policy action is needed. Second, policy-makers need specific communication tools to affect these expectations. In the next two sections, we consider issues associated with each of these dimensions.

2.4 Measuring Inflation Expectations

The ability of policy-makers to gauge their effect on inflation expectations hinges on the availability of high-quality surveys of households' and firms' expectations. To what extent do existing surveys meet the standards one would expect? The answer depends largely on the type of agent.

Household surveys have long been in existence for most advanced economies. For example, the U.S. has the Michigan Survey of Consumers and the New York Fed's Survey of Consumer Expectations (SCE). The United Kingdom has the Barclays Basix and Bank NOP surveys. The European Commission organizes a harmonized survey of households for all European Union countries, although these are implemented by the statistical agencies of member nations. In each case, surveys are done monthly or quarterly using a large (generally greater than a thousand) representative group of households. The Bank of Japan runs the Opinion Survey. Households are asked to provide a point estimate for future price changes or assign weights to different ranges of possible outcomes. Questions are generally phrased in terms of "overall prices in the economy" although some (like the New York Fed's SCE) emphasize inflation rates of a specific price index. These surveys are generally viewed as being of very high quality due to their large and representative cross-samples as well as their high-frequency and long availability.

In contrast, the availability of surveys of firms in most countries is much more limited (Table 2 of Coibion et al. (2018d)). There are few surveys that ask for quantitative inflation expectations of firms and those that do tend not to be nationally representative. The phrasing of questions varies widely, as does the way in which respondents can respond (e.g. point estimates vs ranges, sizes of bins offered, etc.). In contrast to households, there has been little work done to characterize the sensitivity of firms' responses to different types of survey questions. It remains unclear how important it is to have a representative sample of firms across industries and size. There is even ambiguity about whether one can or should measure firms' expectations of aggregate inflation by asking them about their expectations of their own firm's price changes or unit costs.

In the next few sections, we provide new results on the extent to which these different factors matter for the interpretation of survey responses, then draw some conclusions about how well currently available surveys across countries actually measure the inflation expectations of firms in those countries. To assess the sensitivity of answers to survey design, we will primarily rely on a sequence of firm surveys done in New Zealand between 2013 and 2017. These surveys are discussed in detail in Kumar et al. (2015) and CGK. Over 3,000 firms were first surveyed in 2013Q4 and three follow-up surveys were done over the next two years on subsets of these firms. A new panel of over 2,000 firms was drawn in 2016Q2 with a single follow-up survey being done on a subset of these firms six months later. To evaluate various elements of survey design, we provided random subsets of firms with different formulations of questions about inflation, allowing us to study how these questions affect responses. In what follows we provide key takeaways from our analysis.

2.4.1 Point Forecasts vs Distributions

While there are numerous benefits of having access to an economic agent's distribution of subjective expectations (Manski (2004)), respondents may have a hard time understanding questions about distributions of their beliefs and may exhibit a lower response rate (Kleinjans and Soest (2014)). We find that managers have high consistency in their responses to questions eliciting point estimates of future inflation[12] and questions eliciting probability distributions of future inflation[13] (see Appendix Table A.10). Specifically, the correlation between the point prediction and the mean implied by the reported distribution is about 0.9, which is considerably higher than the corresponding magnitude for household surveys. Thus, although consumers often struggle with answering probability distribution questions (Fischhoff and Bruine De Bruin (1999),Bruine de Bruin et al. (2000)), firm managers answer coherently across the two types of questions and bias is unlikely in the distribution-type questions for this type of economic agents.

2.4.2 Wording of Inflation Forecast Questions

Currently available surveys of consumers and firms display considerable heterogeneity in the wording of questions used to elicit inflation expectations. The definitions of inflation range from "the change in the prices you pay" to "inflation as measured by the Consumer Price Index". Few even use the word "inflation". Although this may seem to be a trivial difference in the wording, Armantier et al. (2013) and Bruine de Bruin et al. (2012) document that the phrasing of inflation questions matters for how households interpret and respond to questions.

In one wave of the New Zealand survey, firms were randomly assigned to answer versions of the inflation expectation questions formulated in terms of "prices overall in the economy", "overall inflation rate", and "inflation rate (specifically the Consumer Price Index)". We find that firm managers do not appear to have systematic biases or exhibit difficulties with interpreting the questions: first and second moments of the responses are similar across the wordings (Appendix Table A.11). Thus, managers' answers about inflation do not appear to be disproportionately sensitive to the language used in the question.

2.4.3 Expectations of Aggregate vs Respondent-Specific Variables

While the objective of many surveys is to measure firms' expectations of aggregate inflation, some surveys attempt to measure these expectations by asking firms to report their projected

[12]The point forecast is based on the following question: "During the next twelve months, by how much do you think prices will change overall in the economy? Please provide an answer in percentage terms."

[13]Specifically, participants are asked "Please assign probabilities (from 0-100) to the following range of overall price changes PER YEAR in the economy over the next twelve months for New Zealand: (note that the probabilities in the column should sum to 100)."

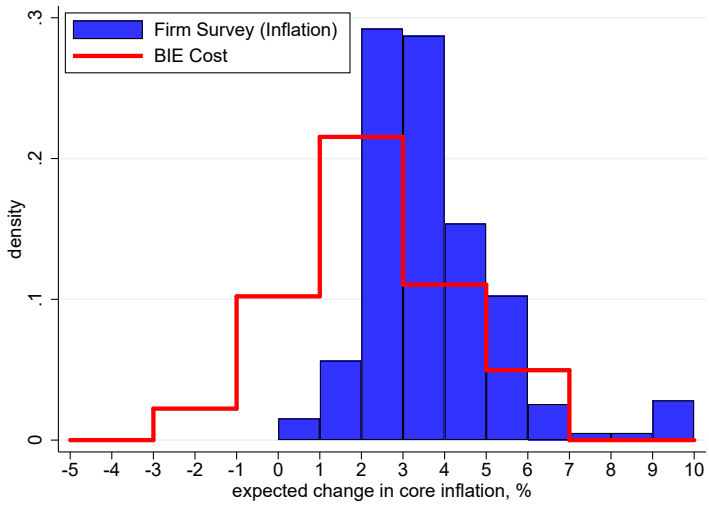
dynamics of firm-level variables such as their own prices or their own unit costs. For example, the Atlanta Fed's Business Inflation Expectations (BIE) survey asks firms about their expectations of future changes in their unit costs rather than their expectations of aggregate inflation. This measure is conceptually different from inflation, but it may be associated with similar results in aggregate. To establish whether this difference in the objects of inflation expectation questions is material for measuring aggregate inflation expectations, we asked firms in the New Zealand survey to report their expectations about their future unit costs and expectations about aggregate inflation.

We find (Appendix Table A.12) that the mean (median) response about firm-specific variables is consistently lower than the mean (median) response about aggregate inflation. This pattern applies not only to expected changes but also to perceived inflation (that is, inflation that happened in the previous twelve months) and actual changes in firm-level variables (that is, actual change in unit costs or prices in the previous 6 or 12 months). The dispersion of inflation expectations and perceptions tends to be larger than the dispersion in expected or actual changes in firm-level variables. Most importantly, we observe that firm-level responses about unit costs or prices are effectively uncorrelated with their expectations and perceptions of aggregate inflation. [14]

We find similar patterns in the U.S. when we compare the distribution of responses about unit costs in the BIE survey and the distribution of point predictions about aggregate inflation in the survey of firms that we ran in April 2018 (Figure 4). Specifically, in the April 2018 wave of the surveys, the BIE responses are generally centered at 2.3 percent (standard deviation is 1.4), while the mean response (after censoring responses greater than 10 percent) of inflation expectations in our survey is 3.6 percent (standard deviation is 2.0). That is, the distribution of responses about aggregates is tangibly shifted to the right and is more dispersed.

[14] Interestingly, the BIE had two special questions in the July-2015 and September-2014 waves to elicit firms' expectations about aggregate inflation so that we can compare responses about aggregate and firm-level variables. Similar to the survey in New Zealand, expected changes in unit costs are lower and less dispersed than changes in the CPI or "prices overall in the economy". Although the magnitudes of the differences are somewhat smaller, we argue below that some of the compression in the moments is due to the particular survey design of the BIE inflation expectation questions.

Figure 2.4: Comparison of Surveys of Firms' Expectations in the U.S.



Note: The figure shows the distribution of responses in the Business Inflation Expectations (BIE) survey run the Federal Reserve Bank of Atlanta and in a survey of firms we ran using a pre-existing nationally representative panel of firms in the U.S. ("Firm survey"). The BIE survey asks respondents to report their expected change in unit costs (the question is "Projecting ahead, to the best of your ability, please assign a percent likelihood to the following changes to unit costs over the next 12 months."). Possible answers are: "Unit costs down (<-1%)", "Unit costs about unchanged (-1% to 1%)", "Unit costs up somewhat (1.1% to 3%)", "Unit costs up significantly (3.1% to 5%)", and "Unit costs up very significantly (>5%)". Our survey asks respondents to report their point predictions for one-year-ahead inflation (the question is "What do you think will be the inflation rate (for the Consumer Price Index) over the next 12 months? Please provide an answer in an annual percentage rate.").

Our results suggest that whether a survey asks respondents to report firm-specific or aggregate measures of price change may influence both the level and heterogeneity of responses. These differences are important because both moments are informative about how agents form expectations and how successful central banks are in anchoring inflation expectations. Furthermore, we document that asking firm managers about changes in unit costs or prices of their firms can bear little connection to what firms project for macroeconomic variables.

2.4.4 Sensitivity of Inflation Expectations to the Design of Questions

In the baseline structure of probability questions in our survey of New Zealand managers, we present respondents with a broad spectrum of possible outcomes ranging from "More than

25%" to "Less than -25%" (which is similar to the wide grid of possible inflation outcomes in the Survey of Consumer Expectations run by the Federal Reserve Bank of New York). In contrast, other surveys often present fewer and/or narrower options. For example, an occasional question about core CPI in the BIE survey has a top bin of "4 percent and above", while the bottom bin is "zero or less" (that is, price decline).[15] Relatedly, point forecasts are often formulated as multiple-choice questions where the number of options is fairly constrained. For example, the Business Outlook Survey run by the Bank of Canada offers only four options for point predictions of CPI inflation: "less than 1%", "between 1% and 2%", "between 2% and 3%", and "above 3%". Given considerable variation in point predictions of managers in New Zealand and more generally households in the U.S. and other countries, such limited scales of possible answers may prime respondents to report predictions in the middle of the provided range or lump responses at the boundaries of the range thus possibly biasing reported inflation expectations.

To assess the quantitative importance of variation in the scale provided in questions eliciting expectations of firm managers, we randomized a set of questions presented to firms. Specifically, the first group of firms is presented with the CPI question in the Atlanta Fed's BIE format. The second group is presented with a grid as in the New Zealand survey (NZ grid).

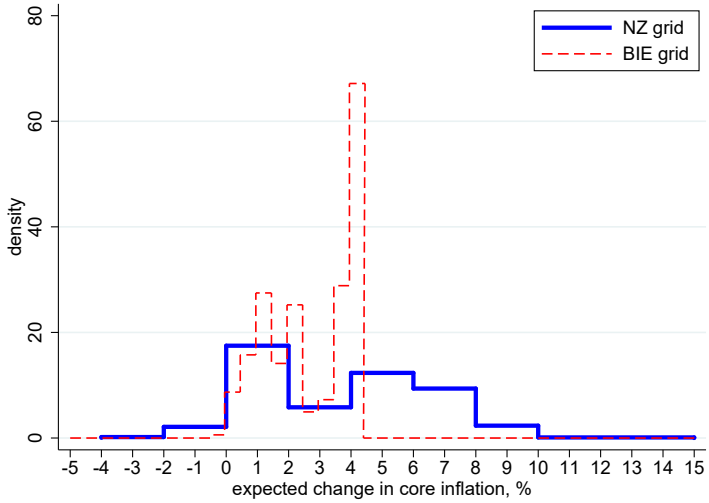
For each question and firm, we compute the mean and standard deviation (a measure of uncertainty) implied by the reported density. Then we calculate moments across firms for these two statistics. We find (Appendix Table A.13) that using a larger number of bins covering a broader set of possibilities for the core CPI inflation rate yields results similar to those of the percent change in general level of prices (our baseline question about "change in prices overall"). Using the same question in the BIE format produces a mean forecast similar to the mean in the baseline format of the question. However, the cross-sectional dispersion of implied means across firms is considerably smaller than in the NZ grid (1.30 vs. 2.37). Furthermore, the implied uncertainty (measured as the standard deviation of the reported probability distribution) is nearly four times smaller in the BIE format than in the NZ grid (0.26 vs. 0.94). This pattern suggests that the BIE format can overstate the degree of anchoring of inflation expectations in the sense of Kumar et al. (2015).

To understand the source of these differences across the grids as well as the variables used to measure inflation expectations, we plot the average (across firms) densities for the different formats of survey questions. Figure 2.5 demonstrates that managers assign much greater probability to outcomes outside the range of the BIE grid. Specifically, when we use the NZ grid, managers give 24 percent probability to inflation being greater than 6 percent

[15]The wording of the occasional BIE question for core CPI inflation is "Please indicate what probabilities you would attach to the various possible percentage changes to the CORE (excluding food and energy) CONSUMER PRICE INDEX over the next twelve months (values should sum to 100%)." Firms assign probabilities to 10 bins running from "4 percent or more" to "will decline" at 0.5 percentage point increments.

which is greater than the mid-point of the top bin of the BIE grid. If we cumulate probability across NZ bins to match the top bin in the BIE grid, managers give nearly 50 percent probability of inflation being greater than 4 percent for the NZ grid and 33 percent for the BIE grid. That is, although there is considerable lumping of responses at the top bin of the BIE grid, this lump is smaller than the cumulative probability managers assign on the NZ grid. This pattern is consistent with responses being affected by the menu of options in the BIE survey question and some of the probability mass being shifted toward the center of the offered menu.[16]

Figure 2.5: Effects of bins on reported distributions of expected inflation.



Note: The figure report average (across firms) probabilities assigned to expected inflation intervals for different survey designs of the probability distribution questions.

In summary, the distribution of probability questions (or multiple-choice questions for point predictions) should be calibrated to match the distribution of unconstrained point forecasts. If the grid of possible outcomes is constrained or not properly centered, elicited inflation expectations may paint a distorted picture. Specifically, inflation expectations may be less responsive to shocks and may appear more anchored than they actually are.

[16]Relatedly, we see that responses on the BIE grid are such that the probability of deflation (in this case only one option: "less than 0%") is almost zero. For the NZ grid, on average probability of deflation is approximately 5 percent. Note that the NZ grid is centered at zero while the BIE grid is centered at 2 percent. As a result, respondents to the BIE grid may be primed to avoid reporting extreme outcomes like deflation.

2.4.5 Designing a Sampling Frame of Managers

A basic question for the design of a survey of price-setters is the sampling frame and the representativeness of the sample of respondents. In household surveys, previous work has documented that expectations differ systematically along different characteristics of individual respondents, such as their age, gender, education, and income. As a result, household surveys aim to create a distribution of respondents which is representative along these observable characteristics. With firm managers, it is less clear whether one should want a sample which mimics the population of managers along these same characteristics, or whether one would want a sample which matches the distribution of the characteristics of the firms for which they are employed.

To assess this question, we consider how expectations of manager respondents in the New Zealand survey correlate with both observable characteristics of respondents (age, gender, income, and education) versus the observable characteristics of the firms (age, size, industry, markups, etc.) at which they are employed. We find (Appendix Table A.14) that while some of personal characteristics are significantly correlated with respondents' expectations, the predictive power of these characteristics is low ($R^2 \leq 0.1$). In contrast, the explanatory power of firms' variables (along with industry fixed effects) is quite high ($R^2 \approx 0.8$). When we include both firm characteristics and individual characteristics in the regression, much of the explanatory power coming from individual characteristics disappears whereas the firm characteristics continue to have significant predictive power. In other words, there seems to be very little value added in ensuring that respondents mimic the demographic characteristics of managers overall. Instead, a well-designed survey should capture the distribution of firm characteristics among the population of firms in the economy.

2.4.6 How Do Existing Surveys Fare?

These results highlight a few characteristics that well-designed surveys of firms' inflation expectations should exhibit: 1) because firm characteristics matter for expectations, surveys should use stratified random sampling from the universe of firms and have broad coverage of industries and firm sizes, 2) questions on inflation expectations should ask for point forecasts or present a sufficiently broad set of quantitative bins as to characterize the full distribution of beliefs, and 3) questions on inflation expectations should ask about firms' beliefs regarding aggregate inflation, not firm-specific concepts. From the broader literature on survey design, surveys should also have a large number of respondents and should avoid all forms of priming of respondents, e.g. providing them with additional information before asking questions.

How do existing surveys of firms conform to these guidelines? Overall, quite poorly. Table 2.2 summarizes major surveys of firms' expectations currently available for a range of countries and how they fare along these metrics. Most surveys fail along several dimensions.

Many, like the Canadian Conference Board or the Livingston survey in the U.S (now run by the Federal Reserve Bank of Philadelphia), use a sampling frame that is not nationally representative ("convenience sampling"). Many of these same surveys consist almost exclusively of larger firms in the economy, with relatively small cross-sections (50-80 respondents per wave is common). Convenience sampling and relatively small cross-sections also characterize surveys in the Czech Republic, New Zealand, Poland and Sweden. The BIE survey run by the Federal Reserve Bank of Atlanta is limited to the six states that are included in the Sixth District of the Federal Reserve system and does not ask firms explicit questions about aggregate inflation. The U.K. survey of firms run by the Confederation of British Industry similarly does not ask firms about their expectations of aggregate inflation and covers only a subset of industries.

Table 2.2: Selected Surveys and Firms' Inflation Expectations

Country	Institution	RS	HS	MQF	LS	NP	QQ	MB	DQ	AI
Canada	Conference Board of Canada	X	✓	✓	✓	✓	X	✓	X	✓
Canada	Central bank	X	✓	✓	X	X	X	X	X	✓
Czech Republic	Central bank	✓	✓	✓	X	✓	✓	-	X	✓
EU Members	European Commission	✓	✓	✓	✓	✓	X	X	X	✓
Iran	Central Bank	✓	X	✓	✓	✓	✓	-	X	✓
Israel	Ungar and Zilberfarb (1993)	✓	X	X	X	X	✓	-	X	✓
Italy	Central bank	✓	X	✓	✓	X*	✓	-	X	✓
Japan	Central bank	✓	✓	✓	✓	✓	X	✓	X	✓
New Zealand	Central bank	X	X	✓	X	✓	✓	-	X	✓
Poland	Central bank	X	✓	✓	X	X	X	X	X	✓
South Africa	Central bank	X	X	✓	✓	✓	✓	-	X	✓
Sweden	Central Bank	X	X	✓	X	✓	✓	-	X	✓
UK	Confederation of British Industry	X	✓	✓	✓	✓	✓	-	X	X
Ukraine	Central bank	✓	✓	✓	✓	✓	X	✓	X	✓
USA	Atlanta Fed	X	X	✓	X	X	X	X	X**	X
USA	Livingston Philadelphia Fed	X	X	X	X	✓	✓	-	X	✓
Uruguay	Central bank	✓	X	✓	X	✓	✓	-	X	✓
Turkey	Central Bank	✓	X	✓	✓	✓	✓	-	X	✓

Note: Column RS (Representative Sample) indicates whether firms in a survey are representative of the group that is being surveyed. HS (Heterogeneous Sample) indicates if a sample of firms covers various types (size, sector, etc.) of firms so that the resulting sample represents the population of firms in the economy. MQF (Monthly or Quarterly Frequency) indicates whether the survey has at least quarterly frequency. LS (Large Sample Size) indicates if a survey has more than 350 firms with non-missing responses. NP (No priming) indicates whether a survey does not provide information to firms before eliciting expectations, does not restrict the sample in any particular way (e.g., does not exclude firms that do not understand the concept of inflation), and does not restrict possible responses. QQ (Quantitative question) indicates if firms are free to report an unrestricted inflation forecast (i.e., responses are not restricted to a binned/range/multiple-choice menu). MB (Many/wide bins) indicates whether a survey allows firms to choose from a wide and detailed range of possible responses if quantitative response are not available. DQ (Distributional question) indicates whether a survey elicits a probability distribution for future inflation. AI (Aggregate Inflation) indicates whether a survey asks firms to report an aggregate measure of inflation, changes in prices overall, etc. (rather than firm's unit costs or prices). *last month annual inflation is given to 2/3 of the firms and firms are not allowed to report "extreme" values. **distributional questions are asked in occasional modules

Another common stumbling block for surveys of firms is "priming" of answers, either by providing respondents with information or using bins that limit the scope of possible answers. The survey of firms run by the Bank of Italy, as described in section 2.3.2, provides most firms with information about recent inflation in Italy and the euro area before asking them about inflation. Firms who are provided with this information display much less disagreement and have forecasts that track recent inflation much more closely than firms who are not. The Business Outlook Survey run by the Bank of Canada offers only four options for point predictions of CPI inflation: "less than 1%", "between 1% and 2%", "between 2% and 3%", and "above 3%".

The European Commission reports results of a "harmonized" survey of firms across all members of the European Union. These surveys are run by the national statistical institutes of each member country, but a minimum number of questions were made consistent across countries by the European Commission (EC) and aggregated values of these questions are then provided to the EC by member statistical institutes. Unfortunately, different surveys are used for different industries (e.g. there is one survey for the industrial sector and a different survey for the service sector). In addition, the harmonized survey questions that refer to aggregate inflation are only qualitative in nature (i.e. will prices "go up", "go down" or "stay the same"?), making them of limited practical use for measuring the level of firms' inflation expectations.

The Bank of Japan's "Tankan" survey, which began including questions on aggregate inflation in 2014, covers 10,000 firms on average per wave, making it the largest survey of firms anywhere (Muto (2014)).[17] While the survey asks firms to provide quantitative forecasts of inflation, it gives them the opportunity to respond "I don't know". Approximately 20 percent of respondents choose "I don't know (or have a clear view)" for 1-year ahead inflation forecasts and around 40 percent make that choice for 3-year and 5-year ahead inflation forecasts. The survey of U.S. firms that we ran in April 2018 similarly gave respondents the option of choosing "I don't know" and about 55% responded that way. Unfortunately, those who choose "I don't know" are almost certainly not a random subset from the overall distribution of beliefs, making the resulting mean forecasts a biased representation of actual forecasts of firms. While we cannot quantify the resulting bias at this stage, the high fraction of respondents who select it suggests that this feature should be avoided in future survey designs and instead surveys should nudge respondents to provide e.g. ranges.

To the best of our knowledge, the surveys of firms which best match our desiderata are those in Ukraine and Uruguay. The National Bank of Ukraine runs a survey of around 1,000 firms per quarter (see Coibion and Gorodnichenko (2015a)), selected in a nationally repre-

[17] The Tankan survey of the Bank of Japan is also exceptional in that it reports an average response rate of 99% (Muto (2014))

sentative way, and these firms are asked well-defined questions about inflation expectations. The central bank of Uruguay also runs a well-designed survey of firms on a quarterly basis. While the cross-section of approximately 300 respondents per wave is somewhat small, it has an extensive panel dimension which can be particularly useful for researchers and has quantitative questions on inflation expectations at different horizons (see Frache and Lluberas (2018)). The fact that no major advanced economy has a survey of firms that compares to those in Ukraine and Uruguay is striking and a major stumbling block to the use of inflation expectations as a policy tool.

2.4.7 Summary and Discussion

Most advanced economies have well-designed representative surveys of households' inflation expectations. In contrast, most existing surveys of firms' inflation expectations appear to suffer from fundamental design flaws that call into question the resulting measurements. Whether it be that firms are not asked about aggregate inflation (Atlanta Fed's BIE survey, U.K. survey), firms are not randomly selected or representative of the broader distribution of firms (e.g., U.K. or Sweden), questions about inflation are not quantitative or too restrictive to be informative (e.g. Bank of Canada, European Commission), or any of the other shortcomings described above, few surveys of firms are sufficiently well-designed as to be very informative about the inflation expectations of firms in their respective economies. At a minimum, these limitations in available surveys should give policy-makers pause before using them as an explicit guide in policy decisions.

Filling this important measurement gap will require the development of nationally representative firm level surveys by government authorities. Even administratively-run "mandatory" surveys of firms tend to achieve response rates of only 70-80% (see Bloom et al. (2017)). Privately administered surveys achieve much lower response rates and still require enormous expenses due to the difficulty of inducing business executives to respond, unlike household surveys. As a result, this gap cannot be filled by academics relying on research grants. Only central banks and statistical agencies have the resources and authority to create the type of large-scale, high-frequency and nationally representative surveys of firms needed to provide high-quality measures of firms' inflation expectations appropriate for policy-making. If Ukraine and Uruguay can create such surveys, we see no reason why major advanced economies cannot do so as well.

2.5 Breaking through the Veil of Inattention

Above and beyond measurement issues, a necessary condition for policy-makers to be able to use inflation expectations as a stabilization tool is that economic agents' beliefs respond

to the policies and announcements. Indeed, as Blinder (2018) observes, there should be a sender and a receiver for communication to be effective. Since expectations are not directly under the control of policy-makers, they should be thought of as indirect instruments that can be moved through the more direct tool of communication strategies. In this section, we review previous experiences with monetary policy announcements and their effects on inflation expectations. Even large monetary policy announcements during and since the Great Recession had little if any discernible impact on households and firms' views about the future. We then provide some suggestions as to how policy-makers could revise their communications strategies to more directly and successfully alter the economic expectations of different agents.

2.5.1 Monetary Policy Announcements and Expectations

Monetary policy announcements have effects on financial markets that occur within minutes. Central bankers now often conduct extensive question-and-answer sessions with the media after policy meetings. Forecasters and analysts can be immediately found on the news explaining the potential implications of monetary policy actions. Does this instantaneous diffusion of news following large policy announcements affect the economic perspectives of households and firms?

In this section, we consider the extent to which consumers, professional forecasters and financial markets in the U.S., U.K. and euro area reacted after some important announcements from the monetary authorities during and following the last financial crisis. The objective is to try to evaluate if these announcements had an impact on agents; inflation expectations or other indicators that might indicate that this type of communication has some effect on their behavior.

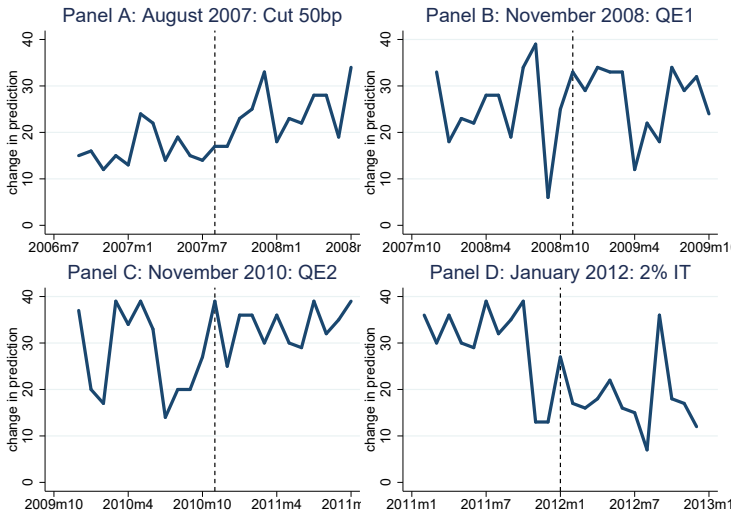
The Case of the U.S.

We focus on four episodes in which the Federal Reserve undertook significant policy actions. The first is the interest rate cut in August 2007. We then consider the announcements of Quantitative Easing (QE) 1 in November 2008 and QE2 in November 2010. Finally, we consider the announcement of the 2% inflation target by the Federal Reserve in January 2012.

We begin with the response of professional forecasters to this news to provide a benchmark for how relatively attentive agents are likely to respond to these policy announcements. Our source of information is the Survey of Professional Forecasters from Bloomberg, in which forecasts can be updated as frequently as daily. We count the monthly changes in predictions from the forecasters to see if they react to this news by changing their analyses. Figure 2.6 shows the number of changes in the predictions from professional forecasters. We see

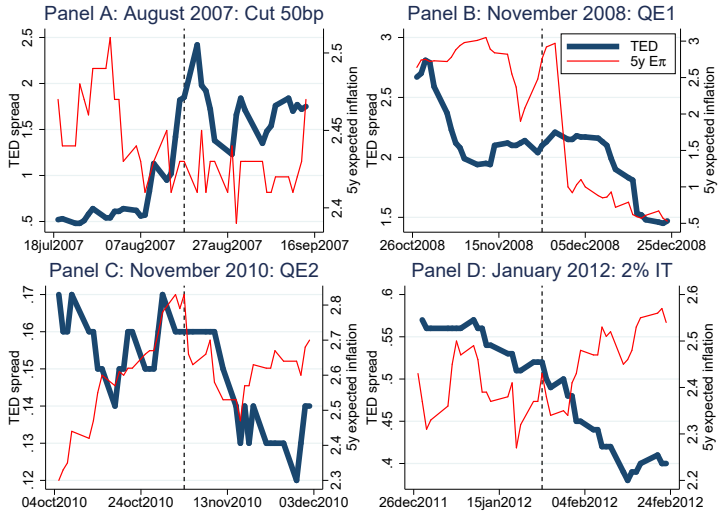
that in general there is an increase in the number of changes in the prediction of forecasters around these announcements. The changes are particularly striking for QE1, QE2 and the 2% inflation target. This seems to indicate that professional forecasters are reacting to the announcement. In the same spirit, we can assess how financial markets reacted after these changes. We use the TED spread as a measure of credit risk and the 5-year inflation swap to gauge the response of financial market participants. We can use daily data which can better isolate these announcements from other events that might have happened in that period. Figure 2.7 shows the TED spread and the 5-year inflation swap in a 2-month window around the events. As with professional forecasters, we observe clear reactions in financial markets. 5-year inflation swaps react after these events with QE2 and the inflation targeting announcement yielding particularly large effects. The TED spread shows smaller changes that might be possible considering that these are periods of high uncertainty.

Figure 2.6: Change in forecasts in Bloomberg's SPF.



Note: These figures show the number of changes in predictions made by professional forecasters in a given month according to the survey of professional forecasters conducted by Bloomberg. The vertical lines show relevant events or announcements related to the Federal Reserve. Panel A shows the 50-basis-point cut in the policy rate on August 17, 2007. Panel B shows the announcement of the first quantitative easing policy on November 25, 2008. Panel C shows the announcement of the second quantitative easing policy on November 3, 2010. Finally, Panel D shows the announcement of the 2% inflation target by the Federal Reserve on January 25, 2012.

Figure 2.7: Reaction of financial markets to Fed announcements.



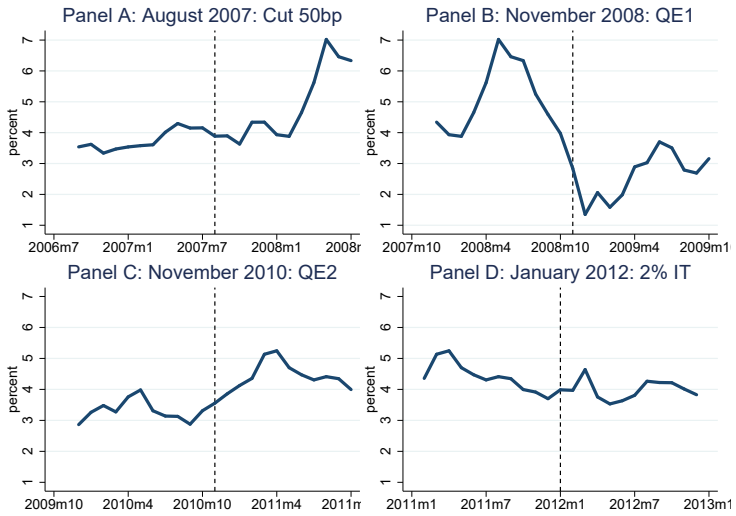
Note: These figures show the TED spread (black, thick line) and the 5-year forward inflation rate expectation (red, thin line) at a daily frequency. Source: FRED. Panel A shows the 50-basis-point cut in the policy rate on August 17, 2007. Panel B shows the announcement of the first quantitative easing policy on November 25, 2008. Panel C shows the announcement of the second quantitative easing policy on November 3, 2010. Finally, Panel D shows the announcement of the 2% inflation target by the Federal Reserve on January 25, 2012

The response of the expectations of professional forecasters and financial markets to the inflation targeting announcement is somewhat surprising. As already discussed, these agents are very well-informed when it comes to inflation dynamics and the objective of the central bank, so one might have expected very little effect on their beliefs from the Federal Reserve's formal adoption of a target that had long been already understood in the financial community as an informal target. These movements in expectations therefore represent a lower bound of what we would expect to see for households and firms given how much less informed the latter appear to be when it comes to inflation and monetary policy.

