INFLATION EXPECTATIONS AND HOUSEHOLD SPENDING

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WHY INFLATION EXPECTATIONS?

Key variable for economic decisions: perceived real interest rate

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Mario Draghi (2015): "*When inflation expectations go up with zero nominal rates, real rates go down. When real rates go down, investments and the economic activity improves. That's the reasoning [of QE].*"

STANDARD MECHANISMS

- *Households consume more*: when inflation expectations rise and nominal interest rates are unchanged (ZLB), real interest rates are lower, so households should save less and spend more.

- *Firms invest more and hire more workers*: when inflation expectations rise and nominal interest rates are unchanged (ZLB), real interest rates are lower so user cost of capital and labor are lower, inducing firms to raise their capital and employment.

- *Firms raise their prices*: with sticky prices, inflation lowers firms' relative price over time, so expectation of higher inflation induces them to raise prices more than they would otherwise.

- *Workers raise their wage demands*: with sticky wages, inflation lowers the real wage over time, so expectations of higher inflation induce workers to raise wage demands, which should raise prices further.

THE ENDOGENEITY PROBLEM

- Many surveys provide household inflation expectations and measures of spending/perceived desirability of spending:
  - *Michigan Survey of Consumers*: Bachmann, Berg and Sims (2015)
  - *NY Fed Survey of Consumer Expectations*: Crump et al. (2015)
  - *Rand American Life Panel*: Burke and Ozdagli (2019)
  - *European Commission*: Duca, Kenny and Reuter (2019)
  - *U. Hamburg Survey*: Drager and Nghiem (2018)
  - and others in Finland, France, Germany, Italy, Japan, etc.

These can be used to assess *correlations* between inflation expectations and "time-to-buy"/spending perceptions of households.

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- A positive correlation can arise because:
  - Higher inflation expectations lead households to substitute toward current consumption.
  - Households that experience higher prices will spend more and likely infer that inflation is higher (D'Acunto et al. 2019).
  - Households that consume more assume other households are also spending more and that this will lead to higher prices in the future.