To evaluate consumers' reaction, we use the Survey of Consumers (MSC) conducted by the University of Michigan. Looking at the average response of households in the MSC in Figure 2.8, we find little visible response to any of the announcements. Binder (2017) similarly notes that household inflation expectations in the U.S. did not appear to respond in a meaningful way to the Federal Reserve's announcement of an inflation target. Consistent with the general inattention paid by households to inflation in general, this suggests that even the adoption of a formal inflation target on the part of the Federal Reserve did not feed into household inflation expectations and they appear to be, at least in the current

environment, look largely invariant to monetary policy announcements and decisions.

Figure 2.8: Inflation expectations in MSC.

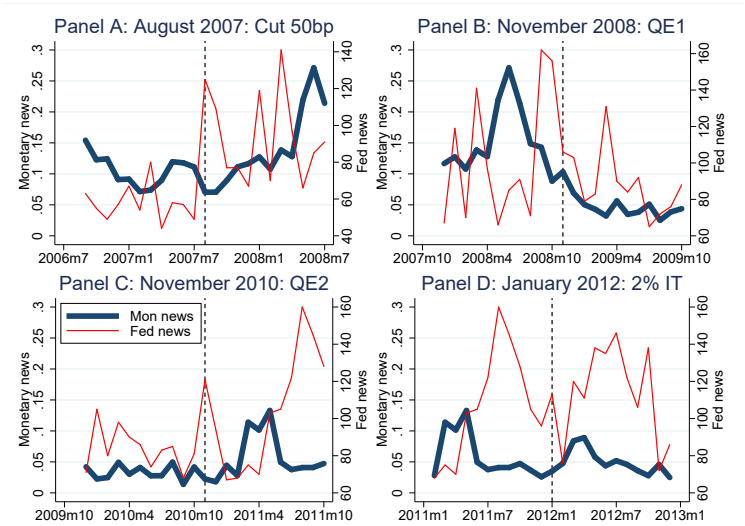


Note: These figures plot the weighted average for the inflation expectation of consumers in the Michigan Survey of Consumers. Panel A shows the 50-basis-point cut in the policy rate on August 17, 2007. Panel B shows the announcement of the first quantitative easing policy on November 25, 2008. Panel C shows the announcement of the second quantitative easing policy on November 3, 2010. Finally, Panel D shows the announcement of the 2% inflation target by the Federal Reserve on January 25, 2012.

To assess how such inattention to what should be large and visible economic announcements can occur, we consider responses to the following question in the MSC: "During the last few months, have you heard of any favorable or unfavorable changes in business conditions?" We use this question to evaluate how consumers are receiving information about different types of policies. Answers are separated by the type of news. We focus on monetary news to see if announcements are reaching households. To quantify the exposure of these announcements, we use a measure of how the media covered these events. This measure is constructed by counting all the news articles that have the phrase "Federal Reserve" in the New York Times ("Fed news"). We have monthly data for both measures. Figure 2.9 plots time series of monetary news and Fed news for a 13-month window around the announcements. We can see that these big announcements seem to have been covered by the media (or at least the New York Times), as we see a reaction of the amount of news related to the Federal Reserve. Despite this upsurge of news reports, we see little reaction in terms of households reporting receiving more information about monetary policy. The percentage of households who heard about monetary news changes little and in some cases we even see declines around the main event. Jointly, this indicates that the increased news coverage in

major news media sources is either not seen by most households or ignored by them when they read the news.

Figure 2.9: News heard by people in MSC and media coverage of the Fed.



Note: The black, thick line shows the share of consumers that say that have heard an economic news story related to monetary policy in the Michigan Survey of Consumers. The red, thin line shows the amount of news articles in a month in the New York Times that contained "Federal Reserve" according to Lexis-Nexis. Panel A shows the 50-basis-point cut in the policy rate on August 17, 2007. Panel B shows the announcement of the first quantitative easing policy on November 25, 2008. Panel C shows the announcement of the second quantitative easing policy on November 3, 2010. Finally, Panel D shows the announcement of the 2% inflation target by the Federal Reserve on January 25, 2012.

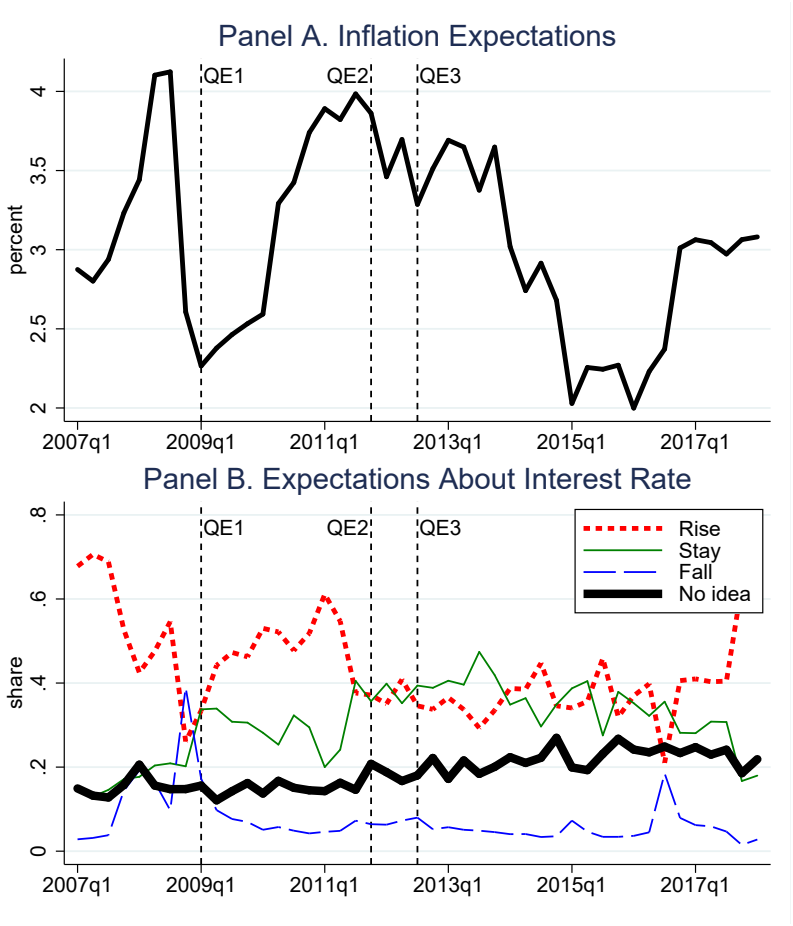
The Case of the U.K.

Like in the U.S., there were a number of notable policy announcements made by the Bank of England following the financial crisis. We focus on the following three: Quantitative Easing in March 2009 (QE1), October 2011 (QE2) and July 2012 (QE3). We use the Bank of England's Survey on Consumer Expectations, a quarterly survey conducted by the Bank of England since 2001 of a representative group of consumers aged 16 years or older. This survey not only includes questions about inflation expectations but also asks respondents about their opinions regarding the work of the Bank of England.

As illustrated in Panel A of Figure 2.10, there is little indication that inflation expectations rose sharply around the time of these events, much as was the case in the U.S. When we examine the evolution of consumers' expectations about the interest rate (Panel B), we

also see that there are no changes around the announcements. Between the second quarter of 2009 and 2010, the survey included another question asking respondents whether they had heard about quantitative easing policies. Following the announcement of QE1, we find that the proportion of consumers that declare that they have no idea about the evolution of interest rates remains constant or increases. About 50% of the respondents stated that they have not heard at all about that policy. Less than 20% said that they have heard a lot about it. This shows that even if this was an exceptional policy, U.K. consumers seemed to be largely unaware of it.

Figure 2.10: UK case.



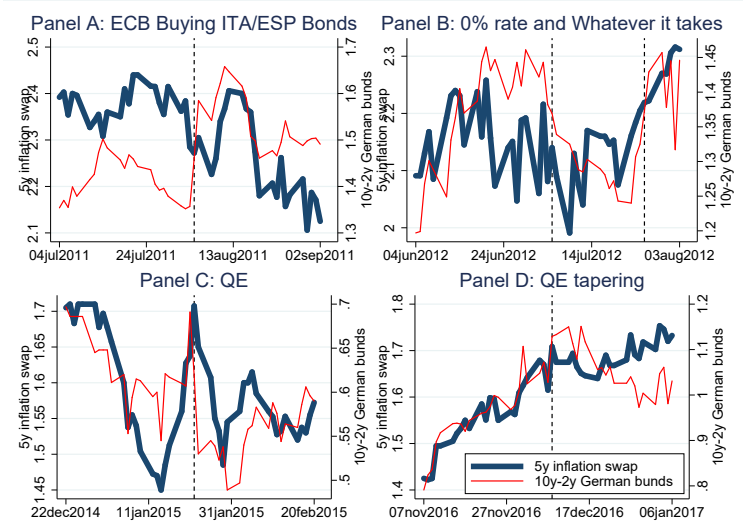
Note: Panel A shows the weighted average of inflation expectations in the Bank of England/TNS Inflation Attitudes Survey. As respondents have to answer in bins, we take the middle point for each middle bin. For the bin "Go Down" we impute a value of -1 and for "Go up by 5% or more" we impute 6%. Panel B shows the results of the question regarding the expectations of interest rates of respondents in the same Survey. "Rise" adds the ratio of respondents that answer "Rise a lot" or "Rise a little", "Stay" corresponds to the answer "Stay about the same", "Fall" aggroups the answers "Fall a little" and "Fall a lot" and "No Idea" is the ratio of respondents that answers that. QE1 corresponds to the first quantitative easing (QE) policy conducted by the Bank of England in March 2009. QE2 is May 2012 and QE3 is in November 2012.

The Case of Eurozone

Finally, we explore what happened with big ECB policy announcements, focusing on four specific episodes: the purchasing of Spanish and Italian bonds (August 9, 2011), 0% interest rate and "whatever it takes" (July 26, 2012), Quantitative Easing (January 22, 2015), and

QE tapering (December 8, 2016). Turning first to financial market responses, we examine how the 5 years inflation swap and the difference between the 10-year and 2-year German bund reacted around these announcements. We use daily data and a two-month window as in the U.S. For these variables we see some reactions around the day of these announcements (Figure 2.11). In the case of the 5 years inflation swap we see moderate changes the day of the events, especially the day of the announcement of the 0% interest rate. In the case of the German bund spread we see bigger changes around the events, with direction that depends on the type of the news.

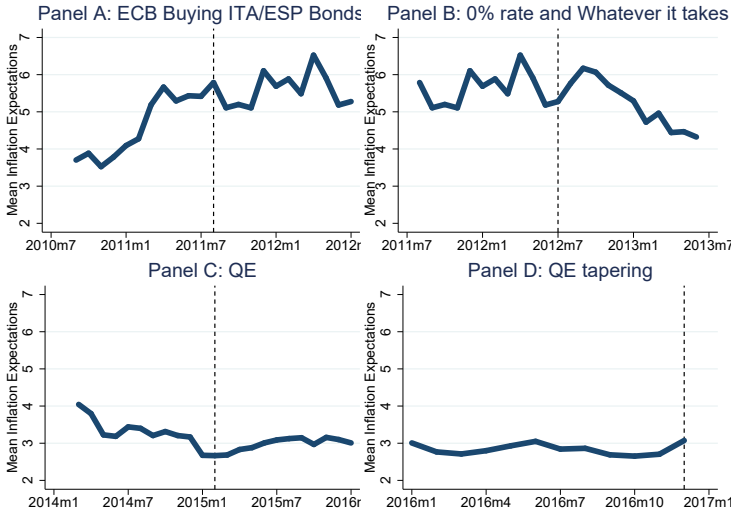
Figure 2.11: Financial markets and ECB policy announcements.



Note:This panel shows the 5-years inflation swap and the difference between the 10-year German bund and 2-year German bund at a daily frequency. All data are from Bloomberg. Panel A shows the movements around the purchasing of Spanish and Italian bonds on August 9, 2011. Panel B shows the movements around when the ECB set the policy interest rate at 0% on July 5, 2012 and when ECB president Mario Draghi announced that the ECB was prepared to do "whatever it takes" to preserve the euro on July 26, 2012. Panel C plots the movements around the quantitative easing policy conducted by the ECB on January 22, 2015 and Panel D plots around the announcement of the quantitative easing tapering on December 8, 2016.

On the other hand, households' inflation expectations appear to be rather insensitive to the announcements (Figure 2.12). For example, the ECB's announcement of its quantitative easing program in March 2015 had no discernible effect on mean one-year-ahead inflation expectations of eurozone consumers, which is similar to the behavior of U.S. consumers in response to the QE announcement by the Federal Reserve.

Figure 2.12: Households' inflation expectations and ECB policy announcements.

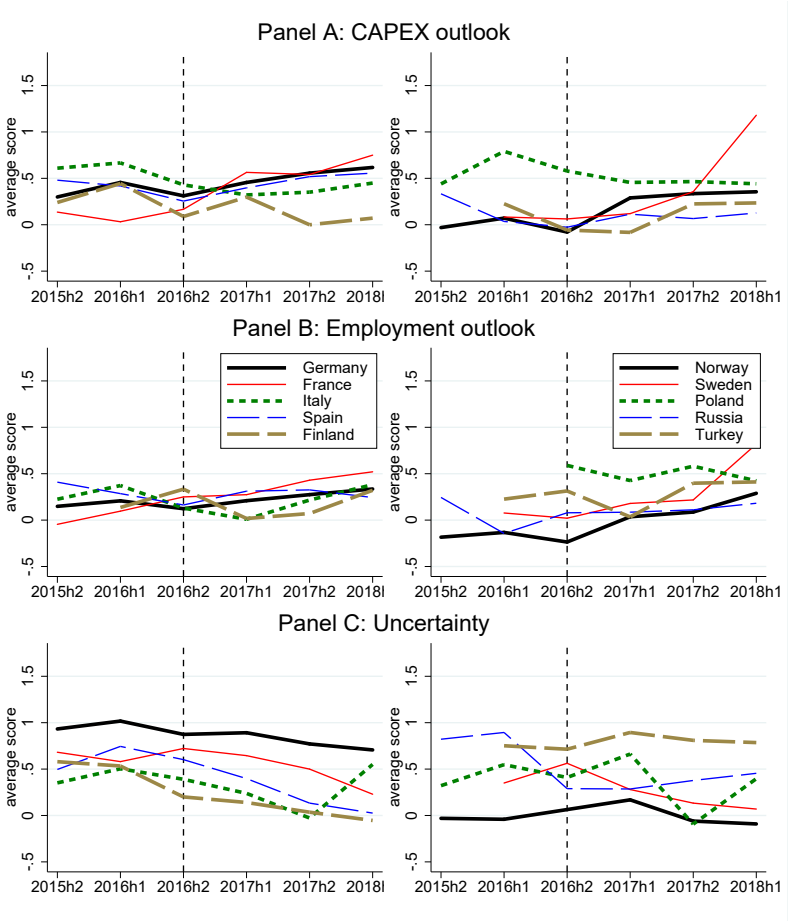


Note:This figure shows the mean one-year-ahead inflation expectation in the eurozone according to Duca et al. (2017). Panel A shows the movements around the purchasing of Spanish and Italian bonds on August 9, 2011. Panel B shows movements around when the ECB set the policy interest rate at 0% on July 5, 2012 and when president Mario Draghi announced that the ECB was prepared to do "whatever it takes" to preserve the euro on July 26, 2012. Panel C plots the movements around the quantitative easing policy conducted by the ECB on January 22, 2015. Panel D plots the movements around the announcement of the quantitative easing tapering on December 8, 2016.

While we do not have access to time-series data on inflation expectations of U.S. firms, we use a unique survey of firms run by Deloitte to study the evolution of firms' expectations in Europe. This survey of Chief Financial Officers (CFOs) across countries in Europe (both within the eurozone and outside of it) begins in 2015-S2 and continues on a semi-annual basis thereafter. This time period includes the QE Tapering announcement which had a discernible effect on financial markets. The Deloitte Survey does not inquire as to CFOs' inflation expectations, but it does ask about their expected capital expenditures and employment over the following twelve months as well as how uncertain they are about the economic outlook. As a result, we can assess whether this announcement had any effect on CFOs' other economic expectations. We report mean responses for countries in the euro area for which we have access to the Deloitte Survey (Germany, France, Italy, Spain, and Finland) and selected non-euro countries (Turkey, Poland, Russia, Sweden, and Norway) for comparison. There is little discernible pattern around the time of the announcements (Figure 2.13). For most economic variables, firms do not seem to become significantly more optimistic or pessimistic than those outside the eurozone. There is a non-trivial decline in optimism about future capital expenditures, but a similar albeit smaller decline also takes

place in non-euro countries, making it difficult to argue that the effect stems primarily from the policy announcement.

Figure 2.13: Expectations of Chief Financial Officers and ECB policy announcements.



Note:These figures show the simple country average in the Deloitte Survey of Chief Financial Officers (CFOs) around the announcement of the QE tapering in December 2016. Panel A shows the result to the question that asks about the evolution of CAPEX of the company in the next 12 months. The lines indicate the average score where if they answer "Decrease significantly" we computed -2, if CFOs answer "Decrease somewhat" -1, 0 for "No change", 1 if the answer is "Increase somewhat" and 2 if the CFOs answer "Increase significantly". Panel B shows the average score for a similar question about the number of employees. The coding of scores is the same. Finally, Panel C plots the answer for the question where CFOs were asked to rate the overall level of uncertainty that the firm is facing. It takes on -2 if the answer is "Very low level of uncertainty", -1 for "Low level...", 0 for "Normal level...", 1 for "High level..." and 2 for "Very high level of uncertainty".

In short, across geographic areas, we find little evidence that households and firms respond strongly to monetary policy announcements, even when these receive pronounced coverage in the main media outlets. These results are notably different from what has been previously documented for fiscal policies. D'Acunto et al. (2016), for example, find that an announcement related to increases in value added taxes in Germany had a strong effect on consumers' inflation expectations and on their spending decisions. Similarly, Kueng (2014) finds that spending of high-income households increases strongly in response to announcements that raise their expected after-tax lifetime permanent income in the U.S.

2.5.2 Policy Solutions to Break the Veil of Inattention

Given this apparent inattention paid to inflation and monetary policy by households and firms in advanced economies that have experienced low inflation for decades, how can policy-makers possibly affect their expectations in order to achieve more stable economic outcomes? Fortunately, a growing literature on the effects of information on agents' beliefs provides a basis for new communication strategies for policy-makers.

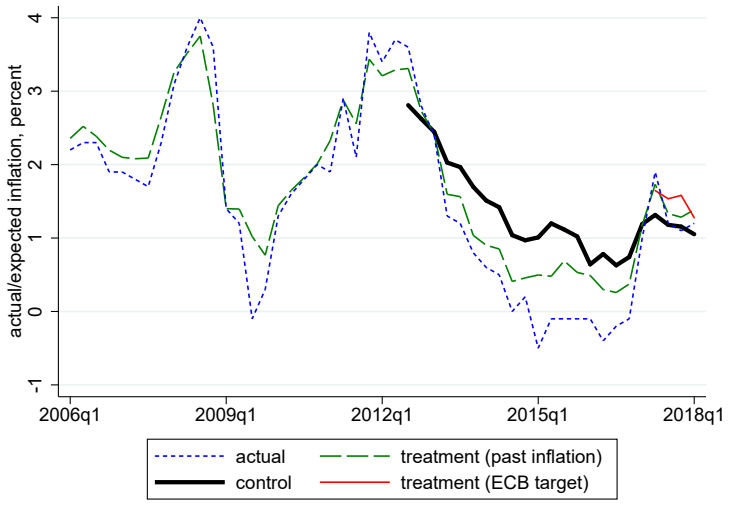
Communication to the public can work

While the veil of inattention may give the appearance that policy-makers will never be able to affect agents' expectations sufficiently to affect their economic decisions, recent experimental evidence suggests otherwise. Specifically, a number of recent papers use information treatments to households and firms and find that these treatments have large and immediate effects on agents' inflation expectations. For example, Armantier et al. (2016) use randomized control trials to provide information about professionals' inflation forecasts to households and find that, relative to a control group that received no such treatment, their inflation forecasts respond strongly to the information and in the expected direction. This effect is particularly strong for households whose beliefs are initially further from the mean and who are more uncertain about inflation. Binder (2017) find a similar result in a separate experiment providing information about recent inflation or about the central bank's inflation target to households.

This strong response of inflation expectations to information treatments is not limited to households. CGK document a similar finding for firms in New Zealand: providing managers with information about inflation or monetary policy can lead to large changes in the inflation forecasts of managers, especially those who are most uninformed. The strength of this effect can also be seen in the unique experiment provided by the Bank of Italy's randomized provision of information about recent inflation to Italian firms. As described in section 2.3.2, starting in 2012Q3, some firms in this survey were asked about inflation without being provided any additional information whereas other firms in the survey were first told about

recent inflation values. As can be seen in Figure 2.14, this provision of information to agents led to large deviations in inflation expectations across the two groups of firms depending on recent inflation dynamics in Italy, with treated firms having expectations that tracked inflation much more closely as well as displaying much less disagreement among themselves about the path of future inflation. Another experiment in this spirit is described in Frache and Lluberas (2018). They document that Uruguayan firms have to obtain information about recent inflation when renegotiating wages at fixed times during the year. They find that when firms undergo this information treatment, their forecasts of inflation improve significantly relative to firms that do not have to acquire information about inflation that month.

Figure 2.14: Inflation expectations after treatment in Italy.



Note:The blue, dashed line shows the actual inflation rate in Italy. The thick, black, solid line shows one-year-ahead inflation expectations of firms in the control group. The long-dash, green line shows inflation expectations of the firms treated with recent inflation statistics (that is, firms are told recent inflation rate before firms are asked to report their inflation expectations). The thin, red line shows inflation expectations of the firms treated with the ECB's inflation target (that is, firms are told the ECB inflation target before firms are asked to report their inflation expectations). Source: Coibion et al. (2019c).

Simple messages are better

How strongly agents respond to new information depends on the nature of the information provided to them, the source of that information, and how much they already know. As a result, we should expect some forms of information treatment to be more powerful than others, which is precisely what this line of research has documented. For example, Armantier et al. (2016) find that providing households with information about professionals' forecasts

of inflation (which they generally don't know or observe) has larger effects on their inflation expectations than providing them information about food inflation (which they are generally more confident about). Binder (2017) find that effects on households' beliefs when providing information about recent inflation or the Federal Reserve's inflation target are approximately the same. CGK find similar effects on inflation expectations when treating firms with information about the central bank's inflation target, recent inflation dynamics or the forecasts of professional forecasters. However, providing participants with information about the forecasts of other firms has much smaller effects on their beliefs, consistent with them viewing these as providing less reliable information. CGR find that Italian firms which receive information about recent inflation respond approximately as much to this information as firms which are told about the ECB's inflation target.

If agents' beliefs are so sensitive to information about recent inflation and the inflation target in experiments, why don't central bankers' policy announcements have more discernible effects on the expectations of households and firms, as documented in section 2.5.1? One reason is that these agents may not be exposed to this news, a possibility to which we return below. But it could also be the case that the way in which the news is presented to them is not comprehensible to them. To assess this possibility, Coibion et al. (2019a) provide different information treatments to U.S. households, including not just simple statements about recent inflation or the central bank's target (as done in previous work), but also by providing randomized subsets of households with either the FOMC statements or USA Today's news coverage of the FOMC announcements or FOMC forecasts. They find that providing households with FOMC statements has no statistically significant marginal effect on agents' beliefs relative to simply telling them about recent inflation dynamics (Table 2.3). This is consistent with Hernández-Murillo and Shell (2014) showing that statements by the FOMC have become increasingly difficult to understand over time and now require a Ph.D. to fully understand.[18] Reading news coverage of FOMC decisions has an even smaller effect on households' inflation forecasts than reading FOMC statements. This suggests that policy-makers cannot rely on news media to make their policy decisions and announcements sufficiently clear for the general population to process. Simply providing FOMC forecasts is as powerful as giving recent inflation figures. The current "Fed-speak" approach is not a particularly successful communication strategy with respect to the general public.

[18]Bulir et al. (2012) document that other central banks tend to have equally complex communication.

Table 2.3: Treatment effects

Dependent variable: Revision of one-year-ahead inflation forecast	
Control group	1.350***
	(0.233)
Treatment groups (coefficients are relative to control)	
Irrelevant 2% figure	0.265
	(0.343)
Past inflation	-1.954***
	(0.366)
Inflation target	-1.411***
	(0.341)
FOMC inflation forecast	-2.004***
	(0.384)
FOMC statement	-2.272***
	(0.335)
USA Today coverage of FOMC statement	-0.950**
	(0.397)
Observations	1,484
R-squared	0.049

Note:The table reports estimated effects of providing information (indicated in the left column) to households participating in the AC Nielsen Homescan panel. For treatment "Irrelevant 2% figure", households are informed that population in the U.S. grew 2% over the last three years. The dependent variable is equal to (post-treatment one-year-ahead inflation expectations) minus (pre-treatment one-year-ahead inflation expectations). Pre-treatment expectations are computed as the implied mean of expected inflation distribution over the next year. Post-treatment expectations are elicited as point forecasts. Source: Coibion et al. (2019a). Robust standard errors are reported in parentheses. ***, **, * indicate statistical significance at 1, 5 and 10 percent levels.

At the same time, Table 2.3 illustrates the potential power of a layered communication strategy that successfully reaches households. Providing information to these agents about recent inflation or the central bank's inflation target moves average inflation expectations (and therefore perceived real interest rates) by around 2 percentage points on average. In contrast, estimates of the effects of quantitative easing and forward guidance point to effects on long-term interest rates of around 50 basis points (e.g., Chodorow-Reich (2014)). The effect of communication treatment on perceived real interest rates is therefore an order of magnitude larger than the types of policies currently used at the ZLB.

A successful communication strategy that aims to affect the expectations of firms and

households should therefore consist of much more accessible messages.[19] Multi-layered presentation (that is, presentation of the same material in a sequence of messages with different levels of complexity) of a central bank's policies may be a more effective way to reach the public as is shown in randomized control trials (Haldane and McMahon (2018)).

Target the message to the scenario

In a communication campaign, a central bank has a choice over which message to share with the public. For example, with forward guidance policies, policy-makers first make a choice over whether or not to engage in such a policy at different times. They then choose whether to engage in a time-dependent or state-dependent approach. With the former, they face a choice of an expected duration to announce while under the latter they must decide on what state-contingencies to announce. With a layered communication strategy targeting the inflation expectations of households and firms, policy-makers would similarly have flexibility over the intensity of the communication campaign as well as the nature of the communication. The growing empirical evidence on how households and firms react to information treatments strongly supports the notion that they respond in a Bayesian manner, i.e. forming new beliefs that depend both on their original belief and the signal they receive. Hence, policy-makers can push inflation beliefs either up or down depending on which information they choose to provide. Clearly no policy institution will want to release information that is factually incorrect, but there are different facts that they can choose to emphasize.

To illustrate this point, consider the case of Italy in 2014. Inflation was running below 1% and expectations of firms were around 1.5%. Giving firms information about recent inflation tended to lower their inflation expectations, as is evident from the difference in beliefs between firms that were told this information and firms that were not (Figure 2.14). But giving them information about the ECB's inflation target of just below 2% would have tended to raise them. By choosing which information to stress, policy-makers can therefore guide expectations in a direction that helps stabilize economic outcomes. Because economic conditions change over time, the message will likely need to change as well.

[19] For comparison, Mervyn King (2007) delivers a representative central banker's view of communications: "Explaining our analysis at some length is a richer source of information for markets than code words or statements about the future path of interest rates. Less weight should be placed on the short statements that are published with the announcements of our decisions because such statements, as we have seen elsewhere, run the risk of becoming monetary policy by code word. They do not help markets understand how we are likely to react to future data." Our results suggest that, when it comes to firms and households rather than financial markets, monetary policy by "code word" may be a much more successful strategy. More elaborate messages, however, can help with a more positive coverage of policy decisions by the media (Berger et al. (2011)).

Repeat the message

Another lesson from the recent literature using experimental treatments is that the effect of information on households' and firms' beliefs is short-lived. For example, CGK perform an experiment in which firm managers were provided with information about the Reserve Bank of New Zealand's inflation target. As discussed above, this information had a large and immediate effect on the reported inflation forecasts of relatively uninformed managers. However, when these were surveyed again six months later, the beliefs of the treated group were not meaningfully different than those of the control group who did not receive the information. The effect of the information treatment on beliefs had fully dissipated within six months.

Other work has found similar transitory effects of information treatments. For example, CGR use the fact that information treatments to Italian firms vary over time with the level of inflation to assess how long-lived the effects of each information treatment are. They find that while the contemporaneous effects on inflation expectations are large, these fade quickly and appear to have dissipated after around six months, similar to the finding in CGK. Frache and Lluberas (2018) similarly find large forecast revisions each time firms in Uruguay are forced to renegotiate wages and acquire information about inflation. Since this happens every six months on average, this again implies that information treatments on firms have only short-lived effects. Cavallo et al. (2017) also report that the effects of informational treatment for consumers dissipate within six months.

The transitory nature of information treatments on inflation expectations of firms and households implies that policy-makers need to pursue a repeated set of announcements when they seek to affect these agents' expectations in a persistent manner. One-time announcements may have immediate and long-lived effects on the expectations of professional forecasters and financial market participants; they have no such effects on other agents' expectations. Policy-makers can therefore consider pursuing systematic communication campaigns that repeatedly target the relevant audience when that audience involves firms or households.

Take the message direct to the target audience

In an early contribution, Berger et al. (2011) asked, "The commercial success of a private firm crucially depends on its ability to reach its customers and to convey a favorable image of its products and corporate identity -but does the same apply to policy institutions?" After studying media coverage of the ECB's decisions, their answer is a conditional yes with the effectiveness of policy communication being potentially clouded by the media. Indeed, the weak responses of household and firm expectations to significant monetary policy announcements documented in section 2.5.1 indicates that relying on traditional media channels to diffuse policy messages is unreliable. First, the media tends to disproportionately cover nega-

tive news (Hamilton (2004)). Second, many households do not follow standard news outlets. Third, even when they are exposed to media articles on monetary policy, households do not respond strongly to their news content compared to simpler messages, as shown in Table 4. Having a significant impact on the inflation expectations of these agents will therefore require more targeted "marketing" strategies.

There is an extensive history of policy-making institutions developing messages meant to shape the general public opinion that can help serve as a guide. Public health messages have long advertised the dangers of certain behaviors through aggressive advertising campaigns in magazines, billboards and television. Each year, there are seasonal campaigns to induce people to take the flu shot or, in the case of the U.S., to induce people to sign up for health care during "open season". Campaigns like these are not limited to health issues however. For example, following the passage of the 2001 Bush tax cuts, the Internal Revenue Service sent letters to American taxpayers letting them know they would be receiving a check in the mail as a result of the policy and that this check was not considered taxable income. The introduction of the euro to the public was similarly preceded by an extensive publicity campaign by the ECB.

The growth of social media can facilitate this targeted approach. Much like corporate advertising and political messages are now targeted to well-defined audiences that are likely to respond to the information, central banks could pursue ad-based communication strategies that focus on specific groups. Such an approach would avoid working through the news media, which much of the population does not follow closely or does not treat as very informative, as illustrated in Table 2.3. Ads with clear narratives could break through this intermediation flow and allow the central bank to directly reach new audiences. [20]

Targeted messages that reach the relevant audience can also help reduce regional disparities in economic activity in a way that aggregate policy actions (like interest rate changes) cannot. This can therefore help mitigate one of the major limitations of common currency areas, namely the inability to "tailor" policy to local conditions. Consider for example the hypothetical case of a currency bloc with one region that is booming (call it the North) and one that is in recession (call it the South), such that aggregate interest rate changes cannot simultaneously stabilize both regions. A campaign that raises inflation expectations in the

[20] In a recent speech, Haldane (2017) emphasizes the importance of narratives: "[W]hen it comes to assessing the impact of central bank actions on the trust and understanding of the public, little if any attention has been paid to some of the richer informational channels through which news might spread between people. For example, the recent work of George Akerlof and Robert Shiller has emphasized the role of "popular narratives" in shaping the public's expectations and decisions. Story-telling is the ultimate communications device. History is no more than a sequence of stories. These stories spread word by word, mail by mail, Tweet by Tweet. They obey the same laws of motion as epidemics, with viral spread beyond a tipping point. And in a world of modern media, these popular narrative epidemics are probably spreading further and faster than ever previously. This matters for individuals' feelings and decisions and, potentially, for macro-economic behavior."

South but lowers them in the North via targeted messages to each can thereby lower real interest rates in the former while raising them in the latter.

2.6 Conclusion

The onset of the zero-bound on interest rates generated a need for new monetary policy strategies. One such commonly discussed approach is a more active management of inflation expectations. If policy-makers can alter agents' inflation expectations, then perceived real interest rates can be altered even in the absence of changes in nominal interest rates, presumably leading to changes in consumption and investment decisions. Furthermore, shaping inflation expectations of price-setters can have a direct effect on price changes, thus providing another channel to control inflation. Our reading of recent evidence makes us cautiously optimistic about the future of this policy option, although it is not yet ready for full deployment. There is now robust evidence on the causal effect of inflation expectations on the decisions of households and firms, which suggests that this tool has potential. However, we note several caveats. First, the specific mechanisms linking inflation expectations and economic decisions are not yet clearly identified, which we view as a call to academics for continuing this burgeoning research agenda. Second, we lack high-quality surveys of firms' expectations, which we similarly view as a call for statistical agencies to develop and field new nationally representative surveys of firms. Third, in low-inflation environments, central banks face the inattention of households and firms to monetary policy announcements, which calls for new communications strategies on the part of central banks.

The current era of low interest rates combined with a possible recession in the coming years suggests that the need for non-traditional monetary policies is likely to grow. Limited fiscal space resulting from the last recession will make the issue of having a wide range of non-traditional monetary tools even more pressing, both because fiscal stimuli are unlikely to be forthcoming and growing debt levels are likely to raise new concerns about the solvency of some national governments. Pursuing new research on expectations, fielding new surveys and developing innovative communications strategies are steps that we can take now in anticipation of future challenges to monetary policy.

But the management of expectations by policy-makers has scope that extends well beyond getting around the zero-bound constraint on interest rates. Because communication can be targeted to different regions, different industries and different groups, this policy tool can in principle be used to affect economic activity in a much more precise and targeted manner than the bludgeon of nominal interest changes. While central banks have long focused on financial markets and how monetary policy actions affect and pass through the financial system, expectations management represents a policy tool to precisely and directly affect consumers and firms while side-stepping the financial system. While this is unlikely to be a

panacea for all of our economic woes, the development of such a tool could be exceptionally useful for economic stabilization, especially when fiscal policy-makers are missing in action.

Finally, improved and layered communication strategies would ultimately enhance the credibility of central banks and help protect their independence. It is short-sighted to believe that simply being successful in keeping inflation low and stable is sufficient to ensure that the central bank is credible and its independence insured. If most economic agents are unaware of the central bank's success, then how can it be viewed as having credibility? Yet the irony of the Lucas critique is that successfully generating a low-inflation environment reduces the incentives of agents to track inflation. As they optimally choose to become more inattentive to aggregate inflation dynamics, the central bank will generally can be viewed as less credible over time, not more. A layered communication strategy that directly targets the beliefs of households and firms can therefore serve not only to enhance economic stability but also to sustain the credibility of the central bank and thereby help protect its independence.

Chapter 3

Monetary Policy and Real Inequality

3.1 Introduction

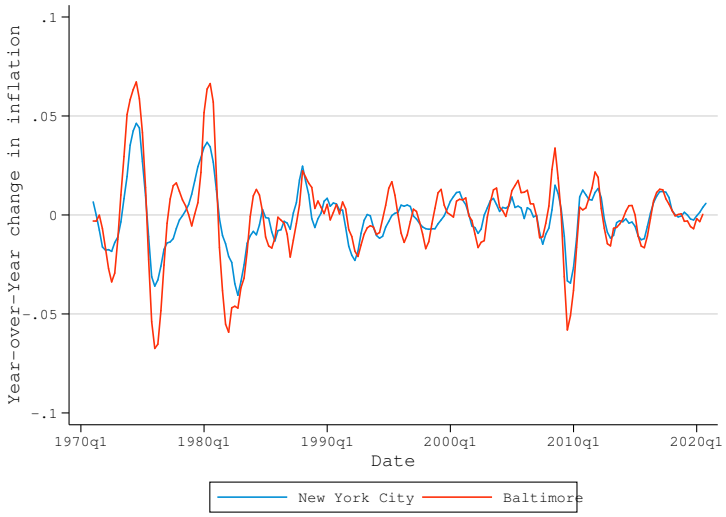
We[1] inquire whether monetary policy shocks exacerbate or reduce geographic inequality in the US. As an illustration, Figure 3.1 compares the change in inflation in a rich city (New York City), and in a poorer city like Baltimore. It shows a pattern around the main events in recent US monetary history: the Great Inflation, the Volcker Disinflation, and the Great Recession. Inflation in Baltimore is more cyclical than in New York City. In this paper, we document that monetary policy shocks create differential responses like the one documented in the figure. Inflation in rich cities reacts by less to the same monetary policy shock identified with the Romer and Romer (2004) methodology than inflation in poor cities. We document this new piece of evidence, and extend a benchmark New Keynesian model to study its implications.

The effect of monetary policy shocks on inflation in a standard New Keynesian model depends on a combination of price and real rigidities (Ball and Romer (1990)). Therefore, differential degrees of real rigidities across regions will induce variation in the inflation rates across geographical areas. We document that the response of prices across U.S. regions is consistent with heterogeneity in real rigidities, which induces changes in the distribution of inflation, and real outcomes across US Metropolitan Areas.

Taking the price index for 29 cities in the US at the quarterly level, we find that the effect of the Romer and Romer (2004) monetary policy shocks extended to 2008 by Coibion et al. (2012), depends on the level of relative income of the cities. After an expansionary monetary policy shock, richer cities in the U.S. enjoy higher real benefits, since they experience lower inflation rates than poor cities, exacerbating regional inequality in the short run. This is true even after correcting for differences in the consumption basket across areas, and when

[1]This Chapter comes from a join work with Juan Herreño. He gave permission to use this material as a chapter of this dissertation.

Figure 3.1: Inflation across space and time



Note: The figure shows the year-over-year change in smoothed quarterly inflation for New York City and Baltimore. Smoothed inflation is the four quarter (backward looking) moving average of overall CPI inflation.

we compute the response of inflation in detailed categories of household expenditures, both in tradable and non-tradable sectors.

This result could be driven by geographical heterogeneity in consumption baskets, in line with the mechanisms highlighted by Cravino et al. (2018) and driven by evidence on sectoral heterogeneity in the frequency of price adjustment by Nakamura and Steinsson (2008). We dig into more disaggregated data, to understand the reaction of price indexes of different subcategories of consumer expenditure after the same monetary policy shock. We find that prices within the same category (for example, food at home) react differently in rich and poor areas. We document that this feature is true for a wide range of goods and services US households consume.

In order to rationalize those results, and understand its implications, we develop a New Keynesian Model in which consumers have non-homothetic preferences. Households must consume at least a minimum level of subsistence that is common across households, as in Simonovska (2015). Households in poor regions are closer to subsistence. The subsistence level makes their demand schedules for individual varieties more inelastic compared to a region far away from subsistence, which induces steeper local Phillips Curves in poor regions. For a common degree of price stickiness, monetary policy will have a larger real effects in rich areas.

With that model, we evaluate the effect of monetary policy shocks on income inequality.

Monetary policy may have important distributional effects in the short run. Contractionary monetary policy shocks induce larger price decreases in poor regions, and will exhibit lower non-neutralities, reducing real income inequality. The opposite is true for expansionary monetary policy shocks.

This paper is part of a growing literature that attempts to understand the distributional effects of monetary policy and its implications. Auclert (2019) and Kaplan et al. (2018) focus on how heterogeneity may change the average effects of monetary policy. Coibion et al. (2012) shows that monetary policy has an effect in nominal income distribution in the U.S., Furceri et al. (2018) find similar effects for a panel of countries. As Cravino et al. (2018), this papers focuses on the heterogeneity of price adjustment. While they explore difference in the price stickiness of goods consumed by rich and poor households, we focus on a different mechanism, highlighting that even for the same degree of price rigidity, heterogeneity in real rigidities will induce different inflation dynamics across regions.

The results of this paper have implications on the literature of secular stagnation and the stability of the Phillips Curve (Blanchard (2016)). In our model, as economies develop, the Phillips Curve should flatten, improving the trade-off faced by monetary authorities.

The rest of the paper is organized in the following way: Section 3.2 presents the data and the empirical results. Section 3.3 presents different versions of the model. Starting from the Standard New Keynesian model, we then derive a model where only the Phillips Curve is income dependent. Then, we derive a model where the Phillips Curve and the IS are income dependent where we show that the implications are similar in term of real wages, but different for implications on real inequality. In Section 3.4, we test the different models and find that real inequality increases in booms. Finally, Section 3.5 concludes.

3.2 Empirical Estimation

We start estimating the effect of a monetary shock on a panel of cities in the US. The Bureau of Labor Statistics (BLS) has reported data on consumer price indexes (CPI) for 29 metropolitan areas[2] with different starting time, ending time and frequency. In order to have

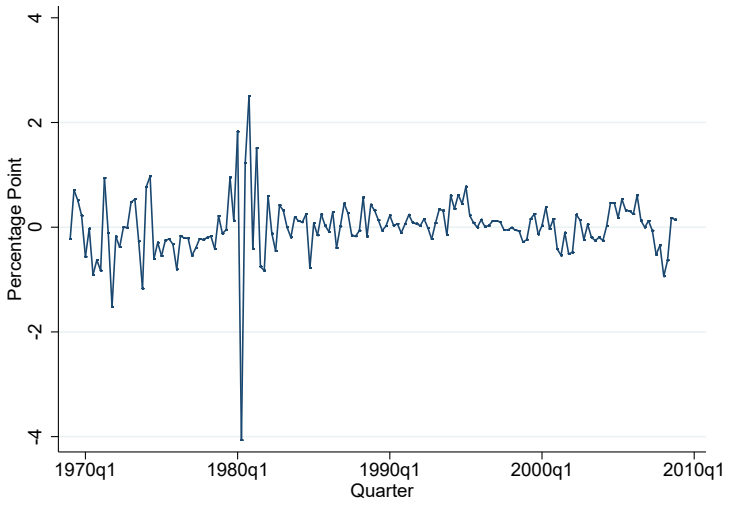
[2]Boston-Cambridge-Newton (MA-NH), New York-Newark-Jersey City (NY-NJ-PA), Philadelphia-Camden-Wilmington(PA-NJ-DE-MD), Chicago-Naperville-Elgin (IL-IN-WI), Detroit-Warren-Dearborn (MI), Minneapolis-St.Paul-Bloomington (MN-WI), St. Louis (MO-IL), Washington-Arlington-Alexandria (DC-MD-VA-WV), Baltimore-Columbia-Towson (MD), Miami-Fort Lauderdale-West Palm Beach (FL) , Atlanta-Sandy Springs-Roswell (GA), Tampa-St. Petersburg-Clearwater (FL), Dallas-Fort Worth-Arlington (TX), Houston-The Woodlands-Sugar Land (TX), Phoenix-Mesa-Scottsdale (AZ), Denver-Aurora-Lakewood (CO), Los Angeles-Long Beach-Anaheim (CA), Riverside-San Bernardino-Ontario(CA), San Francisco-Oakland-Hayward (CA), Seattle-Tacoma-Bellevue (WA), San Diego-Carlsbad (CA), Urban Hawaii, Urban Alaska, Pittsburgh (PA), Cincinnati-Hamilton (OH-KY-IN), Cleveland-Akron (OH), Milwaukee-Racine (WI), Portland-Salem (OR-WA)and Kansas City (MO-KS)

a common frequency across cities, we aggregate the data at the quarterly level, taking the average CPI for cities with more than one observation by quarter. The time series goes from 1913 in some until 2020 in some cities. We get a sample from 1969 to 2008 to match it with the monetary shock used. The price data can also be separated in different categories. We obtain the CPI for food, food at home, food away from home, gas and housing.

The overall price index weights differently the categories, but the smaller categories they are constant across cities. We will start estimating the price index for the overall price index, even if shares are different across cities. The effect on that index will be the effect of different shares and changes of prices. Then, we will move to tighter definitions with constant shares.

For the monetary shock, we use the Romer and Romer (2004), extended to 2008 by Coibion et al. (2012). The shock is available at the monthly basis. In order to match it with our price panel data, we sum the shock at the quarterly level. Figure 3.2 shows the shock over the sample time:

Figure 3.2: Romer and Romer (2004) Monetary Policy Shock



Note: The figure shows the Romer and Romer (2004) monetary policy shock, extended by Coibion et al. (2012) added at the quarterly level.

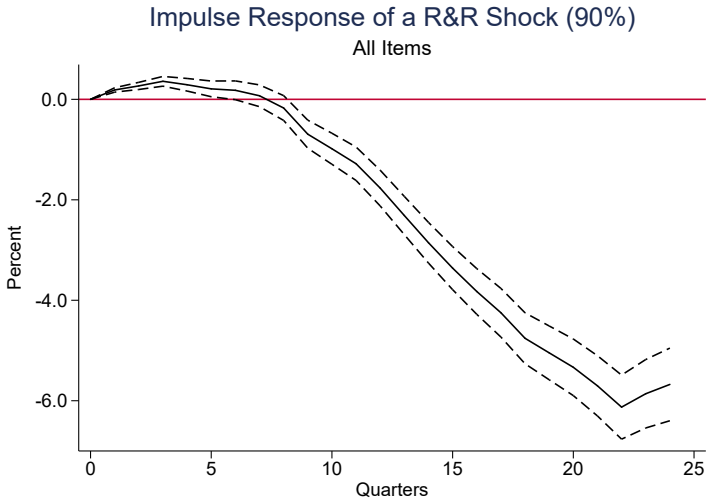
The figure shows a very similar pattern than the original shock. As is well known, most of the variation comes from the "Volcker Disinflation" at the beginning of the 80s century. With this shock plus the CPI panel data, we estimate the effect of a monetary shock on prices. To find this effect, we use a Jorda (2005) regression in a panel version, where we add a city fixed effect. The main specification is the following:

$$\pi_{i,t+h,t} = \frac{\pi_{i,t+h} - \pi_{i,t-1}}{\pi_{i,tt-1}}$$

$$\pi_{i,t+h,t} = \alpha_i^h + \sum_{j=0}^{J} \beta^h RR_{t-j} + \sum_{k=0}^{K} \gamma^h \pi_{t-k,t-k} + \varepsilon_{i,t+h}^h \quad \forall h \in [0, H] \tag{3.1}$$

where i is a city, t is the quarter and h is the time after the shock. The coefficient β^h with account for the cumulative effect of a monetary policy shock RR_t on inflation π_i, t, h periods after the shock. α_i^h is a city fixed effect and $\varepsilon_{i,t+h}^h$ is the error term. Standard errors are clustered at the city level. Figure 3.3 shows the the results of 3.1:

Figure 3.3: Effect of Monetary Policy



Note: The figure shows the results of 3.1 the panel of cities. We use $H = 24$, $J = 4$ and $K = 4$

The effect is similar to the original Romer and Romer (2004). The effect is positive and close to zero for the first two years and the it goes sharply to negative values, reaching a value of -6% after 20 quarters. This result is relatively in magnitude to the original Romer and Romer (2004) results. Their minimum value is about the same value, but in their case it is reached after 12 quarters. So our results takes more time to get to similar values. The standard errors are relatively smaller, but similar in magnitude. In appendix B.2, Figure B.10, we show the same results, but with time clustering. The standard errors are bigger in that case, but the results are still significant. This implies that the effect goes in the same direction in the most of the cities, which reduces the standard errors, given a common time variant shock. Overall, the results with the panel version show a very similar pattern than

the one with the country level price index.

This result represents the average effect of a monetary policy shock across different cities, given a city fixed effect. But, that coefficient can hide heterogeneous effects depending on some characteristics of the region. In particular, the level of income of the cities might play a role on the size of this effect. In order to explore that relationship, we first obtain the personal income per capita of all the commuting zones included in the sample. This variable is on a yearly basis, so it is going to be constant within the year. Given the relative persistence of local income within a year, using a constant income level over the year is not very problematic and it also control for short term changes that might happen. Then, we use that personal income per capita by city to estimate the effect of a monetary policy shock, depending on the level of income at the city level.

But, the level of income per capita has changed significantly in all regions from 1969 to 2007. In 1969 the average personal income per capita was \$4464.129 for this sample and in 2007 was \$44989.55. This means that if we use a gross measure of income to see the effect of a monetary policy, we might be scaling the effect depending of the overall level of economic activity on the economy. In particular, monetary policy shocks were relatively important at the beginning of the 1980s, as figure 3.2. If the effect is non-linear, when we explore the effect of income on the regression, we might reach to the conclusion that poor cities react strongly to a monetary policy shock, but this would be biased by the fact that all the cities in our sample were relatively poor in the 1980s. In order to address this potential bias, we run the personal income per capita on a set of time fixed effects and take the residual of that regression. That city specific residual with contain the deviation from the average of the city personal income per capita at any point of time. With that measure, we run the following specification:

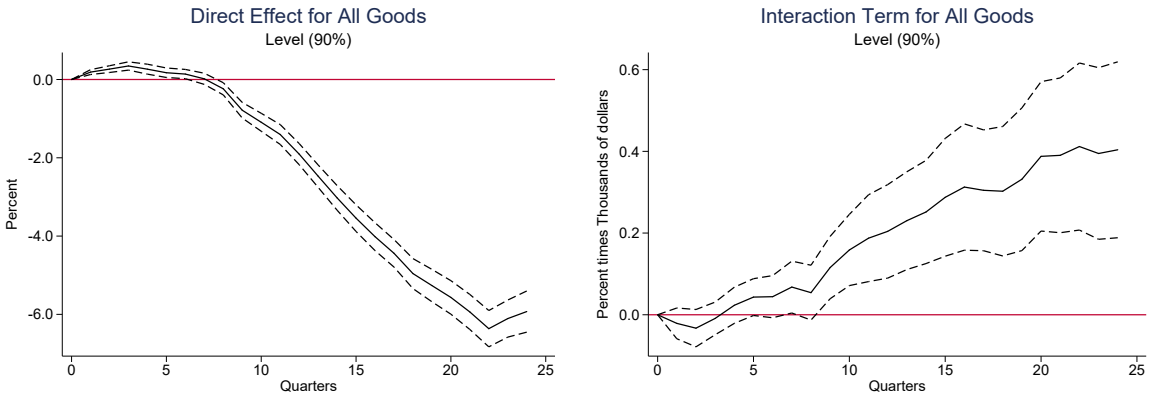
$$\pi_{i,t+h,t} = \alpha_i^h + \sum_{j=0}^{J} \beta^{h,j} RR_{t-j} + \sum_{j=0}^{J} \gamma^{h,j} RR_{t-j} \times PIPC_{i,t-j} + \sum_{j=0}^{J} X'_{t-j} \theta^{h,j} + \varepsilon_{i,t+h}^h \quad \forall h \in [0, H] \tag{3.2}$$

with

$$X_{t-j} = [PIPC_{i,t-j} \quad \pi_{i,t-j,t-j}]$$

Where $PIPC_{i,t}$ is the relative Personal Income per Capita in the city i at time t. The marginal effect of a monetary policy shock in city i, h periods after the shock is $\beta^h + \gamma^h PIPC_{i,t+h}$. The effect will be significant if γ^h is statistically different from zero. The left panel of Figure 3.4 plots the average effect β^h and the right panel plots the effect of γ^h:

Figure 3.4: Effect of Monetary Policy and Income Heterogeneity

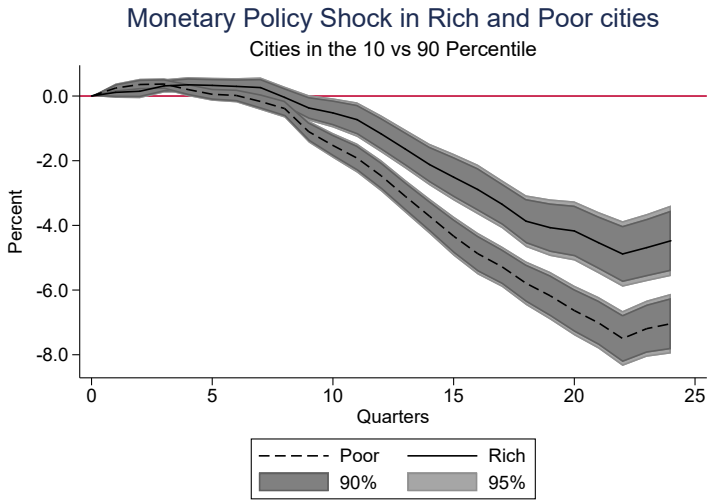


Note: The figure shows the coefficient β^h of 3.2. We use $H = 24$ and $J = 12$

Figure 3.4 shows a very similar pattern than in Figure 3.3. This happens because of the normalization of the income per capita. As is done with a time fixed effect, the average income is zero. Therefore, the effect, considers that average income of each period, giving the same results that without the interaction. Figure 3.4 shows a positive effect.[3] This means that, as the direct effect is negative, as relative income increases, the effect of monetary policy will decrease, meaning that prices are going to adjust slowly in richer cities. In order to see this effect, Figure 3.5 shows the effect for a city in the 10% percentile of the income distribution and another in the 90% percentile:

[3]In Appendix B.2, Figure B.11 we show that the results hold when we cluster at the time level

Figure 3.5: Effect of Monetary Policy for Poor and Rich Cities

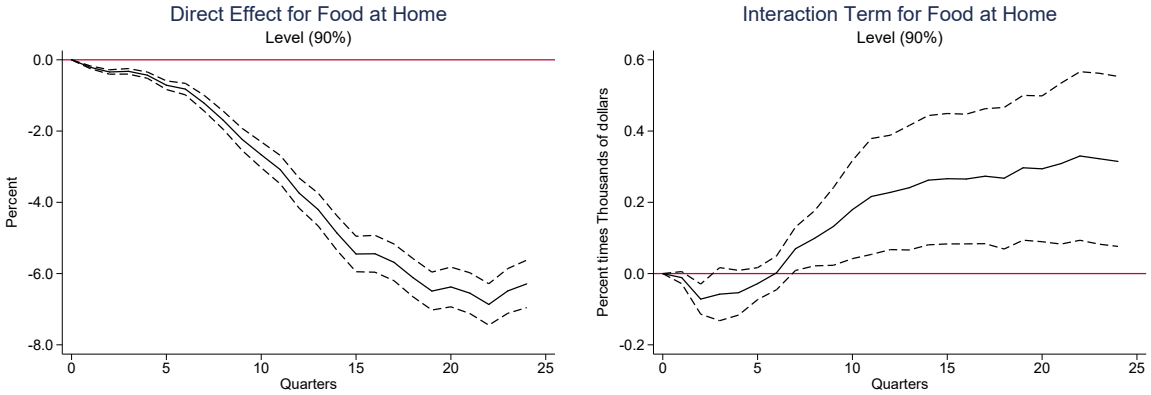


Note: The figure shows the coefficient $\beta^h + \gamma^h PIPC_{i,t+h}$ of 3.2 for cities in the 90% percentile of the distribution and cities in the 10% percentile. the 90% percentile of the distribution represents 4,830USD more than the average and the 10% represents 4,363USD less than the average. We use $H = 24$ and $J = 4$

The result implies that a monetary shock is almost 50% bigger for in the 10% of the distribution compare to the average and 50% milder in the richer 90%. This result confirms that prices adjust less in richer cities. In this exercise, we considering the same price index, meaning that is the same type of good and doesn't consider any substitution effect. This result might change depending ont he type of good.

This effect is also present for tradable goods. As we can see in the following figures, even a narrow definition of goods as "food at home", that is also tradable, has a similar pattern, meaning that similar goods in different regions have different reactions.

Figure 3.6: Effect of Monetary Policy and Income Heterogeneity for Food at Home

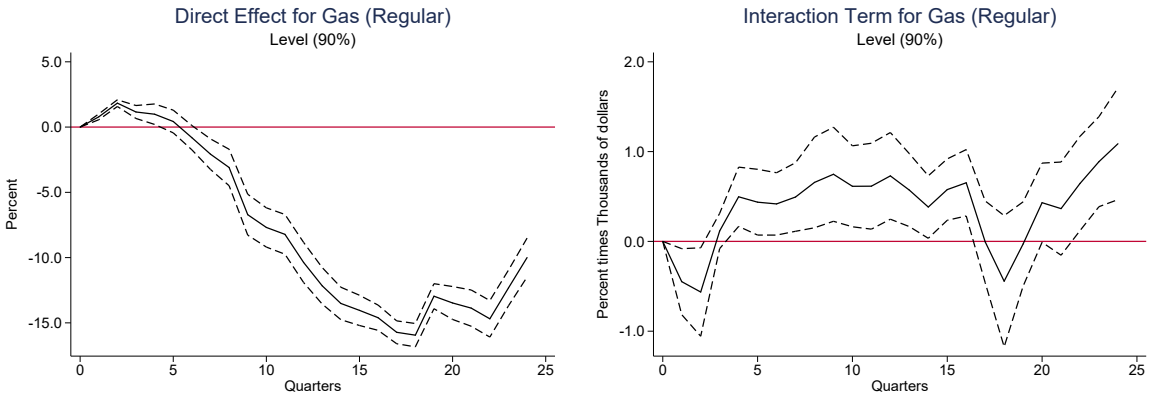


Note: The left panel shows the β^h coefficient and the right panel shows the γ^h coefficient of 3.2 for Food Away From Home. We use $H = 24$ and $J = 4$

This evidence suggests that the reaction happen for the same good, even tradable and homogeneous goods. In Appendix B.2, Figure B.12 show the same results for "Food", "Food Away From Home" and "Housing". We can see that for all those definition the pattern in the same. In the case of housing is relatively smaller, which indicates the the average result is not driven by that particular good.

For those narrow price index definitions the weights are constant. This evidence can be interpreted that there is something else than different level of sticky prices for different goods. One of the problems of price index is that it aggregates many goods, so weights pay an important role. There is not many desegregated goods at the city level, but one exception is gas. This good has the advantage that is very homogeneous across region. Also, according to Nakamura and Steinsson (2008), gasoline changes prices every month, making it a good with very flexible prices, meaning that it should have very small cost of changing prices, figure 3.7 shows the results:

Figure 3.7: Effect of Monetary Policy and Income Heterogeneity for Gas



Note: The left panel shows the β^h coefficient and the right panel shows the γ^h coefficient of 3.2 for gasoline (regular). We use $H = 24$ and $J = 4$

We can see that the effect in the interaction term is smaller, but goes in the same direction. This means that for the same goods across cities, we find a similar effect. The gas price index represents the same good (the price index is only for regular gas) and it is very homogeneous across regions. Therefore, the result is unlikely to come from differences in technology that explains different price settings. In conclusion, one explanation for the results found is that it might come from the real rigidities, meaning that the strategic complementary behavior could be different in the different regions, because of some differences in the elasticity of goods or varieties. In the next section we explore more systematically the implications of this finding.

3.3 Income Dependent Phillips Curve

In this section we derive two versions of New Keynesian Phillips Curve with non-homothetic preferences. The slope of the Phillips Curve will depend on the steady state level income of the region. We discuss the implications of each version.

3.3.1 Simplest Phillips Curve

Households

Households derive utility for consumption and Leisure. We will start presenting homothetic preferences, and the usual New Keynesian Phillips Curve.

The period utility is given by

$$U(C_t, L_t) = \frac{C_t^{1-\gamma}}{1-\gamma} - \int_0^1 \frac{L_t(z)^{1+\alpha}}{1+\alpha} dz$$

Where C_t is a CES aggregator with elasticity of substitution η

$$C_t = \left(\int_0^1 C_t(z)^{\frac{\eta-1}{\eta}} dz \right)^{\frac{\eta}{\eta-1}}$$

And households maximize consumption subject to:

$$P_t C_t + B_{t+1} = B_t(1+i_t) + W_t L_t + D_t$$

Where B_t are holdings of a nominal bond, W_t is the nominal wage, and D_t are the profits from the firms of the region. In this simple model labor demand is determined due to the linearity of labor in the utility function and the real wage must satisfy:

$$\frac{W_t(z)}{P_t} = L_t(z)^{\alpha} C_t^{\gamma} \tag{3.3}$$

Firms

Firm z maximize its value $V_t(z)$ which is just the expected discounted sum of future dividends using the stochastic discount factor of the household M_t to discount. The dividends of the firm, under an assumption of linearity in the production function is given by $D_t(z) = Y_t(z)P_t(z) - W_t(z)L_t(z)$. The firm maximizes the value function subject to the production function $Y_t(z) = A_t L_t(z)$ and the demand curve coming from the household problem $Y_t(z) = Y_t \left(\frac{P_t(z)}{P_t} \right)^{-\eta}$

The first order condition of the firm is given by:

$$0 = \mathbb{E}_t \sum_{t=0}^{\infty} M_t \theta^t Y_t P_t^{\eta} \left(P_t(z) - \frac{\eta - 1}{\eta} S_t(z) \right)$$

Where M_t is the stochastic discount factor, θ is the fraction of firms that do not adjust their prices, and $S_t(z)$ is the nominal marginal cost of firm z. In a nutshell, firms want to minimize the discounted differences between the price that they charge and their marginal costs. Because of the assumptions made before, once we log-linearize this relationship we get the following expression.

$$p_t^* = (1 - \beta\theta)\mathbb{E}_t \sum_{t=0}^{\infty} (\beta\theta)^t \, s_t(z)$$

.

Mixing this equation with the log linear definition of the price index:

$$p_t = (1-\theta)p_t^* + \theta p_{t-1}$$

we get the Phillips Curve

$$\pi_t = \beta \mathbb{E}_t \pi_{t+1} + \frac{(1-\theta)(1-\beta\theta)}{\theta} \hat{mc}_t^r \tag{3.4}$$

Where mc^r are real marginal costs. By replacing the production function function and the labor supply equation gives the real marginal cost equation for z, we get the usual Phillips curve:

$$\pi_t = \beta \mathbb{E}_t \pi_{t+1} + \frac{(1-\theta)(1-\beta\theta)}{\theta} \frac{\gamma+\alpha}{1+\eta\alpha}(y_t - y_t^n)$$

In this equation the elasticities of the labor market α, consumption γ, varieties η, time preferences β and pricing θ play a role in determining the slope of the Phillips Curve. We can see that the slope of the Phillips Curve depends on two terms. The first that depends on θ and β and the second that depends on different elasticities that are usually assumed constant. Now it comes to find a microfoundation to get the variation on those parameters.

In particular, the empirical estimates found different price adjustment for the same products. This means that θ should be stable across regions for our price index, in case different type of goods have different price adjustment because of some technological difference. That is why, we focus on the other terms, with two type of models. In both cases we will consider that consumers have some level of consumption subsistence.