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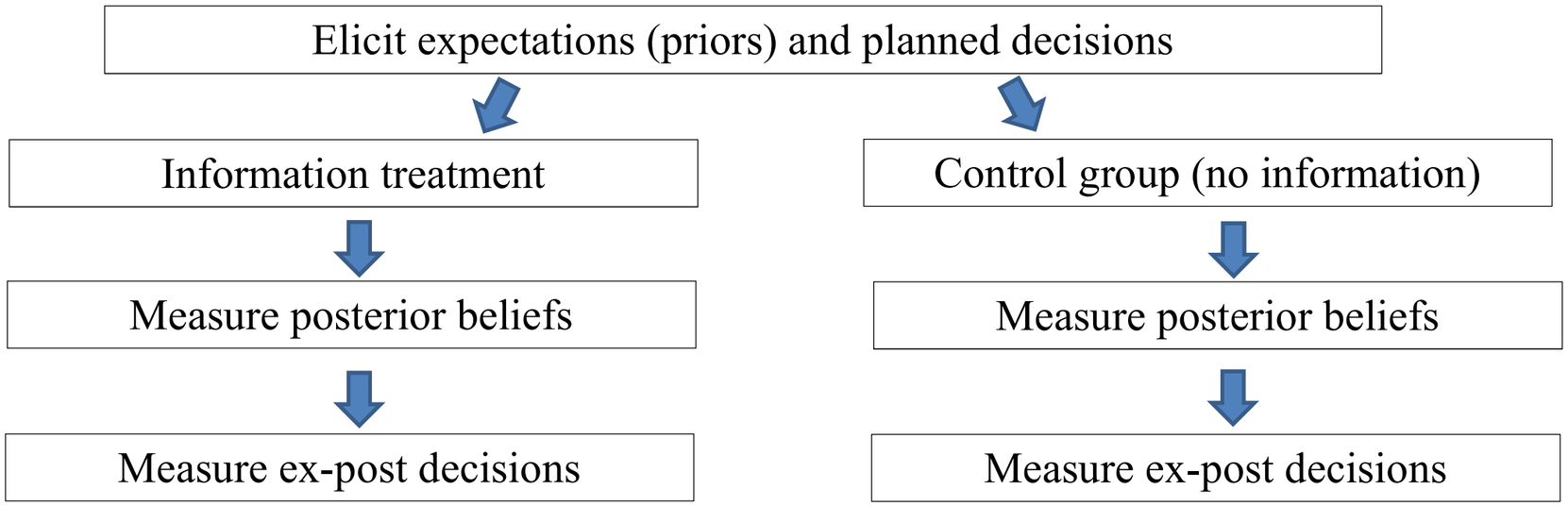
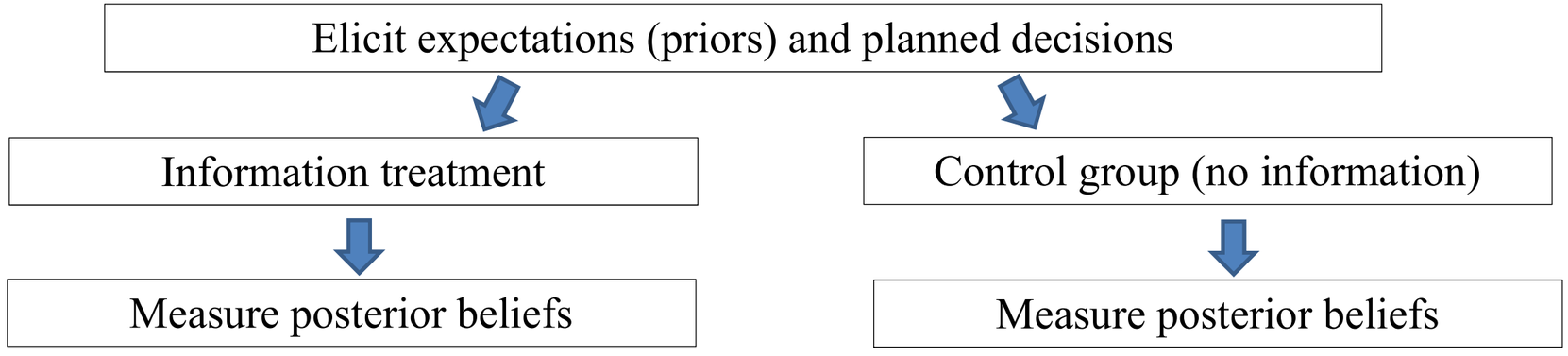
  - Households that consume more assume other households are also spending more and that this will lead to higher prices in the future.
- D'Acunto et al. (2018) use an anticipated shock to the VAT as an exogenous source of variation in inflation expectations to study effects on spending.