3.3.2 Non-homothetic Preferences

We introduce preferences that would create income dependent Phillips Curves. This implies that we should relax the assumption of homotheticity, in order to have income dependent intertemporal elasticity of substitution or for varieties. In a linearized model, this implies that it depends on the steady state level of income. We explore two type of preferences that depend on the level of subsistence. Those preferences will have similar implications for the Phillips Curve, but one will also have implications for the IS curve. We first evaluate their ability of describing the empirical result found and then their implications on real income inequality in the short run.

Subsistence in Each Variety

We start exploring subsistence in the varieties. This formulation has the advantage that it does not change the consumption-leisure decision, therefore the IS curve is not affected. The

result will be an income dependent Phillips Curve and no change in the rest of the New Keynesian Model. This will help to understand the implications of the model. Households maximize her utility that has the following form:

$$U(C_t, L, t(z)) = \frac{(C_t)^{1-\gamma}}{1-\gamma} - \frac{\chi}{1+\alpha}\int_0^1 L_t(z)^{1+\alpha}$$

But now the consumption composite, is the following function:

$$C_t = \left(\int_0^1 (C_t(z) - \bar{C})^{\frac{\eta-1}{\eta}} dz\right)^{\frac{\eta}{\eta-1}}$$

In this world, households require subsistence level $\bar{C}$ of each variety. This implies that for each variety, households need to have at least a consumption higher than that level in order to have positive utility. For instance, in the case of log preferences ($\eta = 1$), if $C_t(z) < \bar{C}$, the utility will be $-\infty$.

Define $\omega(z)_t = C_t(z) - \bar{C}$. Then we can write the demand curves as:

$$\frac{P_t(z)}{P_t} = \left(\frac{\omega(z)_t}{C_t}\right)^{-1/\eta}.$$

Up to a log-linear approximation, the following relationship holds:

$$\hat{\omega}(z)_t = \frac{\hat{C}_t(z)}{\hat{C}_t(z) - \bar{C}}$$

In therm of the marginal cost to the firm, this type of preferences will not change the steps, the main difference comes from elasticity of substitution of different varieties, that now will depend on the level of subsistence. Defining $\tilde{\eta}(\bar{Y})$ as:

$$\tilde{\eta}(\bar{Y}) = \frac{\bar{Y} - \bar{C}}{\bar{Y}}\eta$$

Where $\bar{Y}$ is the steady state income and with

$$\frac{\partial \tilde{\eta}}{\partial \bar{Y}} = \eta \frac{\bar{C}}{\bar{Y}^2} d\bar{Y} > 0$$

we have the new version of the Phillips Curve is:

$$\pi_t = \beta \mathbb{E}_t \pi_{t+1} + \frac{(1-\theta)(1-\beta\theta)}{\theta}\frac{\gamma+\alpha}{1+\tilde{\eta}\alpha}(y_t - y_t^n) \tag{3.5}$$

This is a similar version of the usual Phillips Curve, but now the second term that multiplies the output gap depends in the level of income. We can see that the higher is the steady state income of the region, the flatter will be the Phillips Curve. This means that

changes in the IS, will produce less changes in inflation in richer economies. In order to see that, we derive the rest of the model. In this setting the IS curve does not change. From the preferences structure, we have that the IS curve will be defined by:

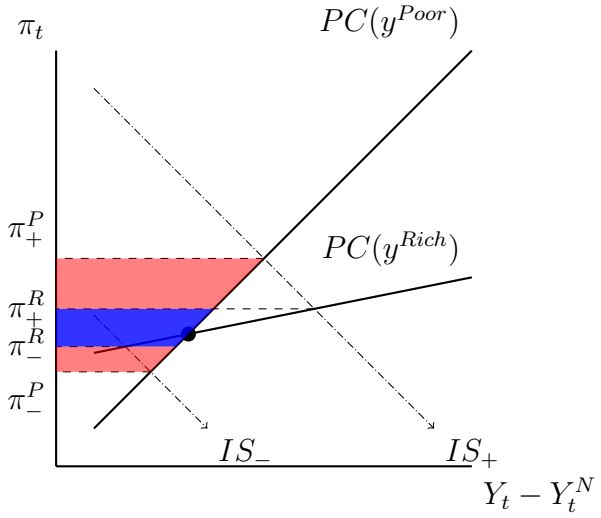
$$(\check{y}_t - \check{y}_t^N) = -\frac{1}{\gamma}\left(i_t - E_t\pi_{t+1} - R_t^N\right) + \mathbb{E}_t(\check{y}_{t+1} - \check{y}_{t+1}^N)$$

and we assume a standard Taylor rule:

$$i_t = \phi_\pi \pi_t + \phi_y(\check{Y}_t - \check{Y}_t^N) + \nu_t$$

with $\epsilon_t = \frac{1}{\phi_\pi}\nu_t$

We can see that the IS curve does not depend on income in this case. The IS curve depends on the intertemporal elasticity of substitution γ that is constant. This means that the effect of monetary policy will translate into similar changes across regions in terms of the changes in aggregate demand. But the fact that the Phillips curve is different, will produce different changes in the short run. The following graph shows those effect, starting from the steady state, were both regions have zero output gap and inflation:

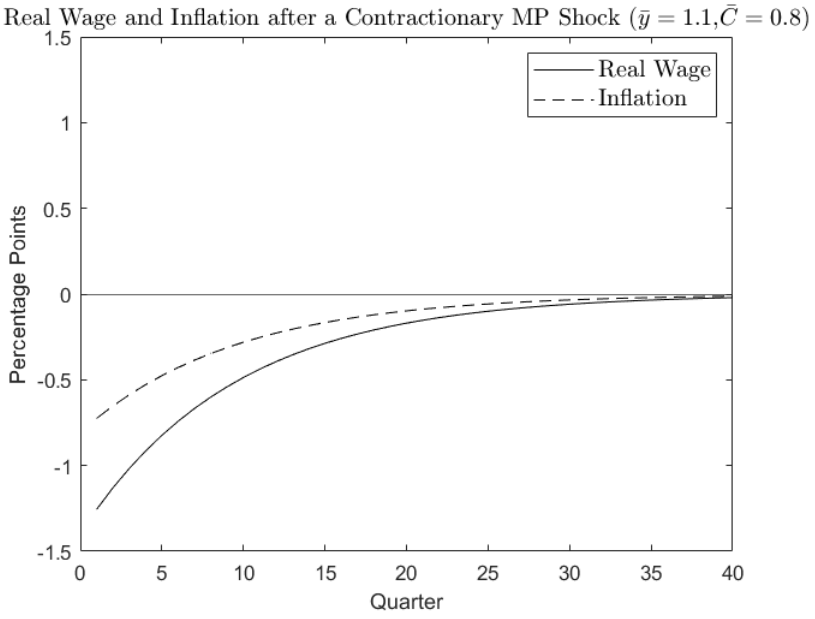


From the graph we can see that changes in the IS will produce different movements along the Phillips Curve depending on the level of income. In particular, Monetary Policy shocks ν_t will produce the same IS shift for both regions. But, in a richer region we will have less inflation volatility. The counterpart will be more variation in terms of deviations from the output gap.

To evaluate that effect more systematically, we simulate the model, using the Phillips Curve, the IS curve and the Taylor Rule. For simplicity, we will assume two regions that do not have any type of relationship. This means that there are two regions that receive

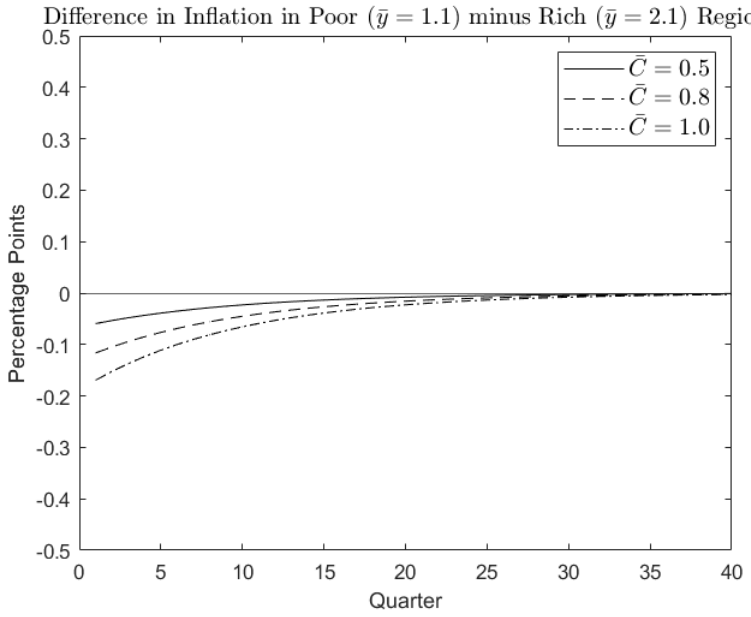
the same monetary policy shock in term of the size, but that they are not part of the same monetary union. This is relevant, because they will have different Taylor rules, meaning that they will have a monetary adjustment to the steady state that can take a different path. We use a $\gamma = 2$, $\alpha = 2/3$, $\theta = 0.75$, $\phi_\pi = 1.5$, $\phi_y = 1.0$ and $\beta = 0.99$. We assume different levels of steady state income $\bar{y}$ and $\bar{q}$. we have that $\epsilon_t = \rho\epsilon_{t-1} + \varepsilon_t$ with $\varepsilon_t \sim N(0, \sigma^2)$ with $\sigma = 0.01$. The following figure shows the results for real wage and the after a 1% contractionary monetary policy shock:

Figure 3.8: Impulse Response of a 1% Monetary Policy Shock



We can see that a contractionary Monetary policy shock reduces inflation as expected. It will also reduce real wages, as there is a contraction in economic activity. This effect will be different depending on the level of income $\bar{Y}$ and depending on how far away regions are from the level of subsistence $\bar{C}$. In order to see the differences between rich and poor economies, we simulate the same shock, but with different levels of income, the following figure shows the different of inflation between rich and poor economies:

Figure 3.9: Unequal Responses of a 1% Monetary Policy Shock



Note: The figure plots $\pi_t^{Poor} - \pi_t^{Rich}$ for different levels of $\bar{q}$

We can see that the lower is the value of $\bar{C}$, the bigger is the difference in inflation. This means that the closer is the income of the poor economy to the level of subsistence, the bigger is the drop in inflation, as their demand for goods will be more inelastic. This increases the difference between regions. The dependence on $\bar{C}$ is coming by the term $\omega = \frac{\bar{Y}}{\bar{Y}-\bar{C}}$ or $\frac{1}{1-\frac{\bar{C}}{\bar{Y}}}$, is direct to show that when $\bar{Y} \to \infty \implies \frac{\bar{C}}{\bar{Y}} \to 0 \implies \omega \to 1$.

This model shows a simple way of rationalizing the results found. In this case, the result only comes from differences on the Phillips Curve, but a more general model can have more implications. In the next sub-section we analyze another formulation of the model.

Subsistence in the Consumption Bundle

Now we present a model where the subsistence is over the whole consumption bundle. That means that households should have a minimum level of consumption, independently of the varieties. The period utility function is given by:

$$U(C_t, L, t(z)) = \frac{\left(C_t - \bar{C}\right)^{1-\gamma}}{1-\gamma} - \frac{\chi}{1+\alpha}\int_0^1 L_t(z)^{1+\alpha}$$

Where $\bar{C}$ is a subsistence level, as in the past formulation. Now it depends of the whole consumption bundle. We don't assume any minimum level of consumption for the varieties in this case, so we will have the standard CES formulation over varieties. This utility function gives the following variety-level labor supply curve:

$$\chi L_t(z)^{\alpha}\left(C_t-\bar{C}\right)^{\gamma}=\frac{W_t(z)}{P_t}$$

Therefore, following the same steps as before, the Phillips Curve is given by:

$$\pi_t=\beta\mathbb{E}_t\pi_{t+1}+\frac{(1-\theta)(1-\beta\theta)}{\theta}\frac{\tilde{\gamma}+\alpha}{1+\eta\alpha}(y_t-y_t^n) \tag{3.6}$$

Where

$$\tilde{\gamma}=\gamma\frac{\bar{Y}}{\bar{Y}-\bar{C}}$$

Being near subsistence increases γ, that is, it decreases the intertemporal elasticity of substitution and steeps the slope of the Phillips Curve. We can see that $\tilde{\gamma}=\frac{\gamma}{\omega}$, using the terms of the model with subsistence at the variety level. This model has a similar consequence in terms of the implications of the Phillips Curve, but is more general, as it does not depends on the elasticity of the labor market α. In this case, the preference structure implies income dependent intertemporal elasticity of substitution, meaning that this will have implications in term of the aggregate demand. Starting from the Euler equation we have that:

$$Q_t=\beta\left[\frac{C_t-\bar{C}}{C_{t+1}-\bar{C}}\right]^{\gamma}\frac{p_t}{p_{t+1}}$$

or

$$Q_t=\beta\left[\frac{Y_t-\bar{C}}{Y_{t+1}-\bar{C}}\right]^{\gamma}\frac{p_t}{p_{t+1}}$$

We can see that now it depends on the level of subsistence. When we log-linearizing this equation, we have:

$$-i_t=\gamma\frac{\bar{Y}}{\bar{Y}-\bar{C}}\check{Y}_t-\gamma\frac{\bar{Y}}{\bar{Y}-\bar{C}}\check{Y}_{t+1}-\pi_{t+1}$$

or

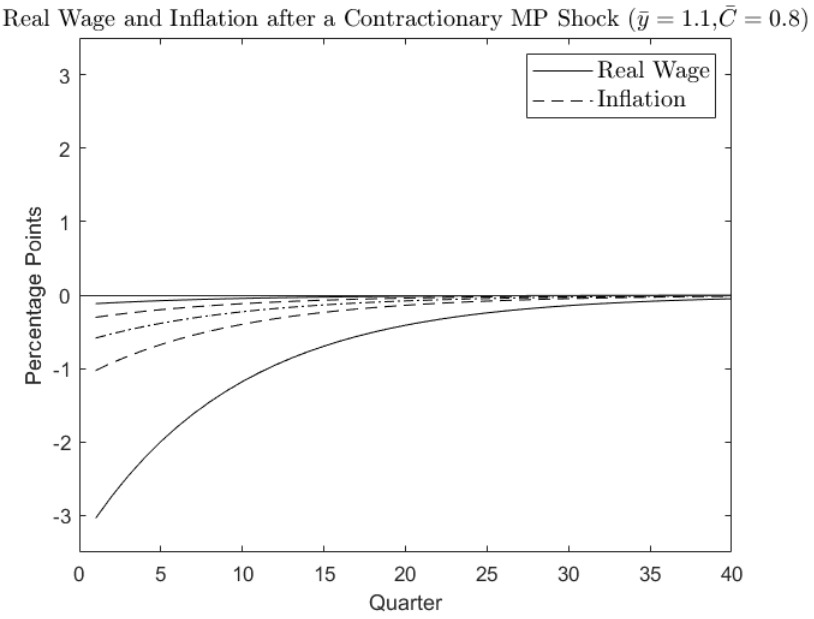
$$i_t-\pi_{t+1}-R_t^N=-\gamma\frac{\bar{Y}}{\bar{Y}-\bar{C}}(\check{Y}_t-\gamma\check{Y}_t^N)+\frac{\bar{Y}}{\bar{Y}-\bar{C}}(\check{Y}_{t+1}-\check{Y}_t^N)$$

That implies that the relationship between the nominal interest rate i_t and the output gap depends on the steady state level of income in each region. This implies that the slope of the IS curve is also income dependent now. We assume a standard Taylor rule to complete the model:

$$i_t=\phi_\pi\pi_t+\phi_y(\check{Y}_t-\check{Y}_t^N)+\nu_t$$

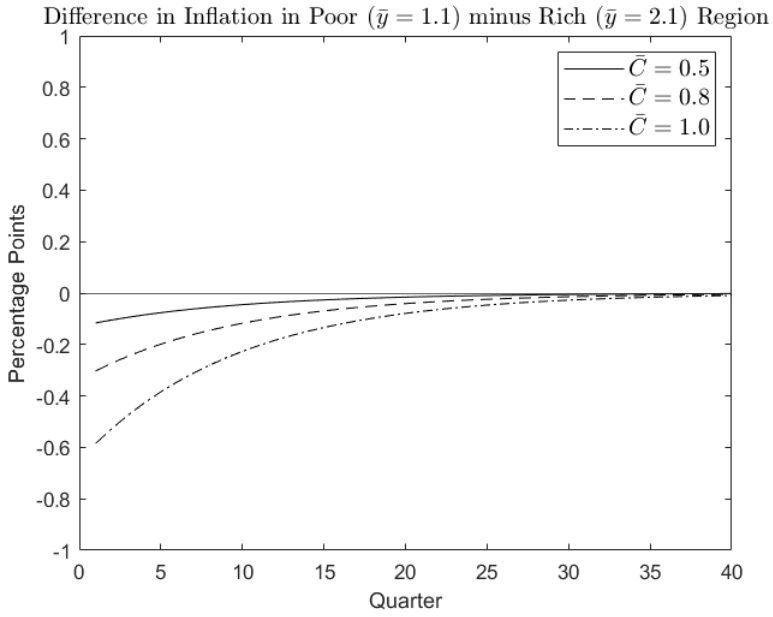
With $\bar{C} > 0$, we have that the slope of the rich region will be flatter as well, reducing even more the effect of the monetary policy on inflation, but increasing the effect on output. This implies that having a level of subsistence in the consumption bundle amplifies the effect found before. More importantly, this will amplify the differences found before between rich and poor regions. The following figure shows the results for inflation after a contractionary monetary policy shock:

Figure 3.10: Impulse Response in Model with Subsistence in Consumption Bundle



We can see that a contractionary Monetary policy shock reduces inflation. In this case, the real wages fall more than inflation. This happens because the consumption leisure condition will imply more sensitive real wages to consumption (or income) changes when the level fo consumption is close to $\bar{C}$. This extra sensitivity will produce bigger changes in real wages in poorer regions. In order to see the differences between rich and poor economies, we simulate the same shock, but with different levels of income, the following figure shows the different of inflation between rich and poor economies:

Figure 3.11: Unequal Responses in Model with Subsistence in Consumption Bundle



Note: The figure plots $\pi_t^{Poor} - \pi_t^{Rich}$ for different levels of $\bar{C}$

We can see that the lower is the value of $\bar{C}$, the bigger is the difference in inflation. This means that the closer is the income of the poor economy to the level of subsistence, the bigger is the drop in inflation, as their demand for goods will be more inelastic. This result is similar compared with the other model, but now the differences between regions are bigger.

Both models can replicate the result found in the empirical setting in terms of prices. But the effect on inequality are not clear. In particular in income inequality. In order to have a measure of real inequality, we should consider how local price index change. In next section, we will consider this case.

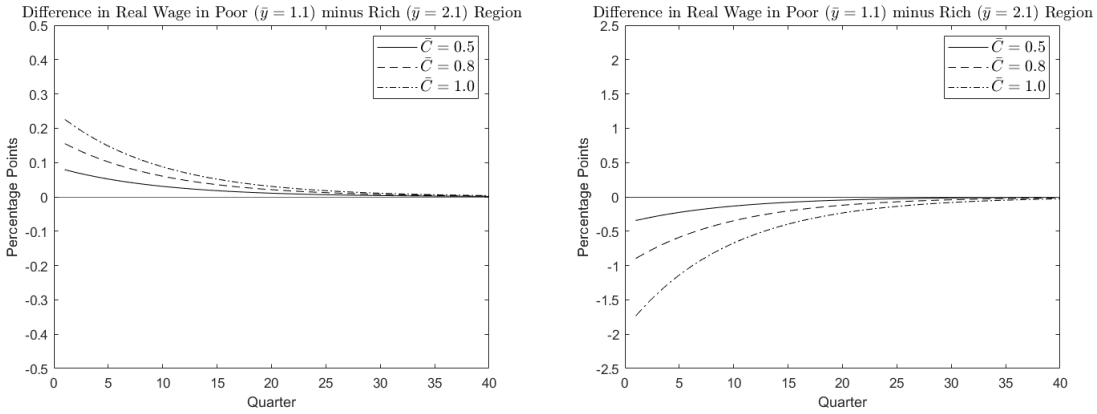
3.4 Income Inequality

In this section we will see the implications of both models in income inequality after a monetary policy shock. We are interested in evaluating the effect on wages and income. We start evaluating the effect on real wage. We adopt a simple framework to evaluate the effects on inequality, that is to assume two independent regions. These regions don't trade between each other, meaning that all prices are set independently. In the case of a single Taylor Rule for both economies, this could create divergence between the economies, are real interest rate

could stay permanently low or high in one or both regions, depending how the monetary policy rule is formulated. This argument is similar to the one formulated by Schmitt-Grohé and Uribe (2003). Therefore, we assume two independent regions, with two different monetary authorities that received the same monetary policy shock in term of size.

The following figure shows the effect of a monetary policy shock on real wages, the left figure shows the effect on the model with subsistence in the varieties and the second in the model with subsistence in the consumption bundle:

Figure 3.12: Real Wage Inequality in Both Models

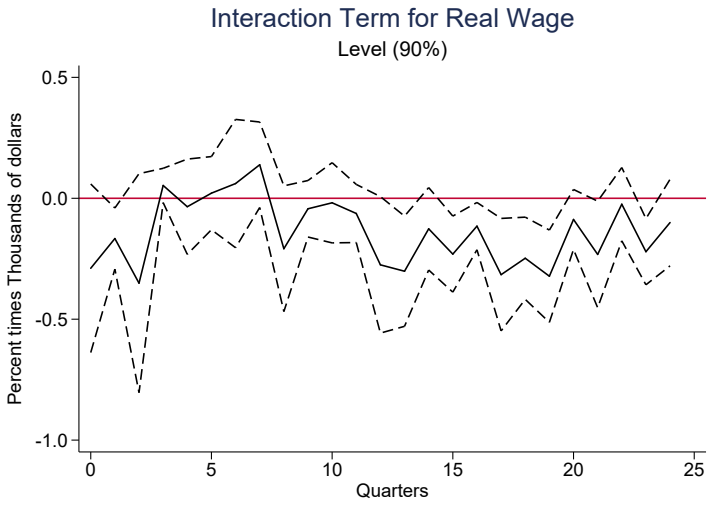


Note: The left figure shows the effect on the model with subsistence in the varieties and the second in the model with subsistence in the consumption bundle. The figures plot $(\check{w}_t^{Poor} - \check{p}_t^{Poor}) - (\check{w}_t^{Rich} - \check{p}_t^{Rich})$ for different levels of $\bar{C}$

We can see different implications depending on the model. In the model with subsistence in the varieties real wages decrease more in the rich regions after a monetary policy shock, reducing inequality. In the model of subsistence in consumption, real wage decrease more in poor regions, increasing inequality. That result comes from the income dependent IS curve, and the fact that real wage is now more sensitive to income when the economy is close to the subsistence level. This result shows a relevant difference between the models, that can be used to test which model explains better empirical results found.

In order to test the implications, we use data on nominal wages at the city level using the Quarterly Census of Employment and Wages. We get the regional average from 2001 and then we get the real wages using the local CPIs. In order to deal with the stationarity of the data, we run city level regressions on quarter dummies and get the error term. We run specification 3.2. We have only a small series from 2001 to 2008. We use 4 lags. Next figure shows the interaction term. A positive value means that the rich region gets a higher increase (or lower decrease) in real wages:

Figure 3.13: Real Wage Inequality in the Data

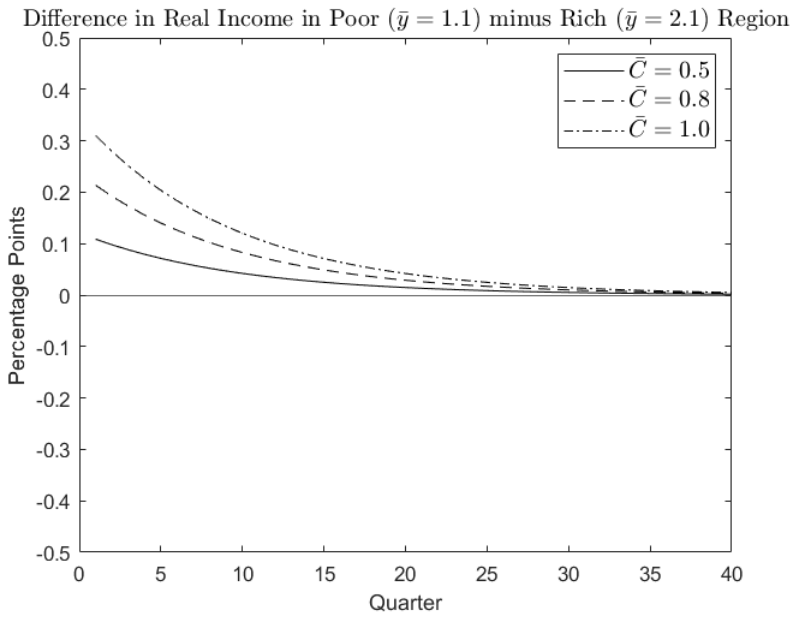


Note: The figure shows the interaction effect of specification 3.2 on real wages.

We can see that rich regions suffer more from a monetary policy shock in terms. The standard errors are high, but significant in many periods. We find significant effects despite the small size and the fact that monetary policy shocks are relatively small after 2001. This result implies that the model of consumption subsistence in the varieties is the one that match this result. This means that the result is coming from heterogeneous Phillips curve, but no different IS curves.

We use the model of subsistence in the varieties to evaluate the effect of monetary policy in short run income inequality. Income inequality will be the result of the sum of changes in real wages and employment. As the preferences used produce a flatter Phillips Curve in richer area, this implies that richer cities will benefit from two mechanism in expansions. From one side they will have a bigger increase in economic activity, that produces higher employment and also lower inflation, that put less pressure in real wages, increasing labor supply. Both should increase real income compared with relatively poor regions. The next figure shows the implications on real income, considering the wage effect and the employment effect:

Figure 3.14: Real Income Inequality



Note: The figure shows the effect on the model with subsistence in the varieties. The figures plot $(\check{w}_t^{Poor} + \check{L}_t^{Poor}) - (\check{w}_t^{Rich} + \check{L}_t^{Rich})$ for different levels of $\bar{C}$

Overall, after a contractionary monetary policy shock real inequality will decrease. This comes from a bigger drop in real wages in rich regions that also comes from a smaller decrease in prices. The opposite happens in booms. Prices react strongly in poor regions. Than inflation reduce real wages and therefore limits the real income gains relative to the rich regions.

We normalize the income difference to match the 10 and 90 percent of the distribution of incomes by city. The level of income in the 10 percentile we normalize it to 1. Then, we take $\bar{C}$ so the monetary policy shock peak at minus 6% as in the empirical setting. We get a value of $\bar{C} = 0.51$. Then, we calibrate the difference between the 10 and 90 percentile in the first quarter of 2006, which have 1.84 times more GDP in richer cities. Then, we evaluate what is the implications for real inequality. We find that real inequality increases by 1.2% after a 1% expansionary monetary policy shock.

3.5 Conclusions

In this paper we evaluate the heterogeneous effect of monetary policy shocks. We first document different effects for poor and rich cities in the price adjustment. These differences are

systematic and common for different type of goods. We conclude that this differences come from differences in the real rigidities, assuming a similar nominal rigidity for the same goods across cities.

We develop a model with non-homothetic preferences. The non-homothetic preferences come from a level of consumption subsistence. Poor regions are closer to that level of subsistence which affect their relevant elasticities that determine the real rigidities. This creates flatter Phillips Curves in richer regions.

With the model and empirical estimates we conclude that there is an increase in real income inequality in booms and a decrease in contractions. The result has implications for the distributional effect of macroeconomics policy and can help to inform central banks on the effect of their policies. These results could have implications on the relative popularity of those institutions and their policies. In addition, this result could have implications on the mechanism of monetary policy, as poor-financially constraint households would also have relative less real income in contractions in after a contractionary monetary shock.

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Appendix A

Additional Tables

A.1 Fireside Chats: Communication and Consumers' Expectations in the Great Depression

Table A.1: Share of Households with Radio by State

State	% Radio	State	% Radio	State	% Radio
Alabama	9.3%	Maine	37.8%	Oklahoma	20.3%
Arizona	17.6%	Maryland	42.9%	Oregon	43.8%
Arkansas	9.0%	Massachusetts	56.8%	Pennsylvania	47.1%
California	50.5%	Michigan	49.9%	Rhode Island	55.9%
Colorado	36.9%	Minnesota	47.5%	South Carolina	8.0%
Connecticut	53.1%	Mississippi	5.3%	South Dakota	47.3%
Delaware	45.1%	Missouri	36.6%	Tennessee	13.5%
DC	52.3%	Montana	32.1%	Texas	17.7%
Florida	15.3%	Nebraska	48.0%	Utah	41.1%
Georgia	9.3%	Nevada	33.1%	Vermont	43.0%
Idaho	31.3%	New Hampshire	44.2%	Virginia	17.6%
Illinois	55.4%	New Jersey	62.5%	Washington	42.1%
Indiana	42.0%	New Mexico	11.3%	West Virginia	22.5%
Iowa	50.0%	New York	57.3%	Wisconsin	50.8%
Kansas	38.8%	North Carolina	10.4%	Wyoming	35.2%
Kentucky	17.2%	North Dakota	42.1%	Average	35.0%
Louisiana	10.9%	Ohio	47.4%		

Note: The Table shows the share of households with a radio in 1930 at the state level, according to the 1930 Census of Population.

Table A.2: Percentage Change in Department Store Sales over Change in Debits

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\Delta \log(D)_{z,t}$	0.63***	0.63***	0.50***	0.50***	0.25***	0.25***	0.16***	0.16***
	(0.06)	(0.06)	(0.07)	(0.07)	(0.03)	(0.03)	(0.04)	(0.04)
$\Delta \log(D)_{z,t-1}$					0.35***	0.35***	0.27***	0.26***
					(0.04)	(0.04)	(0.04)	(0.04)
$\Delta \log(D)_{z,t-2}$								
$\Delta \log(D)_{z,t-3}$								
Zone FE	No	Yes	No	Yes	No	Yes	No	Yes
Time FE	No	No	Yes	Yes	No	No	Yes	Yes
Obs	754	754	754	754	715	715	715	715
R^2	0.628	0.634	0.705	0.710	0.659	0.666	0.727	0.732

	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
$\Delta \log(D)_{z,t}$	0.19***	0.20***	0.14***	0.14***	0.17***	0.17***	0.11**	0.12**
	(0.03)	(0.03)	(0.04)	(0.04)	(0.03)	(0.03)	(0.04)	(0.04)
$\Delta \log(D)_{z,t-1}$	0.20***	0.20***	0.24***	0.25***	0.18***	0.18***	0.23***	0.24***
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
$\Delta \log(D)_{z,t-2}$	0.25***	0.25***	0.13***	0.14***	0.16***	0.17***	0.16***	0.17***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.05)	(0.05)	(0.04)	(0.04)
$\Delta \log(D)_{z,t-3}$					0.14***	0.14***	0.04	0.05
					(0.03)	(0.03)	(0.04)	(0.04)
Zone FE	No	Yes	No	Yes	No	Yes	No	Yes
Time FE	No	No	Yes	Yes	No	No	Yes	Yes
Obs	676	676	676	676	637	637	637	637
R^2	0.694	0.701	0.750	0.755	0.701	0.709	0.752	0.758

Note:*** p<0.01, ** p<0.05, * p<0.1. This table shows results of regressions with annual change monthly in department store sales over annual changes in debits for Federal Reserve districts. I include up to three lags, time fixed effect and district fixed effect depending on the specification. Standard errors are clustered at a Federal Reserve district level.

Table A.3: Bi-weekly city level regression

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
17-Jan-35	-0.173	-0.212	-0.144	-0.197	-0.233*	-0.179	-0.202
	(0.129)	(0.129)	(0.128)	(0.127)	(0.135)	(0.145)	(0.128)
2-Feb-35	0.090	0.057	0.090	0.044	0.008	0.057	0.039
	(0.115)	(0.114)	(0.117)	(0.117)	(0.127)	(0.129)	(0.118)
16-Feb-35	-0.076	-0.104	-0.092	-0.130	-0.126	-0.036	-0.126
	(0.105)	(0.105)	(0.107)	(0.108)	(0.119)	(0.121)	(0.109)
2-Mar-35	-0.044	-0.066	-0.047	-0.077	-0.101	-0.039	-0.076
	(0.085)	(0.085)	(0.086)	(0.087)	(0.096)	(0.093)	(0.088)
16-Mar-35	-0.018	-0.035	-0.027	-0.050	-0.083	-0.021	-0.059
	(0.098)	(0.098)	(0.098)	(0.099)	(0.109)	(0.112)	(0.100)
30-Mar-35	0.056	0.045	0.063	0.047	0.002	0.006	0.038
	(0.080)	(0.080)	(0.078)	(0.079)	(0.081)	(0.089)	(0.079)
13-Apr-35	-0.078	-0.083	-0.050	-0.058	-0.074	-0.032	-0.065
	(0.094)	(0.094)	(0.091)	(0.091)	(0.097)	(0.102)	(0.091)
11-May-35	0.217**	0.223**	0.225**	0.232**	0.202*	0.229**	0.218**
	(0.105)	(0.106)	(0.106)	(0.106)	(0.108)	(0.115)	(0.105)
25-May-35	0.153*	0.164**	0.154*	0.170**	0.212**	0.217**	0.177**
	(0.083)	(0.083)	(0.084)	(0.084)	(0.087)	(0.091)	(0.084)
8-Jun-35	-0.076	-0.059	-0.075	-0.052	-0.069	-0.041	-0.051
	(0.118)	(0.119)	(0.118)	(0.119)	(0.122)	(0.122)	(0.119)
22-Jun-35	-0.002	0.020	-0.007	0.023	0.026	0.069	0.018
	(0.110)	(0.111)	(0.109)	(0.111)	(0.119)	(0.125)	(0.111)
8-Jul-35	0.158	0.185	0.161	0.199	0.129	0.191	0.195
	(0.124)	(0.127)	(0.124)	(0.127)	(0.139)	(0.134)	(0.128)
20-Jul-35	0.003	0.036	-0.008	0.038	0.045	0.097	0.031
	(0.123)	(0.125)	(0.124)	(0.127)	(0.138)	(0.145)	(0.128)
3-Aug-35	0.145	0.184	0.123	0.176	0.121	0.156	0.171
	(0.131)	(0.134)	(0.129)	(0.134)	(0.141)	(0.141)	(0.134)
17-Aug-35	-0.150	-0.106	-0.072	-0.011	-0.026	0.024	-0.013
	(0.142)	(0.144)	(0.120)	(0.124)	(0.134)	(0.140)	(0.125)
31-Aug-35	-0.022	0.028	0.036	0.104	0.062	0.178	0.103
	(0.135)	(0.138)	(0.119)	(0.125)	(0.135)	(0.134)	(0.126)
14-Sep-35	-0.209	-0.154	-0.188	-0.111	-0.122	-0.077	-0.108
	(0.149)	(0.149)	(0.146)	(0.148)	(0.158)	(0.164)	(0.149)
28-Sep-35	-0.085	-0.024	-0.095	-0.011	-0.088	0.016	-0.013
	(0.147)	(0.150)	(0.148)	(0.153)	(0.161)	(0.174)	(0.154)
14-Oct-35	-0.235	-0.169	-0.229	-0.137	-0.206	-0.130	-0.141
	(0.169)	(0.175)	(0.170)	(0.179)	(0.186)	(0.203)	(0.180)
26-Oct-35	-0.325**	-0.253	-0.336**	-0.237	-0.280*	-0.186	-0.238
	(0.154)	(0.162)	(0.153)	(0.164)	(0.169)	(0.185)	(0.165)
9-Nov-35	-0.402**	-0.324	-0.396**	-0.289	-0.359*	-0.230	-0.293
	(0.192)	(0.198)	(0.192)	(0.200)	(0.208)	(0.231)	(0.201)
No Outliers	No	No	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes	Yes	Yes	Yes
Cities	261	261	257	257	244	230	256
Observations	6,525	6,525	6,425	6,425	6,100	5,750	6,400

Note: Week ending the on April 28th is omitted. (1) unrestricted. (2) adds controls. (3) drops outliers. (4) drops outliers and includes controls. (5) drops cities with a Federal Reserve. (6) drops 10% of the cities with the highest and lowest average debits. (7) drops New York City. Controls are trends interacted with the share of urban population, black population and population older than 55 years old. Outliers are cities with changes in log bigger than 1 in absolute value. Standard errors are clustered at city level. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table A.4: Cumulative Bi-weekly city level regression

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
17-Jan-35	-0.051	-0.052	-0.022	-0.024	-0.062	-0.063	-0.024
	(0.091)	(0.090)	(0.090)	(0.088)	(0.092)	(0.099)	(0.089)
2-Feb-35	0.009	0.008	0.024	0.022	-0.003	-0.006	0.021
	(0.067)	(0.067)	(0.067)	(0.066)	(0.070)	(0.075)	(0.067)
16-Feb-35	-0.004	-0.005	-0.000	-0.002	-0.011	-0.003	-0.001
	(0.050)	(0.049)	(0.050)	(0.049)	(0.053)	(0.056)	(0.050)
2-Mar-35	-0.006	-0.006	-0.005	-0.006	-0.011	-0.004	-0.004
	(0.035)	(0.035)	(0.036)	(0.035)	(0.038)	(0.040)	(0.035)
16-Mar-35	-0.007	-0.008	-0.009	-0.011	-0.015	-0.007	-0.010
	(0.023)	(0.023)	(0.024)	(0.023)	(0.025)	(0.027)	(0.023)
30-Mar-35	0.005	0.005	0.003	0.002	-0.005	-0.002	0.002
	(0.017)	(0.016)	(0.017)	(0.017)	(0.018)	(0.019)	(0.017)
13-Apr-35	-0.001	-0.001	0.000	-0.000	-0.004	-0.003	-0.001
	(0.010)	(0.010)	(0.010)	(0.010)	(0.011)	(0.012)	(0.010)
11-May-35	0.027***	0.027***	0.027***	0.027***	0.027***	0.026**	0.026***
	(0.009)	(0.009)	(0.010)	(0.009)	(0.010)	(0.010)	(0.009)
25-May-35	0.040***	0.040***	0.040***	0.041***	0.047***	0.044***	0.041***
	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.015)	(0.014)
8-Jun-35	0.031	0.032	0.031	0.032	0.038*	0.036*	0.032
	(0.019)	(0.020)	(0.020)	(0.020)	(0.020)	(0.021)	(0.020)
22-Jun-35	0.032	0.032	0.030	0.032	0.039	0.040	0.032
	(0.024)	(0.025)	(0.025)	(0.025)	(0.025)	(0.026)	(0.025)
8-Jul-35	0.045	0.045	0.043	0.045	0.049*	0.054*	0.045
	(0.027)	(0.028)	(0.028)	(0.028)	(0.029)	(0.029)	(0.028)
20-Jul-35	0.045	0.046	0.043	0.045	0.051	0.059*	0.045
	(0.030)	(0.032)	(0.031)	(0.032)	(0.032)	(0.033)	(0.032)
3-Aug-35	0.056*	0.056	0.051	0.054	0.057	0.065*	0.054
	(0.033)	(0.035)	(0.034)	(0.035)	(0.036)	(0.036)	(0.035)
17-Aug-35	0.041	0.042	0.047	0.050	0.054	0.062	0.050
	(0.037)	(0.038)	(0.036)	(0.038)	(0.039)	(0.040)	(0.038)
31-Aug-35	0.035	0.037	0.046	0.050	0.052	0.068	0.050
	(0.041)	(0.042)	(0.039)	(0.040)	(0.042)	(0.043)	(0.041)
14-Sep-35	0.022	0.023	0.033	0.037	0.040	0.057	0.038
	(0.043)	(0.044)	(0.040)	(0.042)	(0.044)	(0.045)	(0.042)
28-Sep-35	0.016	0.017	0.026	0.030	0.029	0.051	0.031
	(0.046)	(0.047)	(0.043)	(0.045)	(0.048)	(0.049)	(0.046)
14-Oct-35	0.003	0.004	0.012	0.017	0.014	0.036	0.018
	(0.048)	(0.050)	(0.046)	(0.048)	(0.051)	(0.052)	(0.048)
26-Oct-35	-0.013	-0.012	-0.005	0.000	-0.004	0.019	0.001
	(0.049)	(0.051)	(0.047)	(0.050)	(0.052)	(0.054)	(0.050)
9-Nov-35	-0.032	-0.030	-0.024	-0.018	-0.025	0.002	-0.018
	(0.051)	(0.053)	(0.049)	(0.052)	(0.055)	(0.057)	(0.053)
No Outliers	No	No	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes	Yes	Yes	Yes
Cities	261	261	257	257	244	230	256
Observations	6,375	6,375	6,275	6,275	5,950	5,725	6,250

Note: Week ending the on April 28th is omitted. (1) unrestricted. (2) adds controls. (3) drops outliers. (4) drops outliers and includes controls. (5) drops cities with a Federal Reserve. (6) drops 10% of the cities with the highest and lowest average debits. (7) drops New York City. Controls are trends interacted with the share of urban population, black population and population older than 55 years old. Outliers are cities with changes in log bigger than 1 in absolute value. Standard errors are clustered at city level. *** p<0.01, ** p<0.05, * p<0.1

Table A.5: Results for Cars per capita

	(1)	(2)	(3)	(4)	(5)	(6)
I(year=1930)	0.019***	0.022***	0.001	0.006	0.002	0.007
	(0.003)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
I(year=1931)	0.015***	0.019***	0.004	0.007	0.005	0.008
	(0.002)	(0.005)	(0.004)	(0.005)	(0.004)	(0.006)
I(year=1932)	0.002	0.000	-0.000	-0.006	0.000	-0.005
	(0.002)	(0.003)	(0.002)	(0.004)	(0.002)	(0.004)
I(year=1933)	0.002	-0.000	0.004**	-0.000	0.004***	0.000
	(0.001)	(0.003)	(0.002)	(0.003)	(0.002)	(0.003)
I(year=1935)	0.014***	0.023***	0.009***	0.019***	0.009***	0.018***
	(0.003)	(0.005)	(0.002)	(0.005)	(0.002)	(0.005)
I(year=1936)	0.023***	0.030***	0.016***	0.022***	0.015***	0.020***
	(0.004)	(0.007)	(0.003)	(0.006)	(0.003)	(0.006)
I(year=1937)	0.024***	0.022***	0.014***	0.011***	0.012***	0.009**
	(0.003)	(0.005)	(0.002)	(0.003)	(0.003)	(0.004)
I(year=1938)	0.005***	0.005	-0.000	-0.003	-0.003	-0.005
	(0.002)	(0.004)	(0.002)	(0.004)	(0.002)	(0.004)
I(year=1939)	0.012***	0.014***	0.003	0.005*	0.000	0.002
	(0.001)	(0.004)	(0.002)	(0.003)	(0.003)	(0.003)
Controls	No	No	Yes	Yes	Yes	Yes
Trend x Controls	No	No	No	No	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Zone-year FE	No	Yes	No	Yes	No	Yes
Observations	490	490	490	480	490	490

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.6: Results for Deposits (logs)

	(1)	(2)	(3)	(4)	(5)	(6)
I(year=1930)	-0.200	-0.229	-0.514**	-0.548*	-0.423*	-0.396
	(0.158)	(0.288)	(0.222)	(0.311)	(0.228)	(0.354)
I(year=1931)	0.066	0.057	-0.179	-0.182	-0.120	-0.078
	(0.135)	(0.241)	(0.179)	(0.257)	(0.184)	(0.282)
I(year=1932)	0.258**	0.362**	0.121	0.215	0.161	0.278
	(0.103)	(0.179)	(0.116)	(0.182)	(0.123)	(0.189)
I(year=1933)	0.234**	0.431**	0.198*	0.378*	0.221*	0.409*
	(0.095)	(0.188)	(0.108)	(0.203)	(0.112)	(0.212)
I(year=1935)	-0.086	-0.169*	-0.124**	-0.142*	-0.166***	-0.204**
	(0.055)	(0.094)	(0.057)	(0.071)	(0.059)	(0.085)
I(year=1936)	-0.263***	-0.395***	-0.357***	-0.345***	-0.450***	-0.489***
	(0.076)	(0.128)	(0.089)	(0.095)	(0.087)	(0.106)
I(year=1937)	-0.366***	-0.540***	-0.501***	-0.453***	-0.640***	-0.682***
	(0.090)	(0.197)	(0.110)	(0.143)	(0.108)	(0.142)
I(year=1938)	-0.380***	-0.574**	-0.515***	-0.410**	-0.701***	-0.712***
	(0.094)	(0.230)	(0.117)	(0.164)	(0.118)	(0.180)
I(year=1939)	-0.460***	-0.712***	-0.580***	-0.507***	-0.794***	-0.854***
	(0.097)	(0.253)	(0.114)	(0.151)	(0.131)	(0.202)
Controls	No	No	Yes	Yes	Yes	Yes
Trend x Controls	No	No	No	No	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Zone-year FE	No	Yes	No	Yes	No	Yes
Observations	490	490	490	480	490	490

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.7: Building Permits by City

	(1)	(2)	(3)	(4)	(5)
I(year=1930)*radio	4.974	4.961	4.915	4.910	2.781
	(5.432)	(5.436)	(5.441)	(5.449)	(5.618)
I(year=1931)*radio	5.630*	5.620*	5.603*	5.599*	4.090
	(3.141)	(3.140)	(3.152)	(3.155)	(3.333)
I(year=1932)*radio	-0.617	-0.623	-0.683	-0.684	-1.782
	(0.814)	(0.816)	(0.818)	(0.819)	(1.183)
I(year=1933)*radio	-0.317	-0.319	-0.207	-0.211	-0.933
	(0.567)	(0.566)	(0.620)	(0.618)	(0.944)
I(year=1935)*radio	2.355	2.354	2.118	2.123	1.824
	(1.694)	(1.705)	(1.809)	(1.809)	(1.830)
I(year=1936)*radio	8.377**	8.402**	7.995**	8.015**	6.935*
	(3.449)	(3.462)	(3.629)	(3.626)	(3.981)
I(year=1937)*radio	7.511**	7.530**	7.242*	7.257**	5.782
	(3.476)	(3.470)	(3.661)	(3.641)	(3.796)
I(year=1938)*radio	9.964**	9.973**	9.335*	9.354*	8.297
	(4.904)	(4.905)	(5.510)	(5.472)	(5.613)
I(year=1939)*radio	8.481	8.512	7.804	7.834	6.679
	(6.062)	(6.036)	(6.520)	(6.446)	(6.646)
Log Sales per capita		0.734		0.347	-5.523
		(4.644)		(4.436)	(5.286)
Federal Aid			-0.012	-0.011	-0.011
			(0.024)	(0.023)	(0.024)
City FE	Yes	Yes	Yes	Yes	Yes
State-year FE	Yes	Yes	Yes	Yes	Yes
Control trends	-	No	No	No	Yes
Observations	838	838	838	838	838
R-squared	0.843	0.843	0.844	0.844	0.845

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.8: Federal Aid and Radio

	(1)	(2)	(3)	(4)	(5)
I(year=1930)*radio	-4.086	1.887	-7.807	-1.856	-6.006
	(13.060)	(13.164)	(13.335)	(13.098)	(14.013)
I(year=1931)*radio	-0.960	3.281	-4.680	-0.450	-3.506
	(12.075)	(12.219)	(12.268)	(12.147)	(12.600)
I(year=1932)*radio	-3.328	-0.085	-3.328	-0.107	-0.868
	(11.707)	(11.820)	(11.715)	(11.798)	(11.742)
I(year=1933)*radio	11.903	14.020	11.903	14.006	13.569
	(9.945)	(10.001)	(9.951)	(9.994)	(9.965)
I(year=1935)*radio	-16.996	-15.934	-16.996	-15.941	-15.869
	(10.751)	(10.532)	(10.758)	(10.538)	(10.635)
I(year=1936)*radio	-31.577**	-29.434**	-33.718**	-31.579**	-30.571**
	(12.728)	(12.693)	(12.876)	(12.838)	(12.726)
I(year=1937)*radio	-23.854	-20.291	-25.994*	-22.446	-21.003
	(15.208)	(15.423)	(15.527)	(15.713)	(15.691)
I(year=1938)*radio	-51.391**	-48.786**	-53.531**	-50.934**	-48.786**
	(20.721)	(20.901)	(20.508)	(20.679)	(20.842)
I(year=1939)*radio	-54.780***	-52.444***	-56.921***	-54.591***	-51.817***
	(18.917)	(19.001)	(18.897)	(18.970)	(19.371)
Lag sales per capita		-28.903		-28.709	-4.157
		(20.749)		(20.509)	(3,127.488)
Democrats votes			-0.316*	-0.315*	-115.001
			(0.177)	(0.178)	(73.327)
City FE	Yes	Yes	Yes	Yes	Yes
State-year FE	Yes	Yes	Yes	Yes	Yes
Control trends	-	No	No	No	Yes
Observations	1000	1000	1000	1000	1000
R-squared	0.939	0.940	0.941	0.942	0.943

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.9: IV Regressions, bi-weekly Data

		Distance	
	OLS	First Stage	IV
Coefficient	0.356***	-0.001***	0.758**
	(0.087)	(0.000)	(0.323)
F-Test	27.290		17.779
Observations	266	268	268

Note: *** p<0.01, ** p<0.05, * p<0.1. This table shows the results of the instrumental variable regression for the bi-weekly debit regression. The dependent variables is the log of the bi-weekly sum of debits. The independent variable is the county share of radios. The share of radio is instrumented by the city distance to the closest radio station. I use the information provided by the Seventh Annual Report of the Federal Radio Commission to the Congress of the United States of 1933. They show there the radio station locations in a map with the name of the city. I calculate the distance in miles of those stations with the city from which I have debits. There are 113 stations. Standard errors are clustered at the city level

A.2 Inflation Expectations as a Policy Tool?

Table A.10: Point estimate vs. mean implied by the probability distribution.

	Wave 6			Wave 7		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. Moments						
	Mean	Median	St.dev.	Mean	Median	St.dev.
Mean forecast implied by the , distribution $F_{it}\pi_{t+1}$	2.59	1.40	2.48	2.65	1.20	2.69
Point forecast,	2.75	2.00	2.34	2.74	2.00	2.38
Panel B. Regression						
Dependent variable, $\bar{F}_{it}\pi_{t+1}$	OLS	Huber	Quantile	OLS	Huber	Quantile
Regressor, $F_{it}\pi_{t+1}$	0.98***	0.97***	0.97***	1.07***	1.09***	1.02***
	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	(0.01)
Constant	-0.11**	-0.01	0.01	-0.30***	-0.34***	-0.12**
	(0.05)	(0.03)	(0.06)	(0.06)	(0.06)	(0.06)
Observations	2,032	1,987	2,032	1,399	1,371	1,399
R2	0.863	0.930		0.900	0.918	

Note: The sample is from CGK. $\bar{F}_{it}\pi_{t+1} = \sum_j \bar{\pi}_j \omega_{ijt}$, where i indexes respondents, t indexes time, j indexes inflation bins, ω_{ijt} is the weight assigned to bin j by manager i at time t, $\bar{\pi}_j$ is the midpoint of bin j. $F_{it}\pi_{t+1}$ is the point prediction. All moments and regressions are computed using employment-based sampling weights. Robust standard errors are reported in parentheses. ***, **, * shows statistical significance at 1%, 5%, and 10% levels respectively.

Table A.11: Responses to baseline and alternative formulations of inflation expectation questions.

	N	Inflation forecast, one-year ahead			Inflation forecast, 5-10-years ahead			Inflation backcast, previous 12 months	
		Mean	St.dev.	Uncert.	Mean	St.dev.	Uncert.	Mean	St.dev.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
A.	679	3.72	2.55	1.02	3.29	2.49	1.04	3.42	2.22
B.	681	3.73	2.54	1.04	3.31	2.5	1.11	3.40	2.27
C.	680	3.71	2.53	1.04	3.31	2.46	1.04	3.43	2.26

Note: The table reports basic moments for inflation forecasts solicited via different wordings (shown in the left column) in the following questions:
-A. During the last twelve months, by how much do you think prices changed overall in the economy? Please provide an answer in percentage terms.
-B. During the next twelve months, by how much do you think prices will change overall in the economy? Please provide an answer in percentage terms.
-C. During the next 5-10 years, by how much do you think prices will change overall in the economy? Please provide an answer in percentage terms.
with the corresponding versions soliciting probability distributions. Uncertainty is computed as $\sigma = \sqrt{\sum_j \left(\bar{\pi}_j - \bar{F}_{it}\pi_{t+1}\right)^2 \omega_{ijt}}$where $\bar{F}_{ij}\pi_{t+1} = \sum_j \bar{\pi}_j \omega_{ijt}$, i indexes respondents, t indexes time, j indexes inflation bins, ω_{ijt} is the weight assigned to bin j by manager i at time t, $\bar{\pi}_j$ is the midpoint of bin j. The sample is from CGK.

Table A.12: Expectations of future inflation vs. future changes in own prices

	N	Mean	Median	St.dev.	Corr expected/ perceived π
	(1)	(2)	(3)	(4)	(5)
Panel A. Survey of firm managers, New Zealand					
Wave 3					
Expected inflation, 12-month ahead	1,601	4.48	4.00	2.97	1.00
Expected change in own unit cost 12-month ahead	1,601	2.8-	2.00	3.01	-0.01
Wave 6					
Expected inflation, 12-month ahead	2,032	2.75	2.00	2.35	1.00
Expected change in own unit cost, 6-month ahead	2,032	1.27	1.00	1.88	-0.08
Expected change in own price (main product), 6-month ahead	2,032	0.55	0.50	1.11	-0.01
Expected change in own price (main product), 12-month ahead	2,032	0.59	0.50	1.17	-0.04
Perceived inflation, prev 12 months	2,032	2.58	2.00	2.08	1.00
Change in own unit cost, prev 12 months	2,032	1.37	1.00	2.11	-0.11
Change in own price (main product), prev 6 months	2,032	0.56	0.50	1.28	-0.001
Wave 7					
Expected inflation, 12-month ahead	1,399	2.74	2.00	2.38	1.00
Expected change in own unit cost, 6-month ahead	1,399	0.46	0.00	1.47	0.02
Expected change in own price (main product), 6-month ahead	1,399	0.35	0.1	0.82	0.02
Expected change in own price (main product), 12-month ahead	1,399	0.21	0.00	0.98	0.09
Panel B. Business Inflation Expectations survey, Atlanta Fed					
Jul-15					
Expected change in unit cost, 12-month ahead	221	1.98	1.94	1.48	-
Expected change in CPI, 12-month ahead	221	2.59	2.00	2.14	-
Sep-14					
Expected change in unit cost, 12-month ahead	190	2.06	2.05	1.59	-
Expected change in CPI, 12-month ahead	190	3.68	3.00	2.84	-

Note: The table reports basic moments of expected inflation for various survey designs. The sample in

Panel A is from CGK.

Table A.13: Effects of bin size and distribution on reported inflation expectations.

One-year ahead forecast	N	mean	median	st.dev.	uncert.	Correlation with the change in the general level of prices
	(1)	(2)	(3)	(4)	(5)	(6)
Change in prices overall	2,032	2.59	1.4	2.48	0.92	1
Core CPI						
Baseline NZ grid (dispersed/many bins)	1,011	2.58	1.4	2.37	0.94	0.9
BIE grid (concentrated/few bins)	1,021	2.26	2.1	1.3	0.26	0.85

Note: The table compares basic moments of expected inflation across survey designs. Mean in column (2) reports average implied mean expected inflation across firms. Median in column (3) reports the median implied expected inflation across firms. St. dev. in column (4) reports cross-sectional variation of implied means across firms. Uncertainty (column 5) is the average (across firms) standard deviation of reported probability distributions. Column (6) reports correlation between i) the implied mean for change in prices overall and ii) a given alternative measure of inflation expectations. The sample is from CGK.

Table A.14: Predictors of inflation expectations.

	(1)	(2)	(3)
Firm characteristics			
Log(Age)	0.203***		0.231***
	(0.045)		(0.078)
Log(Employment)	0.600***		0.797***
	(0.108)		(0.127)
Labor's share of costs	-0.009*		0.000
	(0.005)		(0.007)
Foreign trade share	0.013***		0.008*
	(0.004)		(0.004)
Number of Competitors	-0.009***		-0.006
	(0.002)		(0.004)
Avg. margin	-0.002		0.012**
	(0.004)		(0.005)
Manager characteristics			
Age		0.003	-0.002
		(0.008)	(0.005)
Female		0.177	-0.036
		(0.190)	(0.093)
Education:			
Some college		1.018***	0.320***
		(0.257)	(0.112)
College		0.689***	0.087
		(0.198)	(0.108)
Graduate (MA+)		0.033	-0.089
		(0.210)	(0.135)
Tenure		0.074***	0.003
		(0.016)	(0.009)
Income		0.003**	-0.001
		(0.002)	(0.001)
Industry FE	Y	Y	Y
Observations	2,960	1,380	1,371
R2	0.838	0.076	0.901
R2 (industry fixed effects only)	0.812	-	0.872

Note:The table reports results for the Huber robust regression. The dependent variable is the 12-month ahead inflation forecast from Wave #1 survey. Industry fixed effects are for 3-digit industries. The omitted

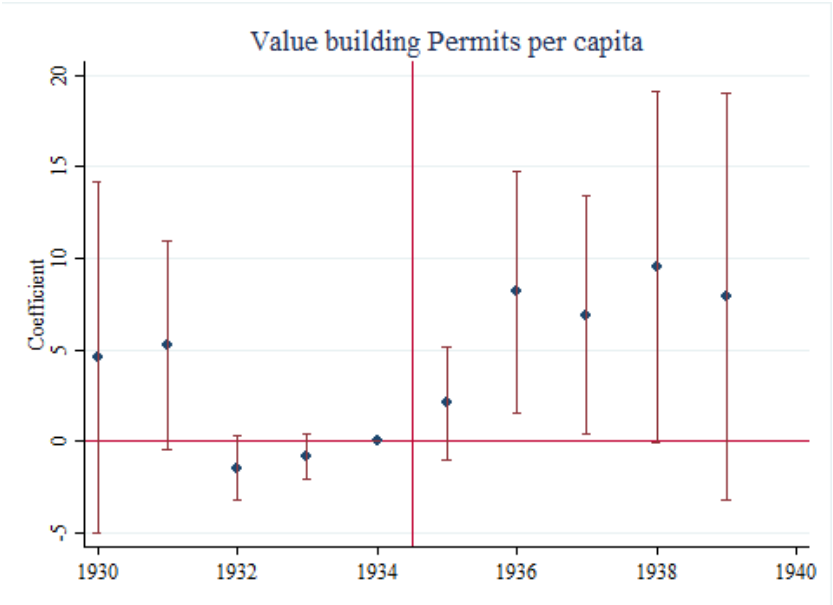
category for manager's education is "high school diploma or less." Sample weights are applied to all specifications. The sample is from CGK. Robust standard errors (clustered at the 3-digit ANZ SIC level) are reported in parentheses. ***, **, * denotes statistical significance at 1%, 5%, and 10% levels respectively

Appendix B

Additional Figures

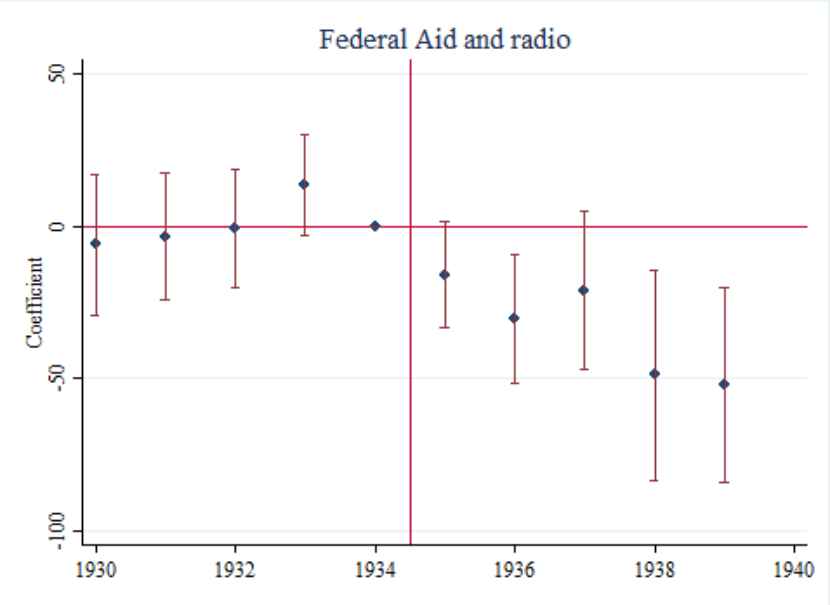
B.1 Fireside Chats: Communication and Consumers Expectation in the Great Depression

Figure B.1: Results for building permits (4)



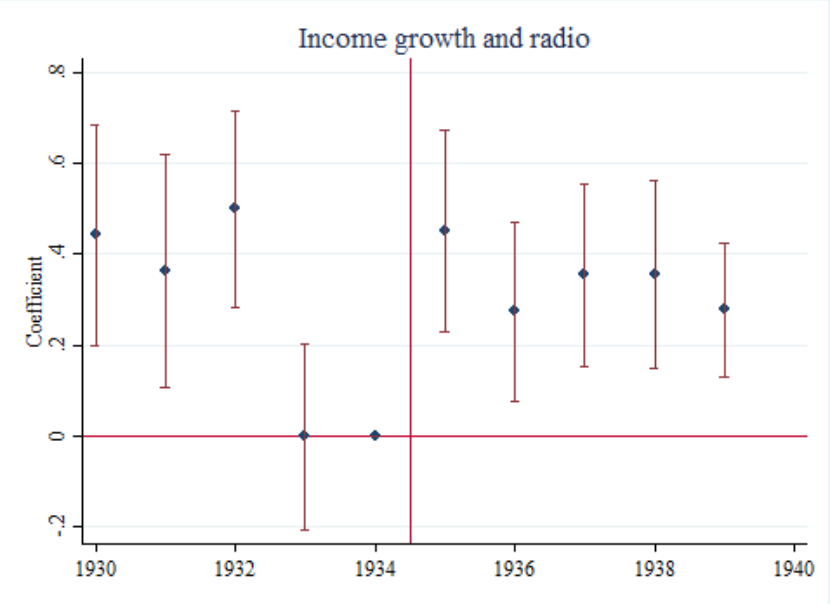
Note: Figure presents results of specification (4) in table A.7. The dependent variable of the regression is the sales of the value of building permits per capita and the dots represents the point estimate of a year dummy interacted by the city share of radio. The vertical red lines represent confidence intervals at a 95%, those standard errors are clustered at the city level.