AN RCT APPROACH TO THE QUESTION



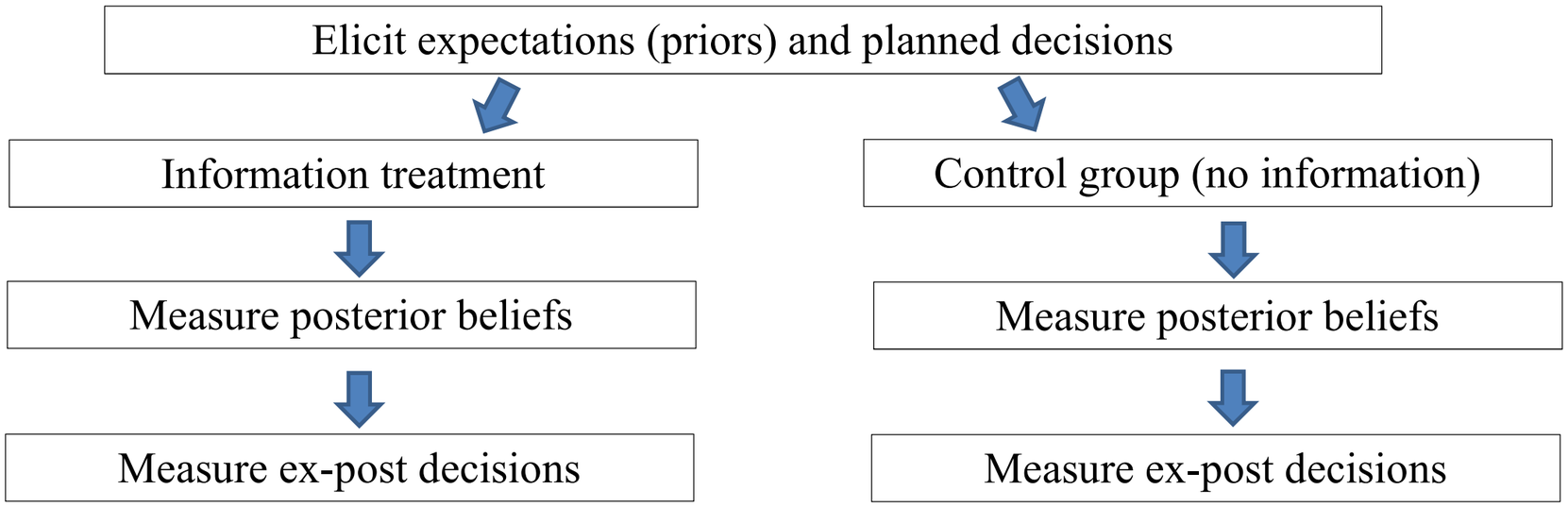
Example: Coibion, Gorodnichenko and Kumar (2018) apply this strategy to firms in New Zealand and find that firms with exogenously higher inflation expectations increase their employment and investment relative to firms in control group.

COIBION, GORODNICHENKO AND WEBER (2019)



CGW (2019) surveys over 20,000 households in the U.S. and applies 8 different information treatments (and a control group) to study how inflation expectations respond to new information, both contemporaneously and over time.

COIBION, GEORGARAKOS, GORODNICHENKO AND VAN ROOIJ (2019)



CGGR (2019) apply this strategy to a survey of households in the Netherlands, using both durable and non-durable good spending by households as outcome variables.

AC NIELSEN PANEL

- Around 80,000 households participate in the panel.
- Rich set of demographics: age, income, #kids, etc.
- Actual (grocery) purchases of households are observed.
- Incentives to respond accurately (prizes, drawings…).

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- Incentives to respond accurately (prizes, drawings…).

- We ran three waves in June, September and December 2018.
- Approximately 25,000 respondents in each wave (compared to 500 in MSC and 1,500 in SCE).
- Questions on inflation expectations (point and distribution), perceived inflation, expectations of other variables, current and planned spending...

THE INFORMATION TREATMENTS

Respondents are randomly assigned to 9 different groups:

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- *Most recent FOMC statement*
- *News coverage of FOMC decisions by USA Today*

THE INFORMATION TREATMENTS

FOMC description of inflation:

"On a 12-month basis, both overall inflation and inflation for items other than food or energy have moved close to 2 percent. Inflation on a 12-month basis is expected to run near the Committee's symmetric 2 percent objective."

USA Today description of FOMC decision:

"Inflation is creeping higher, and that's making the Federal Reserve more confident about raising interest rates. The Fed held its key interest rate steady Wednesday but noted that inflation had climbed close to its 2% goal, paving the way for another rate hike in June…"

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- *Most recent FOMC statement*
- *News coverage of FOMC decisions by USA Today*
- *Recent unemployment rate*
- *Average gas price inflation over last three months: 6.4%*

AVERAGE TREATMENT EFFECTS

Treatments	Outcome: forecast revision		
	Immediate revision	Revision after 3 months	Revision after 6 months
	(1)	(2)	(3)
T5 (pop growth)	-0.269**		
	(0.109)		

There is a small "anchoring" effect from placebo.

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	Immediate revision	Revision after 3 months	Revision after 6 months
	(1)	(2)	(3)
T5 (pop growth)	-0.269**		
	(0.109)		
T6 (UE)	-0.330***		
	(0.109)		
T4 (gas prices)	1.430***		
	(0.119)		

Information about low unemployment reduces inflation expectations.