Figure B.2:



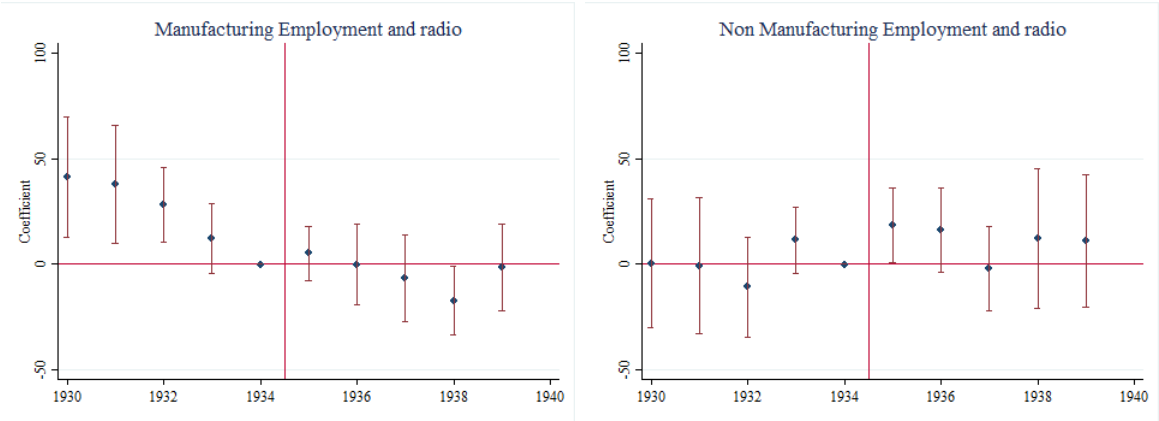
Note:Figure presents results of specification (6) in table A.6. The vertical red lines represent confidence intervals at a 10%

Figure B.3: Results income growth



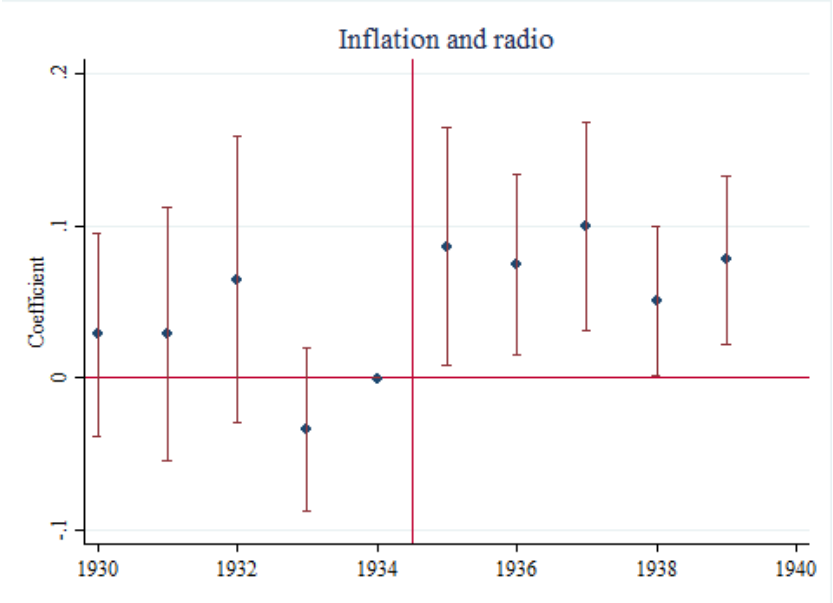
Note:Figure presents results of specification (6) in table A.6. The vertical red lines represent confidence intervals at a 10%

Figure B.4: Results Employment



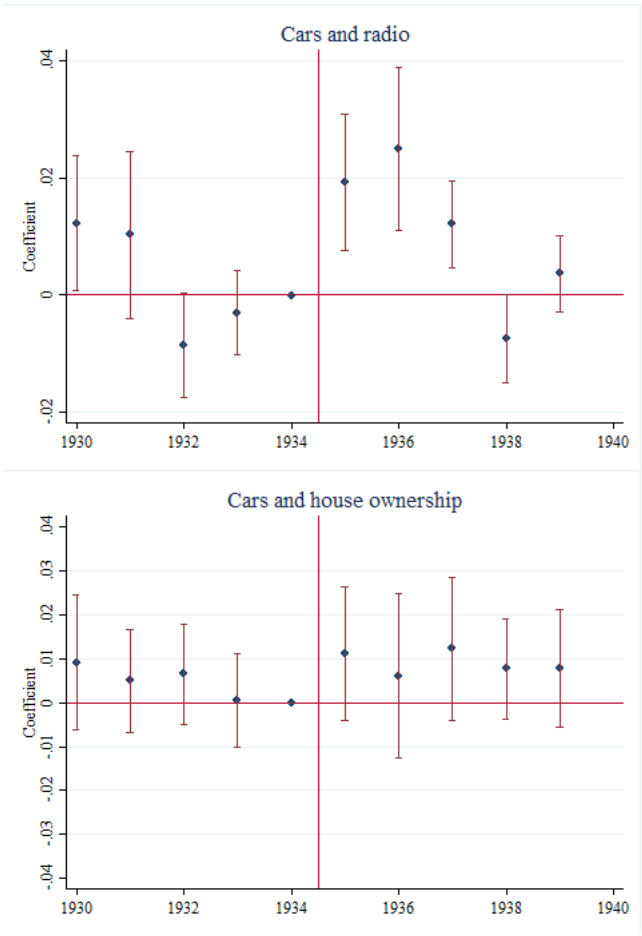
Note:Figure presents results of specification (6) in table A.6. The vertical red lines represent confidence intervals at a 10%

Figure B.5: Results Inflation



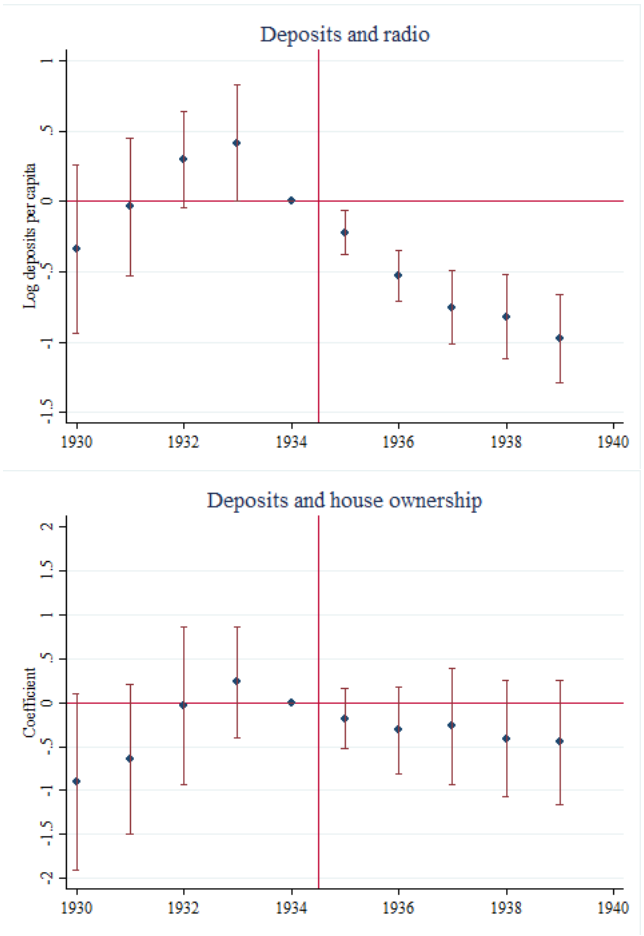
Note:Figure presents results of specification (6) in table A.6. The vertical red lines represent confidence intervals at a 10%

Figure B.6: Placebo for Cars per capita (6)



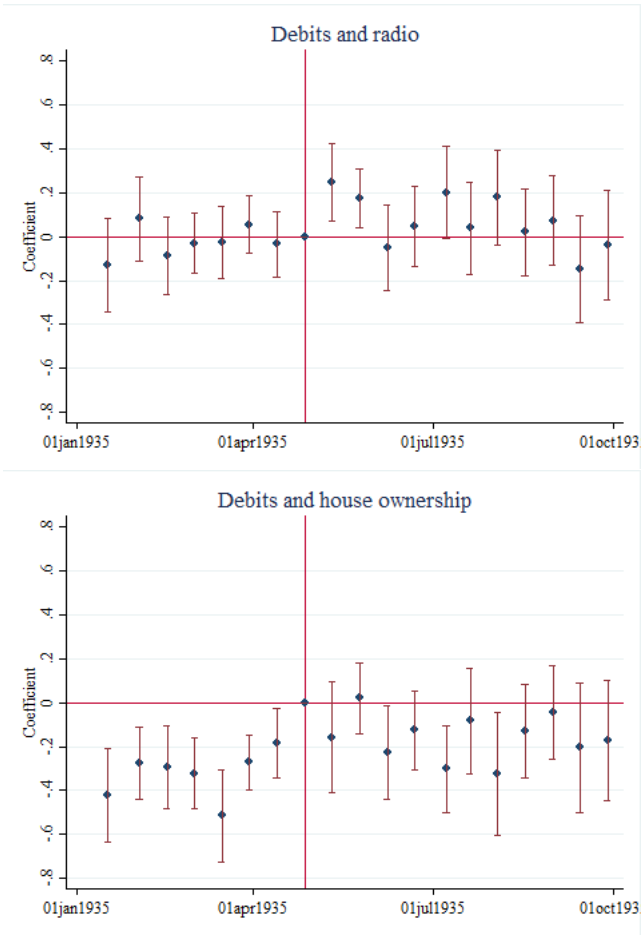
Note: The figure shows the results for regressions, where the dependent variable is the car sales per capita. In the left panel the dots represent the point estimate of a yearly dummy interacted by the state share of radio. In the right panel the dots represent the point estimate of a yearly dummy interacted by the state share of house ownership. The vertical red lines represent confidence intervals at a 95%. Standard errors are clustered at the state level.

Figure B.7: Placebo for Deposits (6)



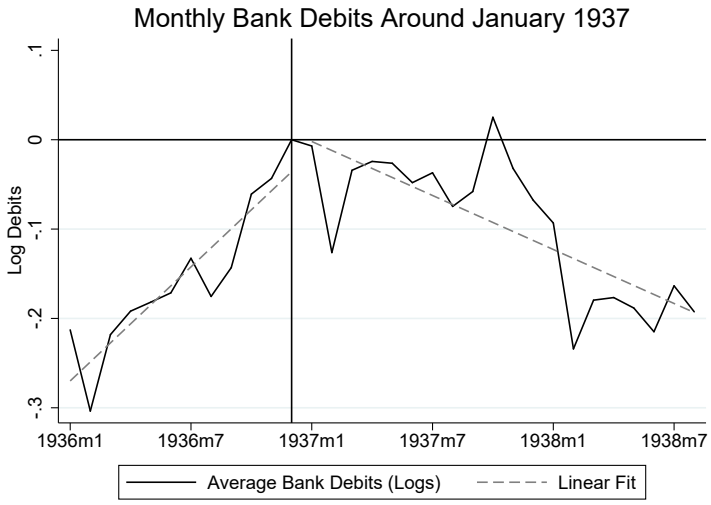
Note: The figure shows the results for regressions, where the dependent variable is the log of deposits. In the left panel the dots represent the point estimate of a yearly dummy interacted by the state share of radio. In the right panel the dots represent the point estimate of a yearly dummy interacted by the state share of house ownership. The vertical red lines represent confidence intervals at a 95%. Standard errors are clustered at the state level.

Figure B.8: Placebo for Debits



Note: The figure shows the results for regressions, where the dependent variable is the log of the sum of bi-weekly debits. In the left panel the dots represent the point estimate of a bi-weekly dummy interacted by the county share of radio. In the right panel the dots represent the point estimate of a bi-weekly dummy interacted by the county share of house ownership. The vertical red lines represent confidence intervals at a 90%. Standard errors are clustered at the county level.

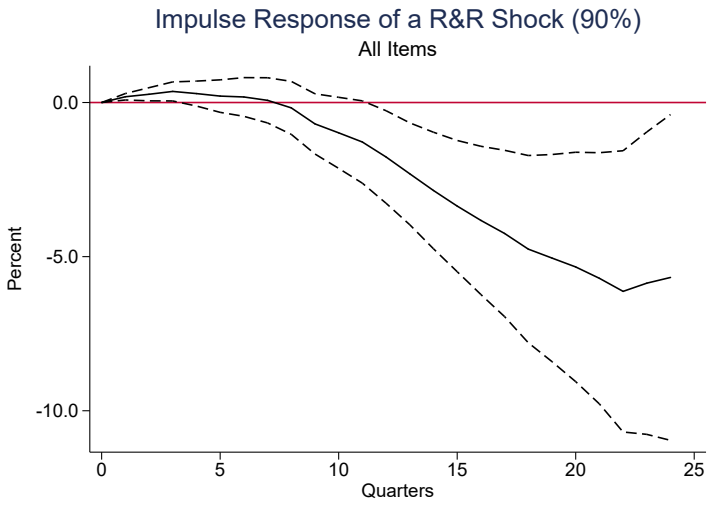
Figure B.9: Decline in Economic Activity when Payroll Tax is Implemented



Note: The figure shows the results for regressions, where the dependent variable is the log of the sum of bi-weekly debits. In the left panel the dots represent the point estimate of a bi-weekly dummy interacted by the county share of radio. In the right panel the dots represent the point estimate of a bi-weekly dummy interacted by the county share of house ownership. The vertical red lines represent confidence intervals at a 90%. Standard errors are clustered at the county level.

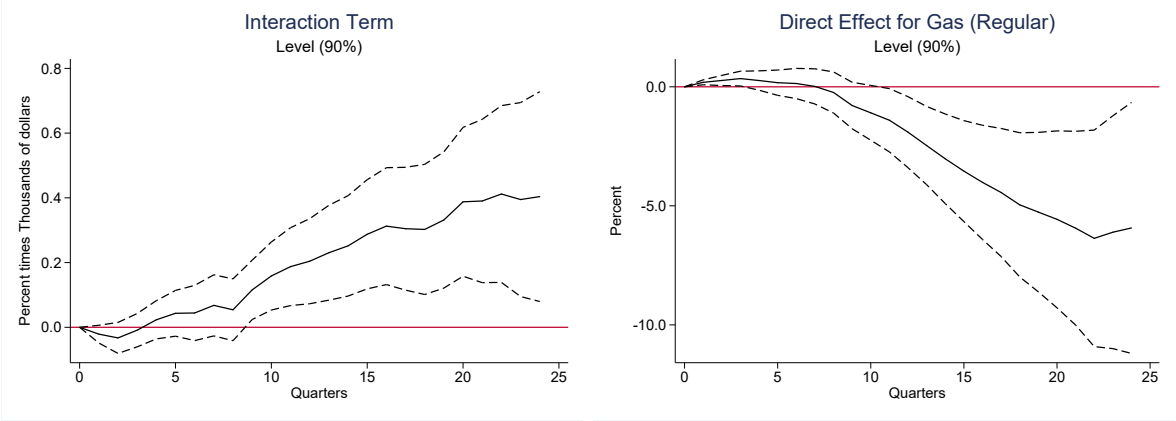
B.2 Monetary Policy and Real Inequality

Figure B.10: Effect of a Monetary Shock with time cluster



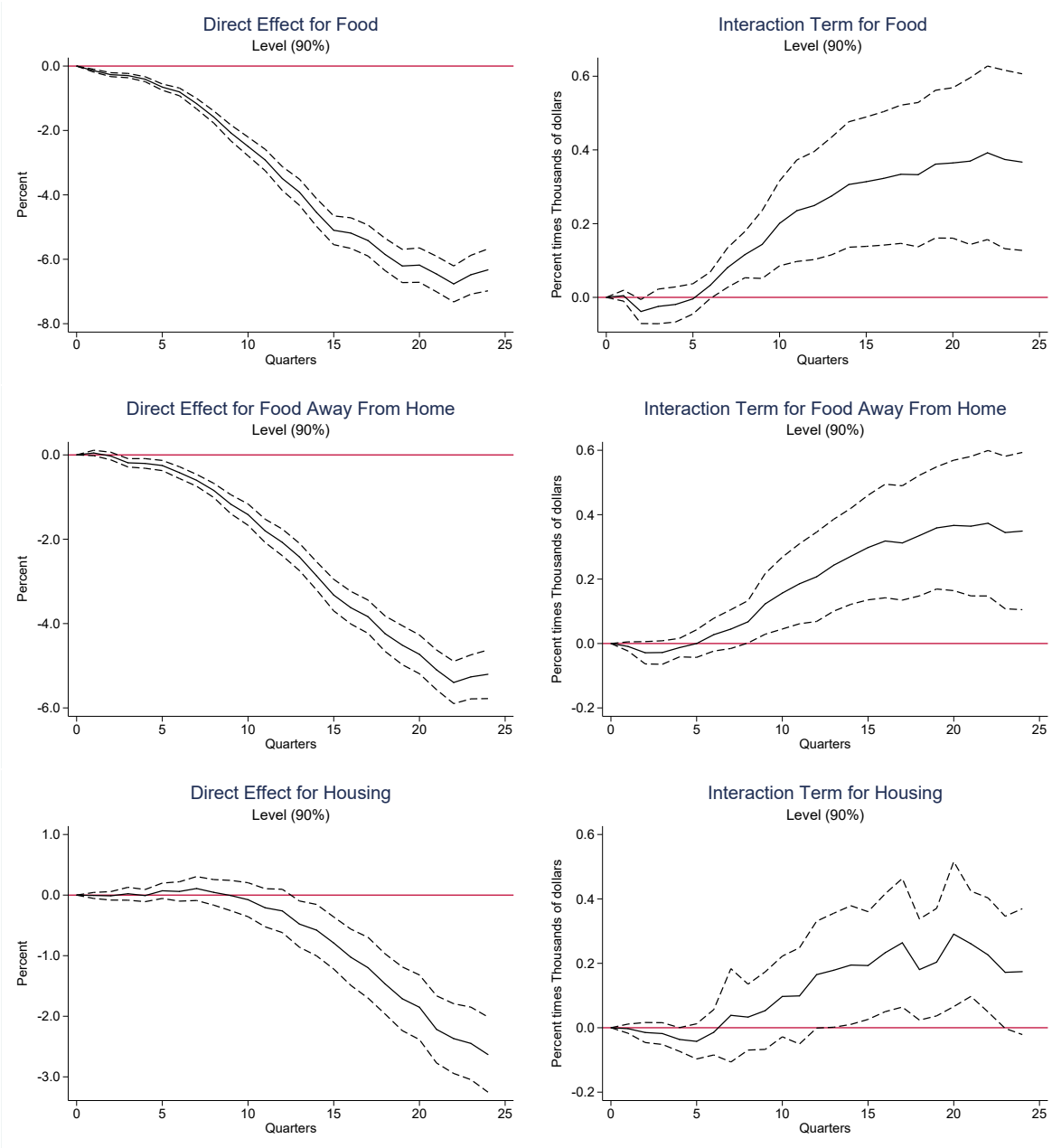
Note: Results for β^h coefficient of specification 3.1. We use $H = 24$ and $J = 4$

Figure B.11: Effect of a Monetary Shock with time cluster



Note: The left panel shows the β^h coefficient and the right panel shows the γ^h coefficient of 3.2 for Food. We use $H = 24$ and $J = 4$

Figure B.12: Effect on Narrow Price Indexes



Note: The left panels shows the β^h coefficient and the right panels shows the γ^h coefficient of 3.2 for different price indexes. We use $H = 24$ and $J = 4$

Appendix C

Other Speeches

Since Roosevelt's inauguration until the event described in this paper, there were six other Fireside chats. I considered the Fireside chat of April 1935 because it involved a policy that affected the consumption-saving decision of individuals and also because it was an isolated event. But other speeches could also affect expectations and improve consumers' mood as is described by many historians. That is why, I will look if there is a reaction around the other speeches. I will exclude the speech of March 12th, 1933, as it was in the middle of a banking holiday, therefore I don't have data around that speech. The following tables show the effect of the other speeches:

Table C.1: Bi-weekly city level regression: Fireside chat of July 24th, 1933

	(1)	(2)	(3)	(4)	(5)	(6)
12-Apr-33	-0.284	-0.193	-0.477**	-0.170	-0.350	-0.388
	(0.191)	(0.170)	(0.201)	(0.181)	(0.435)	(0.452)
26-Apr-33	-0.159	-0.047	-0.325*	-0.036	-0.242	-0.139
	(0.182)	(0.171)	(0.189)	(0.184)	(0.444)	(0.492)
10-May-33	-0.128	-0.077	-0.266	-0.029	-0.037	-0.090
	(0.177)	(0.160)	(0.183)	(0.171)	(0.334)	(0.343)
24-May-33	-0.221	-0.217	-0.331**	-0.178	-0.304	-0.292
	(0.148)	(0.151)	(0.150)	(0.161)	(0.309)	(0.338)
7-Jun-33	-0.121	-0.065	-0.204	-0.028	-0.300	-0.146
	(0.133)	(0.124)	(0.137)	(0.129)	(0.347)	(0.311)
21-Jun-33	-0.057	-0.052	-0.112	-0.061	0.158	0.142
	(0.112)	(0.111)	(0.113)	(0.117)	(0.239)	(0.243)
5-Jul-33	0.070	0.062	0.042	0.037	0.346	0.374
	(0.101)	(0.103)	(0.101)	(0.110)	(0.244)	(0.247)
2-Aug-33	0.236**	0.236**	0.264***	0.181*	0.186	0.210
	(0.095)	(0.098)	(0.097)	(0.101)	(0.262)	(0.278)
16-Aug-33	-0.147	-0.141	-0.091	-0.123	-0.204	-0.176
	(0.135)	(0.140)	(0.134)	(0.137)	(0.290)	(0.316)
30-Aug-33	-0.198	-0.194	-0.116	-0.207	-0.213	-0.173
	(0.155)	(0.157)	(0.157)	(0.161)	(0.458)	(0.470)
13-Sep-33	-0.418***	-0.441***	-0.308**	-0.378***	-0.252	-0.272
	(0.131)	(0.134)	(0.139)	(0.140)	(0.343)	(0.371)
27-Sep-33	-0.333**	-0.335**	-0.194	-0.359**	-0.515	-0.487
	(0.155)	(0.148)	(0.161)	(0.157)	(0.402)	(0.408)
11-Oct-33	-0.559***	-0.591***	-0.393**	-0.613***	-0.773*	-0.925**
	(0.157)	(0.158)	(0.157)	(0.165)	(0.439)	(0.457)
25-Oct-33	-3.475**	-3.454**	-3.281**	-2.554	-2.171	-1.970
	(1.554)	(1.610)	(1.555)	(1.655)	(3.237)	(3.541)
8-Nov-33	-0.339*	-0.396**	-0.118	-0.421**	-0.485	-0.596
	(0.187)	(0.193)	(0.190)	(0.210)	(0.472)	(0.515)
22-Nov-33	-0.595**	-0.475**	-0.347	-0.510**	-0.981**	-0.932*
	(0.231)	(0.203)	(0.243)	(0.224)	(0.493)	(0.516)
6-Dec-33	-0.407*	-0.408*	-0.131	-0.402	-0.872*	-0.898
	(0.219)	(0.226)	(0.221)	(0.247)	(0.491)	(0.545)
20-Dec-33	-0.500**	-0.482**	-0.196	-0.470**	-1.030**	-0.961**
	(0.209)	(0.212)	(0.227)	(0.234)	(0.446)	(0.478)
No Outliers	No	Yes	No	Yes	No	Yes
Controls	No	No	Yes	No	No	No
Observations	4,161	3,990	4,161	3,743	1,729	1,596
Cities	219	210	219	197	91	84

Note: Results for the week ending the on July 19th are omitted. (1) Represent the full-unrestricted sample. (2) eliminates outliers. (3) Adds controls. (4) eliminates cities with a Federal Reserve. (6) includes counties that are more rural than the median. The controls are trends interacted with the share of urban population and the share of black population. Outliers are cities with changes in bigger than 1 and smaller than -1 in

logs. Clusters are at city level. *** p<0.01, ** p<0.05, * p<0.1

Table C.2: Bi-weekly city level regression: Fireside chat of May 7th, 1933 and October 22th, 1933

	May 7th, 1933						October 22th, 1933					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
19-Apr	-0.24‡	-0.21‡	-0.25‡	-0.19*	-0.01	0.05	0.26	0.34‡	0.12	0.41‡	0.59*	0.68‡
	(0.12)	(0.11)	(0.12)	(0.11)	(0.22)	(0.21)	(0.18)	(0.16)	(0.17)	(0.18)	(0.35)	(0.33)
3-May	0.00	0.00	0.00	0.00	0.00	0.00	0.49‡	0.55†	0.37*	0.60†	0.60	0.63*
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.19)	(0.17)	(0.19)	(0.18)	(0.39)	(0.34)
17-May	-0.25‡	-0.31†	-0.24‡	-0.29†	-0.22	-0.26	0.24	0.24	0.13	0.31*	0.38	0.37
	(0.11)	(0.09)	(0.11)	(0.10)	(0.21)	(0.20)	(0.17)	(0.16)	(0.17)	(0.18)	(0.39)	(0.36)
31-May	-0.11	-0.17	-0.09	-0.21*	-0.13	-0.13	0.38‡	0.38†	0.28*	0.39‡	0.46	0.51
	(0.13)	(0.11)	(0.12)	(0.11)	(0.19)	(0.19)	(0.16)	(0.15)	(0.16)	(0.16)	(0.37)	(0.35)
14-Jun	-0.13	-0.14	-0.10	-0.12	-0.15	-0.01	0.36*	0.41‡	0.27	0.48†	0.44	0.63
	(0.16)	(0.14)	(0.16)	(0.15)	(0.32)	(0.31)	(0.19)	(0.16)	(0.19)	(0.17)	(0.50)	(0.43)
28-Jun	0.14	0.05	0.18	-0.01	0.28	0.23	0.63†	0.60†	0.55†	0.59†	0.88‡	0.87*
	(0.15)	(0.13)	(0.15)	(0.14)	(0.31)	(0.28)	(0.16)	(0.16)	(0.16)	(0.17)	(0.44)	(0.45)
12-Jul	0.04	-0.04	0.09	-0.04	0.37	0.31	0.53†	0.51†	0.46†	0.56†	0.97‡	0.94‡
	(0.16)	(0.14)	(0.16)	(0.15)	(0.32)	(0.31)	(0.16)	(0.15)	(0.15)	(0.16)	(0.42)	(0.41)
26-Jul	0.22	0.19	0.29	0.12	0.22	0.29	0.72†	0.74†	0.66†	0.71†	0.82*	0.92‡
	(0.18)	(0.15)	(0.18)	(0.16)	(0.35)	(0.32)	(0.19)	(0.15)	(0.15)	(0.16)	(0.45)	(0.49)
9-Aug	0.04	-0.01	0.11	-0.02	0.07	0.10	0.54†	0.54†	0.48†	0.58†	0.66*	0.73‡
	(0.17)	(0.15)	(0.17)	(0.16)	(0.30)	(0.30)	(0.15)	(0.14)	(0.15)	(0.15)	(0.36)	(0.37)
23-Aug	-0.11	-0.16	-0.03	-0.19	-0.03	0.05	0.38†	0.39‡	0.34‡	0.41‡	0.57	0.68
	(0.19)	(0.16)	(0.19)	(0.18)	(0.38)	(0.35)	(0.15)	(0.15)	(0.14)	(0.16)	(0.38)	(0.42)
6-Sep	-0.19	-0.25	-0.09	-0.23	0.09	0.13	0.31‡	0.30‡	0.28‡	0.37‡	0.69*	0.76*
	(0.18)	(0.16)	(0.18)	(0.17)	(0.38)	(0.36)	(0.14)	(0.14)	(0.13)	(0.15)	(0.36)	(0.39)
20-Sep	-0.36*	-0.43‡	-0.26	-0.44‡	-0.22	-0.21	0.13	0.12	0.11	0.16	0.38	0.43
	(0.19)	(0.17)	(0.19)	(0.18)	(0.40)	(0.35)	(0.11)	(0.11)	(0.11)	(0.12)	(0.36)	(0.36)
4-Oct	-0.18	-0.26	-0.07	-0.30*	-0.42	-0.46	0.31†	0.29‡	0.30†	0.30‡	0.18	0.17
	(0.18)	(0.16)	(0.18)	(0.17)	(0.38)	(0.37)	(0.11)	(0.11)	(0.11)	(0.12)	(0.32)	(0.33)
18-Oct	-0.49‡	-0.55†	-0.37*	-0.60†	-0.60	-0.64*	0.00	0.00	0.00	0.00	0.00	0.00
	(0.19)	(0.17)	(0.19)	(0.18)	(0.38)	(0.34)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
1-Nov	-0.22	-0.32*	-0.09	-0.40‡	-0.45	-0.53	0.27‡	0.23‡	0.28‡	0.20	0.15	0.10
	(0.20)	(0.18)	(0.20)	(0.20)	(0.36)	(0.32)	(0.11)	(0.11)	(0.11)	(0.12)	(0.25)	(0.27)
15-Nov	-0.49‡	-0.48‡	-0.34	-0.50‡	-0.74‡	-0.74‡	0.01	0.07	0.09	0.10	-0.15	-0.10
	(0.21)	(0.19)	(0.21)	(0.21)	(0.33)	(0.29)	(0.13)	(0.12)	(0.13)	(0.13)	(0.24)	(0.26)
29-Nov	-0.44*	-0.44‡	-0.28	-0.50‡	-0.75‡	-0.75†	0.06	0.11	0.09	0.10	-0.16	-0.11
	(0.22)	(0.20)	(0.23)	(0.22)	(0.32)	(0.27)	(0.170)	(0.17)	(0.17)	(0.19)	(0.33)	(0.36)
13-Dec	-0.37*	-0.46‡	-0.21	-0.45‡	-0.81‡	-0.90†	0.12	0.09	0.16	0.15	-0.21	-0.26
	(0.22)	(0.21)	(0.21)	(0.23)	(0.32)	(0.32)	(0.15)	(0.15)	(0.15)	(0.16)	(0.34)	(0.34)
Outliers	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Controls	No	No	Yes	No	No	No	No	No	Yes	No	No	No
Obs	4,674	4,484	4,674	4,237	1,976	1,824	4,674	4,484	4,674	4,237	1,976	1,824
Cities	246	236	246	223	104	96	246	236	246	223	104	96

Note: Results for the week ending the on July 19th are omitted. (1) Represent the full-unrestricted sample. (2) eliminates outliers. (3) Adds controls. (4) eliminates cities with a Federal Reserve. (6) includes counties

that are more rural than the median. The controls are trends interacted with the share of urban population and the share of black population. Outliers are cities with changes in bigger than 1 and smaller than -1 in logs. Clusters are at city level. † $p<0.01$, ‡ $p<0.05$, * $p<0.1$

Table C.3: Bi-weekly city level regression: Fireside chat of June 28th, 1934

	(1)	(2)	(3)	(4)	(5)	(6)
7-Feb-34	0.122	0.051	0.050	0.054	-0.183	-0.270
	(0.155)	(0.152)	(0.153)	(0.167)	(0.335)	(0.315)
21-Feb-34	-0.063	-0.101	-0.128	-0.086	-0.232	-0.304
	(0.125)	(0.126)	(0.126)	(0.138)	(0.264)	(0.256)
7-Mar-34	-0.002	-0.021	-0.059	0.028	-0.047	-0.149
	(0.145)	(0.144)	(0.143)	(0.155)	(0.362)	(0.357)
21-Mar-34	-0.024	-0.035	-0.074	-0.023	-0.131	-0.162
	(0.128)	(0.130)	(0.128)	(0.143)	(0.336)	(0.345)
4-Apr-34	-0.026	-0.087	-0.069	-0.097	-0.415	-0.538
	(0.155)	(0.151)	(0.153)	(0.167)	(0.365)	(0.344)
18-Apr-34	-0.042	-0.045	-0.078	-0.062	0.009	-0.028
	(0.115)	(0.110)	(0.114)	(0.121)	(0.279)	(0.279)
2-May-34	0.052	0.032	0.023	0.008	-0.144	-0.191
	(0.112)	(0.110)	(0.112)	(0.121)	(0.330)	(0.334)
16-May-34	-0.056	-0.130	-0.077	-0.118	-0.034	-0.147
	(0.110)	(0.100)	(0.109)	(0.109)	(0.307)	(0.287)
30-May-34	-0.082	-0.117	-0.096	-0.105	-0.248	-0.309
	(0.107)	(0.105)	(0.107)	(0.114)	(0.308)	(0.306)
13-Jun-34	-0.161	-0.234**	-0.168	-0.214*	0.029	-0.130
	(0.114)	(0.104)	(0.114)	(0.111)	(0.258)	(0.200)
11-Jul-34	-0.122	-0.173	-0.115	-0.134	-0.021	-0.134
	(0.120)	(0.112)	(0.120)	(0.119)	(0.241)	(0.214)
25-Jul-34	-0.025	-0.016	-0.010	-0.006	0.034	0.122
	(0.093)	(0.087)	(0.093)	(0.094)	(0.169)	(0.163)
8-Aug-34	-0.132	-0.198*	-0.110	-0.152	-0.106	-0.218
	(0.124)	(0.113)	(0.125)	(0.118)	(0.245)	(0.213)
22-Aug-34	-0.236*	-0.252*	-0.207	-0.246*	-0.520*	-0.527*
	(0.130)	(0.129)	(0.131)	(0.136)	(0.296)	(0.305)
5-Sep-34	-0.323**	-0.407***	-0.287*	-0.418***	-0.196	-0.395
	(0.154)	(0.142)	(0.154)	(0.153)	(0.345)	(0.297)
19-Sep-34	-0.415***	-0.476***	-0.372***	-0.458***	-0.423	-0.513*
	(0.142)	(0.135)	(0.140)	(0.147)	(0.271)	(0.262)
3-Oct-34	-0.313*	-0.395**	-0.263	-0.403**	-0.373	-0.489
	(0.162)	(0.156)	(0.161)	(0.173)	(0.345)	(0.326)
17-Oct-34	-0.452**	-0.530***	-0.395*	-0.497**	-0.680*	-0.788**
	(0.205)	(0.202)	(0.202)	(0.228)	(0.362)	(0.343)
31-Oct-34	-0.286	-0.363*	-0.222	-0.371	-0.573	-0.658*
	(0.204)	(0.203)	(0.200)	(0.231)	(0.370)	(0.371)
14-Nov-34	-0.409**	-0.489**	-0.338*	-0.450**	-0.564	-0.698*
	(0.198)	(0.191)	(0.195)	(0.215)	(0.390)	(0.363)
28-Nov-34	-0.384**	-0.356*	-0.306*	-0.351*	-0.608*	-0.634**
	(0.182)	(0.184)	(0.178)	(0.205)	(0.307)	(0.317)
No Outliers	No	Yes	No	Yes	No	Yes
Controls	No	No	Yes	No	No	No
Observations	6,760	6,578	6,760	6,240	2,990	2,938
Cities	260	253	260	240	115	113

Note: Results for the week ending the on July 19th are omitted. (1) Represent the full-unrestricted sample. (2) eliminates outliers. (3) Adds controls. (4) eliminates cities with a Federal Reserve. (6) includes counties that are more rural than the median. The controls are trends interacted with the share of urban population and the share of black population. Outliers are cities with changes in bigger than 1 and smaller than -1 in logs. Clusters are at city level. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table C.4: Bi-weekly city level regression: Fireside chat of September 30, 1934

	(1)	(2)	(3)	(4)	(5)	(6)
14-Feb-34	0.398**	0.374**	0.274*	0.429***	0.419	0.262
	(0.158)	(0.152)	(0.155)	(0.163)	(0.286)	(0.245)
28-Feb-34	0.363**	0.441***	0.246	0.469***	0.315	0.288
	(0.164)	(0.152)	(0.160)	(0.163)	(0.247)	(0.254)
14-Mar-34	0.311*	0.321*	0.202	0.357**	0.304	0.183
	(0.168)	(0.164)	(0.165)	(0.175)	(0.314)	(0.296)
28-Mar-34	0.332**	0.390**	0.231	0.410**	0.142	0.171
	(0.163)	(0.159)	(0.158)	(0.171)	(0.264)	(0.273)
11-Apr-34	0.342**	0.351**	0.249	0.350**	0.292	0.142
	(0.161)	(0.152)	(0.155)	(0.164)	(0.299)	(0.263)
25-Apr-34	0.413***	0.501***	0.328**	0.493***	0.352	0.411
	(0.143)	(0.140)	(0.140)	(0.151)	(0.262)	(0.271)
9-May-34	0.370**	0.361**	0.292**	0.353**	0.347	0.230
	(0.149)	(0.145)	(0.146)	(0.158)	(0.296)	(0.278)
23-May-34	0.246	0.290*	0.175	0.311*	0.228	0.207
	(0.150)	(0.148)	(0.146)	(0.161)	(0.282)	(0.286)
6-Jun-34	0.293*	0.302**	0.231	0.306**	0.425	0.289
	(0.151)	(0.141)	(0.148)	(0.152)	(0.289)	(0.263)
20-Jun-34	0.263**	0.313**	0.208	0.344**	0.377	0.394
	(0.129)	(0.123)	(0.129)	(0.133)	(0.233)	(0.240)
4-Jul-34	0.340**	0.358**	0.294*	0.375**	0.542*	0.451
	(0.157)	(0.151)	(0.152)	(0.164)	(0.309)	(0.312)
18-Jul-34	0.212	0.286**	0.173	0.329**	0.340	0.417
	(0.148)	(0.139)	(0.146)	(0.149)	(0.312)	(0.302)
1-Aug-34	0.413***	0.434***	0.382***	0.468***	0.536*	0.505*
	(0.146)	(0.147)	(0.143)	(0.158)	(0.281)	(0.285)
15-Aug-34	0.115	0.144	0.092	0.187	0.131	0.099
	(0.146)	(0.144)	(0.145)	(0.153)	(0.333)	(0.338)
29-Aug-34	0.011	0.048	-0.005	0.055	-0.107	-0.176
	(0.117)	(0.115)	(0.116)	(0.126)	(0.231)	(0.229)
12-Sep-34	-0.003	-0.032	-0.011	-0.010	0.205	0.011
	(0.117)	(0.102)	(0.117)	(0.111)	(0.253)	(0.198)
10-Oct-34	0.017	0.001	0.025	0.038	0.007	-0.144
	(0.142)	(0.126)	(0.142)	(0.142)	(0.235)	(0.177)
24-Oct-34	-0.041	-0.025	-0.025	0.001	-0.251	-0.271
	(0.160)	(0.162)	(0.159)	(0.183)	(0.204)	(0.209)
7-Nov-34	0.103	0.070	0.126	0.091	0.040	-0.097
	(0.160)	(0.152)	(0.160)	(0.170)	(0.273)	(0.230)
21-Nov-34	-0.102	-0.024	-0.071	0.027	-0.218	-0.207
	(0.166)	(0.155)	(0.165)	(0.172)	(0.226)	(0.232)
5-Dec-34	0.105	0.129	0.144	0.117	-0.042	-0.185
	(0.165)	(0.155)	(0.166)	(0.163)	(0.311)	(0.282)
No Outliers	No	Yes	No	Yes	No	Yes
Controls	No	No	Yes	No	No	No
Observations	6,240	6,072	6,240	5,760	2,760	2,712
Cities	260	253	260	240	115	113

Note: Results for the week ending the on July 19th are omitted. (1) Represent the full-unrestricted sample. (2) eliminates outliers. (3) Adds controls. (4) eliminates cities with a Federal Reserve. (6) includes counties that are more rural than the median. The controls are trends interacted with the share of urban population and the share of black population. Outliers are cities with changes in bigger than 1 and smaller than -1 in logs. Clusters are at city level. *** p<0.01, ** p<0.05, * p<0.1

The tables show that there is heterogeneity on the effect of different Fireside Chats. In May 1933, Roosevelt gave a speech about the New Deal. In that speech Roosevelt explained how the New Deal was going. During the speech, Roosevelt recognized some mistakes[1] and also explained some challenges for the policies that he was pursuing. Also this speech, according to some sentiment analysis, is considered pessimistic. That can explain that there is a negative reaction of bank debits after the speech. Nevertheless, this speech was pronounced in a period of a lot of changes. It was in the middle of the "Hundred Years" and just before the announcement of the end of the Gold Standard in June, so this effect might be contaminated also by that heterogeneity, where the radio could have played a role in communicating these policies.

The speech of July 1933 is followed by a big and short lived positive increase in bank debits. This speech was more optimistic and presented results from the hundred years. This speech was after the congress passed the farm and industrial recovery acts, so he could explain the effects of its policies, giving practical examples. The speech of October 1933 also presents a positive and short lived effect.

The other speeches in 1934 don't have a significant effect. This could be because no big announcement were made or because of the topics. The analysis of why a speech works or not goes beyond the purpose of this paper, but it seems that the fact of announcing a relevant policy can make a difference. In particular, the speech of April 1935 talked about future policies, which can explain the big economic effect of that announcement. The rest mostly described short run policies, without changes in future benefits or taxes, which can explain the small effect. The effect could be stronger in more benefit groups.

In addition to those Fireside Chats, President Roosevelt had another speech in 1935, where he announced some of the characteristics of the policies announced in the Fireside Chat of April 28th, 1935. This was the State of the Union of January 4th, 1935. This speech was on a week day at noon. This means that my measure of exposure could not be a good proxy of the share of the population that listened to the speech; if people were not at their houses, then they could listen in other places, also they might not be able to hear the speech if they were working. I run specification 1.2 around that event. Results are presented in table C.5:

[1] "I do not deny that we may make mistakes of procedure as we carry out the policy."

Table C.5: Bi-weekly city level regression: State of the Union and Message to the Congress

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
15-Aug-34	0.104	0.151	0.064	0.120	0.206	0.225	0.124
	(0.195)	(0.196)	(0.198)	(0.199)	(0.209)	(0.226)	(0.200)
29-Aug-34	0.012	0.054	-0.038	0.013	0.048	0.061	0.012
	(0.191)	(0.192)	(0.187)	(0.186)	(0.198)	(0.214)	(0.188)
12-Sep-34	-0.061	-0.023	-0.175	-0.131	-0.078	-0.001	-0.124
	(0.187)	(0.184)	(0.184)	(0.182)	(0.196)	(0.201)	(0.183)
26-Sep-34	-0.054	-0.021	-0.127	-0.088	-0.068	0.061	-0.084
	(0.179)	(0.178)	(0.169)	(0.167)	(0.180)	(0.176)	(0.168)
10-Oct-34	-0.229	-0.201	-0.314*	-0.281	-0.230	-0.161	-0.268
	(0.173)	(0.172)	(0.172)	(0.171)	(0.184)	(0.191)	(0.172)
24-Oct-34	-0.355**	-0.331*	-0.408**	-0.380**	-0.348*	-0.333*	-0.372**
	(0.180)	(0.181)	(0.174)	(0.174)	(0.188)	(0.196)	(0.175)
7-Nov-34	-0.157	-0.139	-0.256	-0.233	-0.189	-0.159	-0.231
	(0.172)	(0.171)	(0.167)	(0.167)	(0.180)	(0.192)	(0.168)
21-Nov-34	-0.427***	-0.413***	-0.416***	-0.399***	-0.339**	-0.322**	-0.390***
	(0.147)	(0.148)	(0.141)	(0.140)	(0.149)	(0.157)	(0.141)
5-Dec-34	-0.167	-0.157	-0.240*	-0.229*	-0.218	-0.271*	-0.229*
	(0.134)	(0.134)	(0.131)	(0.131)	(0.132)	(0.141)	(0.132)
19-Dec-34	-0.083	-0.078	-0.100	-0.095	-0.033	-0.035	-0.106
	(0.126)	(0.126)	(0.123)	(0.123)	(0.130)	(0.140)	(0.123)
16-Jan-35	0.029	0.025	-0.029	-0.035	0.020	0.043	-0.038
	(0.123)	(0.124)	(0.121)	(0.121)	(0.129)	(0.138)	(0.122)
30-Jan-35	0.270**	0.260**	0.159	0.148	0.198	0.169	0.143
	(0.129)	(0.130)	(0.117)	(0.117)	(0.128)	(0.136)	(0.118)
13-Feb-35	0.111	0.097	-0.002	-0.018	0.072	0.116	-0.014
	(0.146)	(0.148)	(0.135)	(0.136)	(0.145)	(0.157)	(0.137)
27-Feb-35	0.147	0.128	0.043	0.021	0.084	0.115	0.023
	(0.141)	(0.144)	(0.132)	(0.133)	(0.143)	(0.155)	(0.134)
13-Mar-35	0.154	0.130	0.024	-0.004	0.048	0.077	-0.012
	(0.160)	(0.163)	(0.146)	(0.147)	(0.158)	(0.174)	(0.148)
27-Mar-35	0.234*	0.206	0.129	0.096	0.141	0.113	0.088
	(0.139)	(0.143)	(0.127)	(0.129)	(0.138)	(0.151)	(0.130)
10-Apr-35	0.115	0.082	0.022	-0.017	0.056	0.074	-0.024
	(0.146)	(0.151)	(0.138)	(0.140)	(0.147)	(0.162)	(0.141)
24-Apr-35	0.194	0.156	0.076	0.031	0.122	0.116	0.033
	(0.162)	(0.168)	(0.150)	(0.154)	(0.163)	(0.175)	(0.155)
8-May-35	0.393***	0.351**	0.286**	0.236	0.301**	0.308*	0.223
	(0.150)	(0.157)	(0.141)	(0.146)	(0.152)	(0.165)	(0.146)
22-May-35	0.338**	0.291*	0.228	0.172	0.310*	0.304*	0.181
	(0.161)	(0.169)	(0.154)	(0.160)	(0.164)	(0.179)	(0.160)
5-Jun-35	0.110	0.058	0.014	-0.048	0.031	-0.006	-0.045
	(0.161)	(0.167)	(0.156)	(0.160)	(0.162)	(0.178)	(0.161)
No Outliers	No	No	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes	Yes	Yes	Yes
Cities	259	259	255	255	242	228	254
Observations	6,475	6,475	6,375	6,375	6,050	5,700	6,350

Note: Week ending the on January 2th is omitted. (1) unrestricted. (2) adds controls. (3) drops outliers. (4) drops outliers and includes controls. (5) drops cities with a Federal Reserve. (6) drops 10% of the cities with the highest and lowest average debits. (7) drops New York City. Controls are trends interacted with the share of urban population, black population and population older than 55 years old. Outliers are cities with changes in log bigger than 1 in absolute value. Standard errors are clustered at city level. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Appendix D

Other Macroeconomic Aggregate

The results presented above indicate an increase in economic activity in terms of the spending of certain durable goods and reductions of saving. If this is the case, we should also see an increase in economic activity. The effects found shows that, even controlling by the base economic activity, we have a significant economic effect in some micro-variables, but we still don't know what happened with macroeconomic aggregates. In this section, we will see what happened with income, inflation, and employment after the event in regions more affected by the speech. For income, I use personal income per capita at the state level from the BLS. I run the same specification than before, but in this case, I don't have controls.

For employment, I use manufacturing employment and non-manufacturing employment from Wallis (1989). He had an index for each of the 49 continental states. As we don't have data for Alaska, we stay with 48 states. The separation between manufacturing and non-manufacturing helps, as it indicates a measure of how tradable is the sector, if the effect is local, the non-manufacturing sector should have a differential impact.

In the case of the inflation data, CPI was obtained at a city level at that time. The BLS collected data in Chicago, Boston, New York City, Philadelphia, Pittsburgh, Saint Louis, Detroit, Cincinnati, Cleveland, Kansas City, Atlanta, Dallas, San Francisco, Los Angeles, and Seattle. I run that regression controlling by state income and Federal Aid. The following table presents the results for income, employment, and inflation:

Table D.1: Macro Variables and Radio

	(State Level)				(City Level)	
	GDP pc growth	GDP pc	Mnf Empl	N-Mnf Empl	Inflation	Inflation
I(1930)*radio	0.448***	505.522***	42.1**	0.10	0.088***	0.032
	(0.146)	(77.953)	(17.23)	(18.35)	(0.024)	(0.034)
I(1931)*radio	0.368**	380.485***	38.5**	-1.02	0.069**	0.029
	(0.155)	(99.330)	(17.04)	(19.63)	(0.034)	(0.042)
I(1932)*radio	0.503***	200.322*	28.7**	-11.02	0.075	0.063
	(0.130)	(100.505)	(10.56)	(14.26)	(0.056)	(0.048)
I(1933)*radio	-0.000	2.651	12.5	11.3	-0.040*	-0.035
	(0.125)	(37.653)	(10.07)	(9.61)	(0.021)	(0.027)
I(1935)*radio	0.451***	123.186***	4.94	18.8*	0.088**	0.087**
	(0.135)	(21.500)	(7.76)	(10.71)	(0.041)	(0.040)
I(1936)*radio	0.271**	270.369***	-0.71	- 16.4	0.075***	0.076**
	(0.120)	(53.608)	(11.50)	(11.90)	(0.028)	(0.030)
I(1937)*radio	0.350***	353.841***	-7.32	-1.68	0.107***	0.101***
	(0.121)	(75.076)	(12.46)	(11.77)	(0.033)	(0.035)
I(1938)*radio	0.349***	250.773***	-18.2*	12.8	0.034	0.051**
	(0.125)	(32.057)	(9.70)	(19.75)	(0.021)	(0.025)
I(1939)*radio	0.270***	307.016***	-2.53	11.7	0.078***	0.079***
	(0.089)	(56.463)	(12.3)	(18.48)	(0.019)	(0.028)
Federal aid						-0.000**
						(0.000)
State income						0.000
						(0.000)
Observations	490	490	480	480	140	140
R-squared	0.877	0.991	0.904	0.862	0.945	0.951

Note: *** p<0.01, ** p<0.05, * p<0.1. This table shows results for regressions, where the independent variable is a year dummy interacted by the regional share of radio. The dependent variable is presented on the top of the column. Income per capita growth and income per capita are at the state level and comes from the BLS. Manufacturing and non-manufacturing employment comes from Wallis (1989) and are at the state level. Inflation data comes from the BLS are are at the city level for 14 cities. Standard errors are clustered at the state level for the first four columns and at the city level in the case of the column 5 and 6.

We can see a positive effect after the reform. For income per capita at a state level we can see that the effect is significant for income per capita in levels and growth. We see also that these regions were growing faster at the beginning of the period. This result could indicate that they might have been suffering some recession before the reform, which suggests the importance of controlling for economic activity in the previous estimate. In Appendix A.2. there are Figures that shows the estimates of the table for each variable.

In the case of employment, we can see that in the case of manufacturing employment there

is no effect in the period after the speech. The effect is small and not statistically significant. In the case of non-manufacturing employment, we can see a high and significant impact. These results are consistent with a local increase in economic activity, with an increase in the non-tradable sector. If the effect is local, the increase in the demand for tradable goods should be similar in every region, as the rise in the demand comes from everywhere. Also, if the regions consume a small proportion of its manufacturing goods, an increase in economic activity should not increase employment in that specific region for that sector. In the case of non-tradable goods, this should be different, as the demand for local goods increases, so employment increases, as locals consume more those goods, relative to the other region. For that reason, the results are consistent with the shock that I am evaluating.

In the case of inflation, results are cleaner. Pre-trends are not present, as coefficients are not significant. The effect lasts more periods after the event. We see a positive and significant effect. Regions more exposed to the speech through the radio present higher inflation, which is another indicator of recovery through an demand shock. This result presents more evidence on the importance of expectations, in particular in cases of recession, where demand is contracted, and there are restrictions to stimulate output.

In general, we see that most of the economic indicators present an increase after the event in regions exposed to the radio. In particular, we see a difference between manufacturing and non-manufacturing sectors, that is consistent with growth in the local non-tradable sector. I will explore more those results in the theoretical section. Overall, we can see that the speech had a countercyclical effect.

Appendix E

Model the Tax Announcement

The empirical results indicate that cities more exposed to the speech reacted by spending more on durable goods. Though Roosevelt's speech had several features but, , I now turn to focus solely on the fiscal side. The WPA and SSA represented future increases in government expenditures that were financed with a future permanent payroll tax. This policy mix, which has recent incarnations in the United States and other countries, has been the subject of examination in the economics literature. For example, D'Acunto, Hoang and Weber (2018) examine how announcements of future increases in consumption taxes stimulate spending through inter-temporal substitution without increasing government debt. D'Acunto, Hoang and Weber (2016), find that an increase in spending on durable goods accounts for one the mechanism underpinning the increase in spending after a VAT announcement in Germany. Their measure in comparison to the measure used in this paper, is less direct; it relies on a binary survey question about specific durable goods. Johnson, Parker and Souleles (2006), Parker, Souleles, Johnson and McClelland (2013) and Sahm, Shapiro and Slemrod (2012) document increases in non-durable spending after tax rebates in 2001 and 2008 in the United States. Parker (1999) and Kueng (2014) find increases in non-durable spending after announcements of decreases in income taxes. Hence, my analysis of the 1935 Fireside Chat has the potential to inform us not only about a particular episode, but also about recent experience.

To rationalize the empirical findings through the lens of theory and incorporate the evidence of other academic works, I develop a multi-region sticky information model (e.g. Mankiw and Reis (2002), Reis (2006b), Reis (2006a), Coibion (2006)), in which regions have different level of information stickiness. My framework also builds on models of durable goods (as in Barsky, House and Kimball (2007) and Engel and Wang (2011)). The model also tries to understand the level inattention in the data and how radio usage helped to reduce inattention with the announcement.

Having consumers with sticky information implies that in each period there is a constant probability of updating information. Roosevelt's speech can be interpreted as an increase of

the perceived probability that the WPA and SSA will be implemented. Therefore, consumers who listened to the speech would adjust their expectations given this announcement, while consumers who did not listen to the speech would maintain the same expected consumption path. In that sense, a higher probability of updating information could be associated with listening to the speech, hence with a higher share of radio ownership. Later in this section, I relate radio usage and the speed of information updating in the model.

In this version of the model, only consumers have sticky information. They live in one of many symmetric regions in the economy. In each region, there is a tradable durable and non-durable sector with perfectly competitive firms. There is no labor mobility between regions, but there is perfect labor mobility across sectors in a region. There is a single monetary policy that targets aggregate variables. Goods can be traded across regions with no trade costs, and consumers have preferences for varieties of goods produced everywhere.

E.1 Setting

I start with a version of the model in which there are only two regions $r = \{A, B\}$. Each region has a representative agent i that, given her information in time t, consumes a final good bundle $X_{r,t}$ and supplies labor $N_{r,t}$. The consumption bundle is composed of the flow of a non-durable good (C) and the stock of a durable good (D) that depreciates at rate δ. The representative consumer maximizes:

$$\max E_{t-k} \sum_{z=0}^{\infty} \beta^z \left[\log X_{r,t+z} - \frac{\nu}{1+\psi} N_{r,t+z}^{1+\psi} \right]$$

subject to

$$P_{r,C,t+z} C_{r,t+z} + P_{r,D,t+z} I_{r,t+z} + B_{r,t+z} \leq (1 - \tau_{r,t}) W_{r,t+z} N_{r,t+z} + B_{t+z-1} R_{r,t+z-1} + T_{r,t+z}$$

with

$$X_{r,t+z} = \left[(1-\alpha)^{\frac{1}{\eta}} C_{r,t+z}^{\frac{\eta-1}{\eta}} + \alpha^{\frac{1}{\eta}} D_{r,t+z}^{\frac{\eta-1}{\eta}} \right]^{\frac{\eta}{\eta-1}} \tag{E.1}$$

and

$$I_{r,t} = D_{r,t} - (1-\delta) D_{r,t-1}$$

$N_{r,t}$ is the labor supply, which can be provided to both sectors D and C with $N_{r,t} = N_{C,r,t} + N_{D,r,t}$. $W_{r,t}$ the wage earned in region $r = A, B$, as there is free labor mobility within a

region, wages across sectors are equalized, therefore $W_{r,t} = W_{D,r,t} = W_{C,r,t}$. $B_{r,t}$ is the holding risk-less bond, that costs R_t. $C_{r,t}$ is the consumption of non-durables and $D_{r,t}$ is the stock of durables. Both of them aggregate to $X_{r,t}$ given by equation E.1. Finally, $T_{r,t}$ are transfers from the government and $\tau_{r,t}$ payroll taxes charged to the consumers to finance those transfers. As firms are competitive, profits are zero. The non-durable consumption bundle consists of one good produced locally (H) and another produced abroad (F) with a common elasticity of substitution between both goods ω_c. ϕ_c represents a preference shifter that is between zero and one. If $\phi \in (0.5, 1]$ the local consumer has home bias. The non-durable consumption bundle is given by:

$$C_{r,t} = \left[\phi_c^{\frac{1}{\omega_c}} C_{H,r,t}^{\frac{\omega_c - 1}{\omega_c}} + (1-\phi_c)^{\frac{1}{\omega_c}} C_{F,r,t}^{\frac{\omega_c - 1}{\omega_c}} \right]^{\frac{\omega_c}{\omega_c - 1}}$$

The corresponding price index of the non-durable consumption bundle is:

$$P_{r,C,t} = \left[\phi_c P_{C,H,r,t}^{1-\omega_c} + (1-\phi_c) P_{C,H,r',t}^{1-\omega_c} \right]^{\frac{1}{1-\omega_c}}$$

where r' is B when $r = A$ and vice versa. $P_{C,H,r,t}$ is the price of the non-durable good produced in r and $P_{C,H,r',t}$ is the price of the non-durable good produced in $r' \neq r$. The durable good is also tradable, and given by:

$$D_{r,t} = \left[\phi_d^{\frac{1}{\omega_d}} D_{H,r,t}^{\frac{\omega_d - 1}{\omega_d}} + (1-\phi_d)^{\frac{1}{\omega_d}} D_{F,r,t}^{\frac{\omega_d - 1}{\omega_d}} \right]^{\frac{\omega_d}{\omega_d - 1}}$$

and its price index is defined as:

$$P_{r,D,t} = \left[\phi_d P_{D,H,r,t}^{1-\omega_d} + (1-\phi_d) P_{D,H,r',t}^{1-\omega_d} \right]^{\frac{1}{1-\omega_d}}$$

with $P_{D,H,r,t}$ the price of the durable good produced in r and $P_{D,H,r',t}$ the price of the durable good produced in $r' \neq r$.

I introduce inattentive consumers as in Coibion (2006), Mankiw and Reis (2007), and Reis (2006a). Consumers in region $r = A, B$ adjust their information with an exogenous probability $(1 - \mu_r)$. Then, the representative consumer in each region decides her consumption path depending on whether she has updated information. Consumers who do not adjust information at the moment of the announcement will act as if the announcement was not made. They will continue following the path of consumption previously decided. Consumers who heard the announcement adjust information and revise their consumption plans accordingly. Therefore, $1 - \mu_r$ represents the fraction of consumers who update information in a given region (i.e. that listened to the announcement). I relate $1 - \mu_r$ to the measure of exposure used in the empirical part of this paper. Specifically, listening to the speech increased the perceived probability that the WPA and SSA will be implemented in policy, leading consumers who listened to the speech to react according to those anticipated policies.

In an extreme case, if nobody listens to the speech, nothing new happens.

Given this setting, the log-linearized level of desire consumption is defined by $\check{c}^*$ in the case of the non-durable good and $\check{d}^*$ for the durable good.[1] Then, time t log-linearized consumption of the non-durable good in region r and produced in region s, $\check{c}_{s,r,t}$ is given by:

$$\check{c}_{s,r,t} = (1-\mu_r)\sum_{i=0}^{\infty}\mu_r^i E_{t-i}\check{c}^*_{s,r,t}$$

and in the case of the durable good:

$$\check{d}_{s,r,t} = (1-\mu_r)\sum_{i=0}^{\infty}\mu_r^i E_{t-i}\check{d}^*_{s,r,t}$$

Expectations about future will be particularly important for the consumption of the durable good, as consumers will not want to over-or under-consume in case a particular shock happens in the future.

Firms produce with labor, and have constant returns to scale in a perfectly competitive market. They don't face any rigidity in pricing or information. Hence, price is equal to the marginal cost. Production function is linear in labor; therefore the firms' optimization problem gives the following price equation:

$$P_{H,s,r,t} = \frac{W_{r,t}}{A_{r,s,t}}$$

for sector $s = c, d$ in region r. $A_{r,s,t}$ is the total factor productivity of the firm that is normalized to one in steady state. The market clearing condition is:

$$Y_{r,C,t} = C_{H,r,t} + C_{F,r',t}$$

and

$$Y_{r,D,t} = I_{H,r,t} + I_{F,r',t}$$

Finally, the monetary authority targets the national nominal GDP. There is no monetary shock, therefore

$$M_t = \sum_{r=1}^{2}(P_{C,H,r,T}Y_{r,C,t} + P_{D,H,r,T}Y_{r,D,t})$$

with $M_t = \bar{M}$.

[1] Details of the model derivation are in Appendix E.5

E.2 Calibration

Following Barsky, House and Kimball (2007), I set the substitution between durable and non-durable $\eta = 1$ and preferences for durables $\alpha = 0.25$. From Nakamura and Steinsson (2014) I get the preference for local for local goods $\phi_s = 0.7$ and the Frisch elasticity $\psi^{-1} = 1$. Engel and Wang (2011) provided the elasticity of substitution between local and foreign goods $\omega_s = 7$ and the quarterly depreciation rate of durable $\delta = 0.05$. The intertemporal discount factor is $\beta = 0.995$.

E.3 Policy Announcement

The objective of this section is to show how the model behaves with an announcement similar to the one explored in the empirical part. I simulate the effect of the announcement of an increase in payroll taxes. To simplify the effect of the tax, the revenues of the tax will be transferred completely to consumers according to their contribution in each region. This shock aims to mimic some features of the SSA. The act explicitly included an increase in payroll tax and Roosevelt mentioned it in the speech.[2]

Eventually, this shock will produce an increase in the cost of labor, affecting the consumption-leisure optimality condition. As the shock is permanent, it should produce a decrease in consumption of both goods. In a model with symmetric regions, only non-durable goods, and no frictions, the shock will produce a decrease of spending at the moment that it happens, rather than at the time when the shock is announced. Regions will not borrow from each other as they have the same information, and they do not have any other instrument to smooth the shock.

This result changes with a durable good. Durable goods allow consumers to have intertemporal substitution. Therefore, regions can change their spending on durable good today to smooth the shock. This will allow them to have a bigger stock of durables at the moment of the shock. With this higher stock, they can decrease the spending on durable $I_{r,t}$ strongly at the moment when the policy is implemented. With this adjustment, households can smooth both the consumption of durables, which will depreciate slowly, and the consumption of non-durable goods, as the adjustment is produced by the flow durable goods. That is why, with full information, both regions should increase their consumption of durable good at the moment of the announcement. A similar result is found in Yang (2005) for tax announcements. Mertens and Ravn (2011) reports similar results with more general prefer-

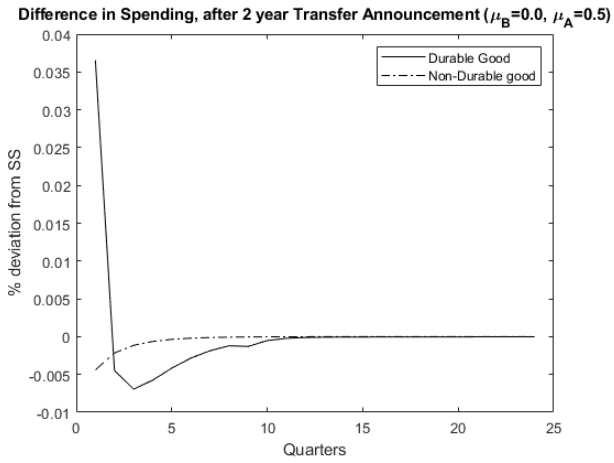
[2] As he said "It is obvious that we cannot continue to create governmental deficits for that purpose year after year. We must begin now to make provision for the future. That is why our social security program is an important part of the complete picture."

ences.

With heterogeneity in the information adjustment parameter μ_r between regions r, consumers in the more informed region receive the announcement earlier, in the same way that listening to Roosevelt's speech can produce an increase in the perceived probability that the policy will occur. Therefore, we should expect an increase in spending on durables in the more informed region in anticipation to an announcement of a payroll tax. Prices also play a role here. The announcement increases the demand for durables goods. As durable goods are tradable, the change in price will be a function of how many households know about the announcement. This will produce a relatively low price of durable good for the more informed region compared with the less informed region, which will perceive the price as relatively high. This difference in the perceived price of durable good and the value that each region gives to the durable good will increase even more the difference in the spending on durable goods.

To simulate the effect of being exposed to the speech, region B will be relatively more attentive compared to region A. In the following simulation I will assume that region B is always fully informed, and region A is partially adapting to information each period ($\mu_A = 0.5$, $\mu_B = 0$). Then, I shock the economy with an announcement of a direct transfer $T_{r,t}$ completely financed by a 1 percent permanent increase in taxes τ_r, t for both regions. The following figure shows the differential effect on spending in region B compared with region A on durable and non-durables goods expenditure after the announcement ($P_{D,B,t}I_{B,t} - P_{C,B,t}I_{A,t}$ for durable goods and $P_{C,B,t}C_{B,t} - P_{C,A,t}C_{A,t}$ for non-durable goods).

Figure E.1: Simulations of the Effects of Announcing a Payroll Tax and Transfer Two Years in Advance

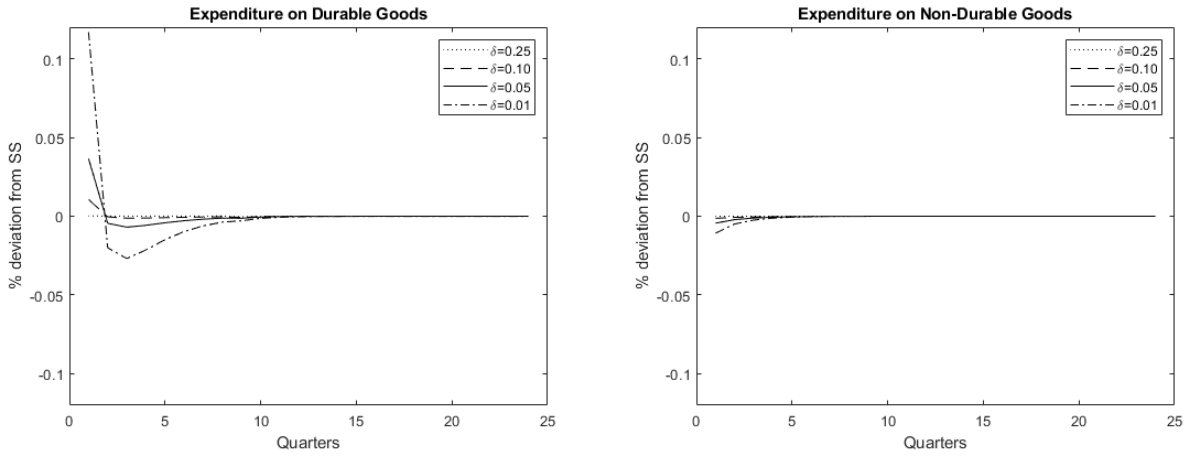


Note: The figure displays the quarterly difference in spending between two regions after an announcement made two years before a 1 percent increase in payroll taxes returned as a transfer to consumers. The difference is computed as the spending of the more attentive region (B) minus the spending of the less attentive region.

After the announcement, expenditures on non-durable good does not react very differently across regions. There is a small relative increase in expenditure in the less attentive region, but the difference is not persistent. In the case of the durable good, the more informed region strongly increases its expenditures relative to the other. The reaction of the difference in durable goods expenditures is strong in the first period, but it rapidly goes to small negative numbers before it converges to zero. Intuitively consumers in the more informed region anticipate the shock and want to smooth their consumption, anticipating the increase in the cost of labor as discussed before. Because today's spending will affect future consumption of the stock of durable goods, more attentive consumers react strongly to the announcement today. The more attentive region reacts strongly only for one period. The effect is not very persistent because in region B all the consumers adjust their information at the moment of the shock ($\mu_B = 0$). In the following periods, more consumers in region A adjust, which creates the relative increase in the stock of durable.

To show the importance of durable good, I run the same simulation, but now the durable good will depreciate at different rates. This simulation aims to show that the effect found in the last figure comes from the durable component of the good. Figure E.2 shows the results:

Figure E.2: Simulations for Different δ



Note: The figure displays the quarterly difference in expenditure between two regions after an announcement made two years before of a transfer financed with a one percent permanent increase in payroll taxes when there are only non-durable goods. The difference is computed as the spending of the more attentive region (B) minus the spending of the less attentive region. The left panel shows the difference in expenditure on durable goods, and the right panel shows the difference in expenditure of non-durable good. The figure the simulation of the same shocks but changing the value of the durable depreciation rate δ

The left panel of Figure E.2 shows that as the durable good depreciates faster, the effect of the announcement in the more attentive region becomes smaller relative to the other region. For low values of depreciation, the differential effect is big, with a high reaction in the more attentive region. The graph shows that for a value of 0.25, meaning that the good depreciates completely in a year, the effect is very small. In an extreme case of $\delta = 1$, the difference between regions is zero until the announcement, when the more attentive region react differentially, but in a very small magnitude compared with the reaction with low depreciation rates. In the case of the non-durable good, there is a small reaction to accommodate the change in durable spending. Those differences disappear when there is no durable good.

These results underscore the importance of durable goods in the empirical analysis. The consumption of durable goods is key to anticipate the policy announcement and thus explains an early differential reaction in expenditure in the more attentive region. This shows that announcements of future policies that are well communicated can lead to consumer behavior change, and can lead to effects that take place more quickly largely through expenditures on durable goods. This result is in line with other papers that explore the role of expectations on spending on durable goods. Romer (1990), for example, shows that the Great Crash increased uncertainty, which led to a decline in spending on durable goods. This model

confirms the role of durables goods when information about the future changes.

E.4 From Radio Usage to Sticky Information

In the empirical analysis, I estimate an annual increase of roughly 2.0 percent on car expenditure of full exposed regions compared with non-exposed regions the year after the announcement.[3] The objective here is to get a sense in the model of those changes, and tp see if the model can replicate those results and, if so, under which parameters. One of the problems is that in the model I have a measure of information stickiness μ, whereas in the empirical part I have a measure of exposure to the speech given by the radio usage. I assume that there is a relationship between the level of information stickiness and radio usage. I try to get a sense of the level of the relationship between both and the level of information stickiness in my empirical setting.

I first assume a linear relationship between the radio usage and the level of information stickiness. Intuitively consumers are inattentive because information is costly. Having a radio should decrease that cost. With a radio, consumers will have access to the announcement easily; therefore they will have a lower level of inattention. I postulate that the true relationship between radio usage and the level of sticky information is:

$$1 - \mu_r = \Psi + \Theta \times RadioShare_r \tag{E.2}$$

Where $1-\mu_r$ is the frequency that a consumer in r updates information and $RadioShare_r$ is the share of households with radio in a region r. To establish parameters Ψ and Θ I increase the size of the model from two to include 49 regions (the 48 states plus DC data used in Section 1.5), and simulate a similar shock to the one described in the empirical setting. Hence, I modify the non-durable good aggregator in the utility function. Now the consumption of foreign variety has the following form:

$$C_{F,r,t} = \left[\sum_{i \neq r}^{49} C_{F,r,i,t}^{\frac{\omega_V - 1}{\omega_V}} \right]^{\frac{\omega_V}{\omega_V - 1}}$$

in the case of the durable good it takes a similar form:

$$D_{F,r,t} = \left[\sum_{i \neq r}^{49} D_{F,r,i,t}^{\frac{\omega_V - 1}{\omega_V}} \right]^{\frac{\omega_V}{\omega_V - 1}}$$

[3] Column (6) in table A.5

$C_{F,r,i,t}$ is the consumption of non-durable of region r of products produced in region i and $D_{F,r,i,t}$ is the stock of durable of region r produced in region i. Then, I simulate an announcement of a 6 percent increase in payroll taxes that is fully paid through a transfer T_r, as the SSA announcement. Then, I compute the one-year increase in the consumption of durable goods. I do this experiment for μ varying from 0.05 to 0.95 across the 49 regions.

From this simulation I determine changes in terms of durable goods expenditures for each region that depends on the level of inattention μ_r. Once I simulate the model, I run the following regression:

$$\Delta(P_{d,r} \times I, r) = \Gamma + \Lambda \times (1 - \mu_r) + \varepsilon_r \tag{E.3}$$

where $\Delta(P_{d,r} \times I, r)$ is the change in spending on durable goods in a region r. The result is a value of $\Lambda = 5.6\%$ and $\Gamma = 0.005$. To create an empirical counterpart of equation E.3, I run a similar regression with data on car sales per capita and radio usage. I run the difference between 1935 and 1934 in spending on cars:

$$\Delta(P_{d,r} \times I, r, 1935) = \xi + \Phi \times RadioShare_r + \epsilon_r \tag{E.4}$$

Now, I match the coefficient in equations E.3 and E.4 with the true coefficients of the relationship between information stickiness and radio usage assumed in equation E.2. Assuming errors terms equal to zero in expectations, I set the following expression:

$$1 - \mu_r = \left(\frac{\xi - \Gamma}{\Lambda}\right) + \frac{\Phi}{\Lambda} RadioShare_r$$

Thus, $\Psi = \left(\frac{\xi - \Gamma}{\Lambda}\right)$ and $\Theta = \frac{\Phi}{\Lambda}$. From the empirical part we have that $\Phi = 0.02$ and $\xi = 0.002$. From the model $\Lambda = 0.056$ and $\Gamma = 0.005$. With these parameters $\Psi = -0.088$ and $\Theta = 0.36$. This result means than an increase of 10 percent in the amount of radios in a county in 1935, increases the number of consumers that updated information by 3.6 percent according to the model.

This information provides an indication of the level of inattention of people at that time. According to the Census, the average households' radio usage in the United States was 34 percent in 1930 with a standard deviation of 17 percent. That means that the level of information stickiness μ was on average 87 percent, moving from 80 percent to 93 percent. Mankiw and Reis (2007) find a value of 92% for consumers. This value is relatively similar to the one found in this paper.

E.5 Model Derivation

This section explain in detail the derivation of the model presented in section E. It also present results with inattentive firms and compare it with the case of sticky prices.

Consumers

There are two regions A and B and each region has a representative agent i that has to decide between consuming a final good bundle $X_{r,t}$ and working in a firm j conditional or their information in time t. The consumption bundle is composed by the flow of a non-durable good and the stock of a durable good that depreciates at a rate δ. If $\delta = 1$, then this good behaves as a non-tradable. The representative agent maximize the intertemporal utility function given by:

$$\max \sum_{z=0}^{\infty} \beta \left[\log X_{t+z} - \frac{\nu}{1+\psi} \int_0^1 N_{r,t+z}(i)^{1+\psi} di \right]$$

subject to

$$P_{r,C,t+z}C_{r,t+z} + P_{r,D,t+z}(D_{r,t+z} - (1-\delta)D_{r,t+z-1}) + B_{r,t+z} \leq N_{r,t+z}W_{r,t+z} + B_{t+z-1}R_{r,t+z-1} + T_{r,t+z}$$

with

$$X_{r,t+z} = \left[(1-\alpha)^{\frac{1}{\eta}} C_{r,t+z}^{\frac{\eta-1}{\eta}} + \alpha^{\frac{1}{\eta}} D_{r,t+z}^{\frac{\eta-1}{\eta}} \right]^{\frac{\eta}{\eta-1}}$$

Where $N_{r,t}(i)$ is the labor supply in firm (i) and $W_{r,t}$ the wage earned in region $r = A, B$. $B_{r,t}$ is the risk-less bond, that pays a real interest rate R_t. $C_{r,t}$ is the consumption of non-durable and $D_{r,t}$ is the stock of durable. They aggregate in $X_{r,t}$. Finally, $\Pi_{r,t}$ are the profits. The non-durable consumption bundle consists in one good produced locally and another produced abroad with a common elasticity of substitution between both goods ω. ϕ represents a preference shifter the is between 0 and 1. If $\phi \in (0.5, 1]$ the local consumer has home bias:

$$C_{r,t} = \left[\phi^{\frac{1}{\omega}} C_{H,r,t}^{\frac{\omega-1}{\omega}} + (1-\phi)^{\frac{1}{\omega}} C_{F,r,t}^{\frac{\omega-1}{\omega}} \right]^{\frac{\omega}{\omega-1}}$$

The durable consumption bundle also consists in the sum of a locally produced good and a good produced in the other region:

$$D_{r,t} = \left[\phi^{\frac{1}{\omega}} D_{H,r,t}^{\frac{\omega-1}{\omega}} + (1-\phi)^{\frac{1}{\omega}} D_{F,r,t}^{\frac{\omega-1}{\omega}} \right]^{\frac{\omega}{\omega-1}}$$

Given this, the price index for the non-durable and durable consumption bundle is:

$$P_{r,C,t} = \left[\phi P_{H,C,r,t}^{1-\omega} + (1-\phi)P_{F,C,r,t}^{1-\omega}\right]^{\frac{1}{1-\omega}}$$

$$P_{r,D,t} = \left[\phi P_{H,D,r,t}^{1-\omega} + (1-\phi)P_{F,D,r,t}^{1-\omega}\right]^{\frac{1}{1-\omega}}$$

with $P_{F,s,r,t} = P_{H,s,r',t}$, then the economy has no trade cost.

Taking first order condition, and considering λ_r, t the Lagrange multiplier, we get the following conditions for the leisure-consumption decision and the intertemporal consumption condition:

$$C_{r,t} : X_{r,t}^{\frac{1-\eta}{\eta}}(1-\alpha)^{\frac{1}{\eta}}C_{r,t}^{\frac{-1}{\eta}} - \lambda_{r,t}P_{r,C,t} = 0$$

$$D_{r,t} : X_{r,t}^{\frac{1-\eta}{\eta}}\alpha^{\frac{1}{\eta}}D_{r,t}^{\frac{-1}{\eta}} - P_{r,D,t}\lambda_{r,t} + \beta(1-\delta)E_t\left[P_{r,D,t+1}\lambda_{r,t+1}\right] = 0$$

$$B_{r,t} : \lambda_{r,t} - \beta E_t\left[R_t\lambda_{t+1}\right] = 0$$

$$N_{r,t}(i) : \nu N_t(i)^{\psi} - W_t\lambda_t = 0$$

$$C_{H,r,t} : X_{r,t}^{\frac{1-\eta}{\eta}}(1-\alpha)^{\frac{1}{\eta}}C_{r,t}^{\frac{1}{\omega}-\frac{1}{\eta}}\phi^{\frac{1}{\omega}}C_{H,r,t}^{\frac{-1}{\omega}} - \lambda_{r,t}P_{c,r,t} = 0$$

$$C_{F,r,t} : X_{r,t}^{\frac{1-\eta}{\eta}}(1-\alpha)^{\frac{1}{\eta}}C_{r,t}^{\frac{1}{\omega}-\frac{1}{\eta}}\phi^{\frac{1}{\omega}}C_{F,r,t}^{\frac{-1}{\omega}} - \lambda_{r,t}P_{c,r',t} = 0$$

$$D_{H,r,t} : X_{r,t}^{\frac{1-\eta}{\eta}}\alpha^{\frac{1}{\eta}}D_{r,t}^{\frac{1}{\omega}-\frac{-1}{\eta}}\phi^{\frac{1}{\omega}}D_{H,r,t} - P_{H,D,r,t}\lambda_{r,t} + \beta(1-\delta)E_t\left[P_{H,D,r,t+1}\lambda_{r,t+1}\right] = 0$$

$$D_{F,r,t} : X_{r,t}^{\frac{1-\eta}{\eta}}\alpha^{\frac{1}{\eta}}D_{r,t}^{\frac{1}{\omega}-\frac{-1}{\eta}}(1-\phi)^{\frac{1}{\omega}}D_{F,r,t} - P_{H,D,r',t}\lambda_{r,t} + \beta(1-\delta)E_t\left[P_{H,D,r',t+1}\lambda_{r,t+1}\right] = 0$$

Firm

The firm has the following production function:

$$y_{r,j,t}(i) = A_{r,j,t}N_{r,j,t}(i)$$

Then,

$$p_{r,j,t}(i) = \frac{W_{r,t}(i)}{A_{r,j,t}}$$

Log-linearization

The log-linearize version of the equations presented above are:

$$C_{H,r,t} : \frac{1-\eta}{\eta}\check{x}_{r,t} + \left(\frac{1}{\omega_c} - \frac{1}{\eta}\right)\check{c}_t - \frac{1}{\omega_c}\check{c}_{r,h,t} = \check{\lambda}_{r,t} + \check{p}_{r,c,t}$$

$$C_{F,r,t} : \frac{1-\eta}{\eta}\check{x}_{r,t} + \left(\frac{1}{\omega_c} - \frac{1}{\eta}\right)\check{c}_t - \frac{1}{\omega_c}\check{c}_{r,f,t} = \check{\lambda}_{r,t} + \check{p}_{r',c,t}$$

with

$$\check{c}_{r,t} = \phi_c\check{c}_{r,h,t} + (1-\phi_c)\check{c}_{r,f,t}$$

and

$$\check{x}_{r,t} = \kappa\check{c}_{r,t} + (1-\kappa)\check{d}_{r,t}$$

with

$$\kappa = \frac{(1-\alpha)(1-(1-\delta)\beta)^{\eta-1}}{(1-\alpha)(1-(1-\delta)\beta)^{\eta-1} + \alpha}$$

$$D_{H,r,t} : \frac{1-\eta}{\eta}\check{x}_{r,t} + \left(\frac{1}{\omega_d} - \frac{1}{\eta}\right)\check{d}_t - \frac{1}{\omega_d}\check{d}_{h,r,t}$$
$$= \frac{1}{1-(1-\delta)\beta}\left(\check{\lambda}_{r,t} + \check{p}_{h,d,t} - \beta(1-\delta)(\check{\lambda}_{r,t+1} + \check{p}_{r,d,t+1})\right)$$

$$D_{F,r,t} : \frac{1-\eta}{\eta}\check{x}_{r,t} + \left(\frac{1}{\omega_d} - \frac{1}{\eta}\right)\check{d}_t - \frac{1}{\omega_d}\check{d}_{f,r,t}$$
$$= \frac{1}{1-(1-\delta)\beta}\left(\check{\lambda}_{r,t} + \check{p}_{f,d,t} - \beta(1-\delta)(\check{\lambda}_{r,t+1} + \check{p}_{r',d,t+1})\right)$$

with

$$\check{d}_{r,t} = \phi_d\check{d}_{r,h,t} + (1-\phi_d)\check{d}_{r,f,t}$$
$$B_{r,t} : \check{\lambda}_{r,t} = \check{\lambda}_{r,t+1} + \check{R}_t)$$
$$N_{r,t} : \psi\check{n}_{r,t} = \check{w}_{r,t} + \check{\lambda}_t)$$

and

$$\check{n}_{r,t} = \kappa_n\check{n}_{r,c,t} + (1-\kappa_n)\check{n}_{r,d,t}$$

with

$$\kappa_n = \frac{(1-\alpha)(1-(1-\delta)\beta)^{\eta}}{(1-\alpha)(1-(1-\delta)\beta)^{\eta} + \delta\alpha}$$

Firm:

$$\check{p}_{r,s,t} = \check{w}_{r,t} - \check{a}_{r,s,t})$$

Then, we have the following equation that define the economy:

$$\check{y}_{r,c,t} = \phi_c \check{c}_{r,h,t} + (1-\phi_c)\check{c}_{r',f,t}$$

$$\check{y}_{r,d,t} = \phi_d \check{i}_{r,h,t} + (1-\phi_d)\check{i}_{r',f,t}$$

with

$$\delta \check{i}_{r,h,t} = \check{d}_{r,h,t} - (1-\delta)\check{d}_{r,h,t-1}$$

$$\delta \check{i}_{r,f,t} = \check{d}_{r,f,t} - (1-\delta)\check{d}_{r,f,t-1}$$

$$\check{m}_t = \frac{1}{N_r}\sum_{r}^{N_r}\left(\kappa_n(\check{p}_{r,c,t} + \check{y}_{r,c,t}) + (1-\kappa_n)(\check{p}_{r,d,t} + \check{y}_{r,d,t})\right)$$

Appendix F

Speech Transcript

Since my annual message to the Congress on January fourth, last, I have not addressed the general public over the air. In the many weeks since that time the Congress has devoted itself to the arduous task of formulating legislation necessary to the country's welfare. It has made and is making distinct progress.

Before I come to any of the specific measures, however, I want to leave in your minds one clear fact. The Administration and the Congress are not proceeding in any haphazard fashion in this task of government. Each of our steps has a definite relationship to every other step. The job of creating a program for the Nation's welfare is, in some respects, like the building of a ship. At different points on the coast where I often visit they build great seagoing ships. When one of these ships is under construction and the steel frames have been set in the keel, it is difficult for a person who does not know ships to tell how it will finally look when it is sailing the high seas.

It may seem confused to some, but out of the multitude of detailed parts that go into the making of the structure the creation of a useful instrument for man ultimately comes. It is that way with the making of a national policy. The objective of the Nation has greatly changed in three years. Before that time individual self-interest and group selfishness were paramount in public thinking. The general good was at a discount.

Three years of hard thinking have changed the picture. More and more people, because of clearer thinking and a better understanding, are considering the whole rather than a mere part relating to one section or to one crop, or to one industry, or to an individual private occupation. That is a tremendous gain for the principles of democracy. The overwhelming majority of people in this country know how to sift the wheat from the chaff in what they hear and what they read. They know that the process of the constructive rebuilding of America cannot be done in a day or a year, but that it is being done in spite of the few who seek to confuse them and to profit by their confusion. Americans as a whole are feeling a lot better – a lot more cheerful than for many, many years.

The most difficult place in the world to get a clear open perspective of the country as a whole is Washington. I am reminded sometimes of what President Wilson once said: "So many people come to Washington who know things that are not so, and so few people who

know anything about what the people of the United States are thinking about." That is why I occasionally leave this scene of action for a few days to go fishing or back home to Hyde Park, so that I can have a chance to think quietly about the country as a whole. "To get away from the trees", as they say, "and to look at the whole forest. " This duty of seeing the country in a long-range perspective is one which, in a very special manner, attaches to this office to which you have chosen me. Did you ever stop to think that there are, after all, only two positions in the Nation that are filled by the vote of all of the voters – the President and the Vice-President? That makes it particularly necessary for the Vice-President and for me to conceive of our duty toward the entire country. I speak, therefore, tonight, to and of the American people as a whole.

My most immediate concern is in carrying out the purposes of the great work program just enacted by the Congress. Its first objective is to put men and women now on the relief rolls to work and, incidentally, to assist materially in our already unmistakable march toward recovery. I shall not confuse my discussion by a multitude of figures. So many figures are quoted to prove so many things. Sometimes it depends upon what paper you read and what broadcast you hear. Therefore, let us keep our minds on two or three simple, essential facts in connection with this problem of unemployment. It is true that while business and industry are definitely better our relief rolls are still too large. However, for the first time in five years the relief rolls have declined instead of increased during the winter months. They are still declining. The simple fact is that many million more people have private work today than two years ago today or one year ago today, and every day that passes offers more chances to work for those who want to work. In spite of the fact that unemployment remains a serious problem here as in every other nation, we have come to recognize the possibility and the necessity of certain helpful remedial measures. These measures are of two kinds. The first is to make provisions intended to relieve, to minimize, and to prevent future unemployment; the second is to establish the practical means to help those who are unemployed in this present emergency. Our social security legislation is an attempt to answer the first of these questions. Our work relief program the second.

The program for social security now pending before the Congress is a necessary part of the future unemployment policy of the government. While our present and projected expenditures for work relief are wholly within the reasonable limits of our national credit resources, it is obvious that we cannot continue to create governmental deficits for that purpose year after year. We must begin now to make provision for the future. That is why our social security program is an important part of the complete picture. It proposes, by means of old age pensions, to help those who have reached the age of retirement to give up their jobs and thus give to the younger generation greater opportunities for work and to give to all a feeling of security as they look toward old age.

The unemployment insurance part of the legislation will not only help to guard the individual in future periods of lay-off against dependence upon relief, but it will, by sustaining purchasing power, cushion the shock of economic distress. Another helpful feature of unemployment insurance is the incentive it will give to employers to plan more carefully in order that unemployment may be prevented by the stabilizing of employment itself.

Provisions for social security, however, are protections for the future. Our responsibility for the immediate necessities of the unemployed has been met by the Congress through the most comprehensive work plan in the history of the Nation. Our problem is to put to work three and one-half million employable persons now on the relief rolls. It is a problem quite as much for private industry as for the government.

We are losing no time getting the government's vast work relief program underway, and we have every reason to believe that it should be in full swing by autumn. In directing it, I shall recognize six fundamental principles:

(1) The projects should be useful.

(2) Projects shall be of a nature that a considerable proportion of the money spent will go into wages for labor.

(3) Projects which promise ultimate return to the Federal Treasury of a considerable proportion of the costs will be sought.

(4) Funds allotted for each project should be actually and promptly spent and not held over until later years.

(5) In all cases projects must be of a character to give employment to those on the relief rolls.

(6) Projects will be allocated to localities or relief areas in relation to the number of workers on relief rolls in those areas.

I next want to make it clear exactly how we shall direct the work.

(1) I have set up a Division of Applications and Information to which all proposals for the expenditure of money must go for preliminary study and consideration.

(2) After the Division of Applications and Information has sifted those projects, they will be sent to an Allotment Division composed of representatives of the more important governmental agencies charged with carrying on work relief projects. The group will also include representatives of cities, and of labor, farming, banking and industry. This Allotment Division will consider all of the recommendations submitted to it and such projects as they approve will be next submitted to the President who under the Act is required to make final allocations.

(3) The next step will be to notify the proper government agency in whose field the project falls, and also to notify another agency which I am creating – a Progress Division. This Division will have the duty of coordinating the purchases of materials and supplies and of making certain that people who are employed will be taken from the relief rolls. It will also have the responsibility of determining work payments in various localities, of making full use of existing employment services and to assist people engaged in relief work to move as rapidly as possible back into private employment when such employment is available. Moreover, this Division will be charged with keeping projects moving on schedule.

(4) I have felt it to be essentially wise and prudent to avoid, so far as possible, the creation of new governmental machinery for supervising this work. The National Government now has at least sixty different agencies with the staff and the experience and the competence necessary to carry on the two hundred and fifty or three hundred kinds of work that will be undertaken. These agencies, therefore, will simply be doing on a somewhat enlarged scale

the same sort of things that they have been doing. This will make certain that the largest possible portion of the funds allotted will be spent for actually creating new work and not for building up expensive overhead organizations here in Washington.

For many months preparations have been under way. The allotment of funds for desirable projects has already begun. The key men for the major responsibilities of this great task already have been selected. I well realize that the country is expecting before this year is out to see the "dirt fly", as they say, in carrying on the work, and I assure my fellow citizens that no energy will be spared in using these funds effectively to make a major attack upon the problem of unemployment.

Our responsibility is to all of the people in this country. This is a great national crusade to destroy enforced idleness which is an enemy of the human spirit generated by this depression. Our attack upon these enemies must be without stint and without discrimination. No sectional, no political distinctions can be permitted. It must, however, be recognized that when an enterprise of this character is extended over more than three thousand counties throughout the Nation, there may be occasional instances of inefficiency, bad management, or misuse of funds. When cases of this kind occur, there will be those, of course, who will try to tell you that the exceptional failure is characteristic of the entire endeavor. It should be remembered that in every big job there are some imperfections. There are chiselers in every walk of life; there are those in every industry who are guilty of unfair practices, every profession has its black sheep, but long experience in government has taught me that the exceptional instances of wrong-doing in government are probably less numerous than in almost every other line of endeavor. The most effective means of preventing such evils in this work relief program will be the eternal vigilance of the American people themselves. I call upon my fellow citizens everywhere to cooperate with me in making this the most efficient and the cleanest example of public enterprise the world has ever seen. It is time to provide a smashing answer for those cynical men who say that a democracy cannot be honest and efficient. If you will help, this can be done. I, therefore, hope you will watch the work in every corner of this Nation. Feel free to criticize. Tell me of instances where work can be done better, or where improper practices prevail. Neither you nor I want criticism conceived in a purely fault-finding or partisan spirit, but I am jealous of the right of every citizen to call to the attention of his or her government examples of how the public money can be more effectively spent for the benefit of the American people.

I now come, my friends, to a part of the remaining business before the Congress. It has under consideration many measures which provide for the rounding out of the program of economic and social reconstruction with which we have been concerned for two years. I can mention only a few of them tonight, but I do not want my mention of specific measures to be interpreted as lack of interest in or disapproval of many other important proposals that are pending.

The National Industrial Recovery Act expires on the sixteenth of June. After careful consideration, I have asked the Congress to extend the life of this useful agency of government. As we have proceeded with the administration of this Act, we have found from time to time more and more useful ways of promoting its purposes. No reasonable person wants

to abandon our present gains – we must continue to protect children, to enforce minimum wages, to prevent excessive hours, to safeguard, define and enforce collective bargaining, and, while retaining fair competition, to eliminate so far as humanly possible, the kinds of unfair practices by selfish minorities which unfortunately did more than anything else to bring about the recent collapse of industries.

There is likewise pending before the Congress legislation to provide for the elimination of unnecessary holding companies in the public utility field.

I consider this legislation a positive recovery measure. Power production in this country is virtually back to the 1929 peak. The operating companies in the gas and electric utility field are by and large in good condition. But under holding company domination the utility industry has long been hopelessly at war within itself and with public sentiment. By far the greater part of the general decline in utility securities had occurred before I was inaugurated. The absentee management of unnecessary holding company control has lost touch with and has lost the sympathy of the communities it pretends to serve. Even more significantly, it has given the country as a whole an uneasy apprehension of over concentrated economic power.

A business that loses the confidence of its customers and the good will of the public cannot long continue to be a good risk for the investor. This legislation will serve the investor by ending the conditions which have caused that lack of confidence and good will. It will put the public utility operating industry on a sound basis for the future, both in its public relations and in its internal relations.

This legislation will not only in the long run result in providing lower electric and gas rates to the consumer, but it will protect the actual value and earning power of properties now owned by thousands of investors who have little protection under the old laws against what used to be called frenzied finance. It will not destroy values.

Not only business recovery, but the general economic recovery of the Nation will be greatly stimulated by the enactment of legislation designed to improve the status of our transportation agencies. There is need for legislation providing for the regulation of interstate transportation by buses and trucks, to regulate transportation by water, new provisions for strengthening our Merchant Marine and air transport, measures for the strengthening of the Interstate Commerce Commission to enable it to carry out a rounded conception of the national transportation system in which the benefits of private ownership are retained, while the public stake in these important services is protected by the public's government.

Finally, the reestablishment of public confidence in the banks of the Nation is one of the most hopeful results of our efforts as a Nation to reestablish public confidence in private banking. We all know that private banking actually exists by virtue of the permission of and regulation by the people as a whole, speaking through their government. Wise public policy, however, requires not only that banking be safe but that its resources be most fully utilized, in the economic life of the country. To this end it was decided more than twenty years ago that the government should assume the responsibility of providing a means by which the credit of the Nation might be controlled, not by a few private banking institutions, but by a body with public prestige and authority. The answer to this demand was the Federal Reserve

System. Twenty years of experience with this system have justified the efforts made to create it, but these twenty years have shown by experience definite possibilities for improvement. Certain proposals made to amend the Federal Reserve Act deserve prompt and favorable action by the Congress. They are a minimum of wise readjustment of our Federal Reserve system in the light of past experience and present needs.

These measures I have mentioned are, in large part, the program which under my constitutional duty I have recommended to the Congress. They are essential factors in a rounded program for national recovery. They contemplate the enrichment of our national life by a sound and rational ordering of its various elements and wise provisions for the protection of the weak against the strong. Never since my inauguration in March, 1933, have I felt so unmistakably the atmosphere of recovery. But it is more than the recovery of the material basis of our individual lives. It is the recovery of confidence in our democratic processes and institutions. We have survived all of the arduous burdens and the threatening dangers of a great economic calamity. We have in the darkest moments of our national trials retained our faith in our own ability to master our destiny. Fear is vanishing and confidence is growing on every side, renewed faith in the vast possibilities of human beings to improve their material and spiritual status through the instrumentality of the democratic form of government. That faith is receiving its just reward. For that we can be thankful to the God who watches over America.