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	(1)	(2)	(3)
T5 (pop growth)	-0.269**		
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T6 (UE)	-0.330***		
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T4 (gas prices)	1.430***		
	(0.119)		
T2 (past inflation)	-1.111***		
	(0.109)		
T3 (inflation target)	-1.034***		
	(0.109)		
T7 (Fed inflation forecast)	-1.143***		
	(0.108)		

Simple messages have large average effect on beliefs.

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T8 (FOMC statement)	-1.213***		
	(0.108)		

The full FOMC statement has no more effect than simple messages.

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T7 (Fed inflation forecast)	-1.143***		
	(0.108)		
T8 (FOMC statement)	-1.213***		
	(0.108)		
T9 (USA today coverage)	-0.528***		
	(0.109)		

The USA Today article has a much smaller effect!

AVERAGE TREATMENT EFFECTS

Treatments	Outcome: forecast revision		
	Immediate revision	Revision after 3 months	Revision after 6 months
	(1)	(2)	(3)
T5 (pop growth)	-0.269**	-0.097	0.096
	(0.109)	(0.093)	(0.104)
T6 (UE)	-0.330***	-0.250***	-0.115
	(0.109)	(0.096)	(0.103)
T4 (gas prices)	1.430***	-0.190**	-0.117
	(0.119)	(0.095)	(0.103)
T2 (past inflation)	-1.111***	-0.067	0.251**
	(0.109)	(0.094)	(0.104)
T3 (inflation target)	-1.034***	-0.394***	-0.017
	(0.109)	(0.095)	(0.103)
T7 (Fed inflation forecast)	-1.143***	-0.240**	0.142
	(0.108)	(0.095)	(0.103)
T8 (FOMC statement)	-1.213***	-0.163*	0.075
	(0.108)	(0.095)	(0.107)
T9 (USA today coverage)	-0.528***	-0.211**	0.104
	(0.109)	(0.095)	(0.103)

Effects are reduced by ~75% after 3 months and fully gone after 6 months.

WHY IS THE USA TODAY ARTICLE DISCOUNTED?

	Score		Share of people choosing "do not know"
	mean	st.dev.	
	(1)	(2)	(3)
Credibility of news sources			
Newspapers	3.07	1.16	0.11
TV	2.87	1.12	0.08
Social media	2.12	1.08	0.09
Friends and coworker	2.83	1.02	0.10
Government	2.84	1.14	0.11

Respondents report that they view newspapers as the least credible source for news about the economy. The most credible is social media.

Scores are from 1 (very credible) to 5 (not credible)

WHY IS THE USA TODAY ARTICLE DISCOUNTED?

The people who discount the USA Today article the most are:

- Men (USA Today article has no effect on them)
- Low-income (bottom tercile does not respond to news article)
- Low-education (those with high school or less show no response)

Political affiliation has no effect on how people respond to the news article.

SUMMARY

- Simple information treatments regarding inflation can have very large effects on inflation expectations of U.S. households.

- The source of the information matters: news media in particular seems to be discounted.

- Communications strategies that rely on traditional media to transmit information about monetary policy are unlikely to be very successful.

- Do the resulting changes in beliefs have any effect on household decisions?

DNB Survey of Households: Special survey

- Stage I (March 2018):
  - Collect:
    - background information (current demographics, recent spending, liquidity constraints, financial/numeric literacy, etc.)
    - expectations (inflation, income, etc.) [probability distributions]
    - plans for spending on durable and nondurable goods

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What do you think your household's spending on purchases of **durable goods** will be per month in the next three months (April, May and June)? Please provide an answer in euros.

April: …… euros
… I do not have plans to buy durables in this month
… I do not know

May: …… euros
… I do not have plans to buy durables in this month
… I do not know

June: …… euros
… I do not have plans to buy durables in this month
… I do not know

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  - Administer information treatments

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    - expectations (inflation, income, etc.) [probability distributions]
    - plans for spending on durable and nondurable goods
  - Administer information treatments
  - Collect expectations again [point predictions]

- Stage II (April 2018)
  - Collect expectations and spending (actual for March 2018 and plans for April and May 2018)

- Stage III (May 2018)
  - Collect expectations and spending (actual for April 2018 and plans for May 2018)

- Stage IV (June 2018)
  - Collect expectations and spending (actual May 2018)

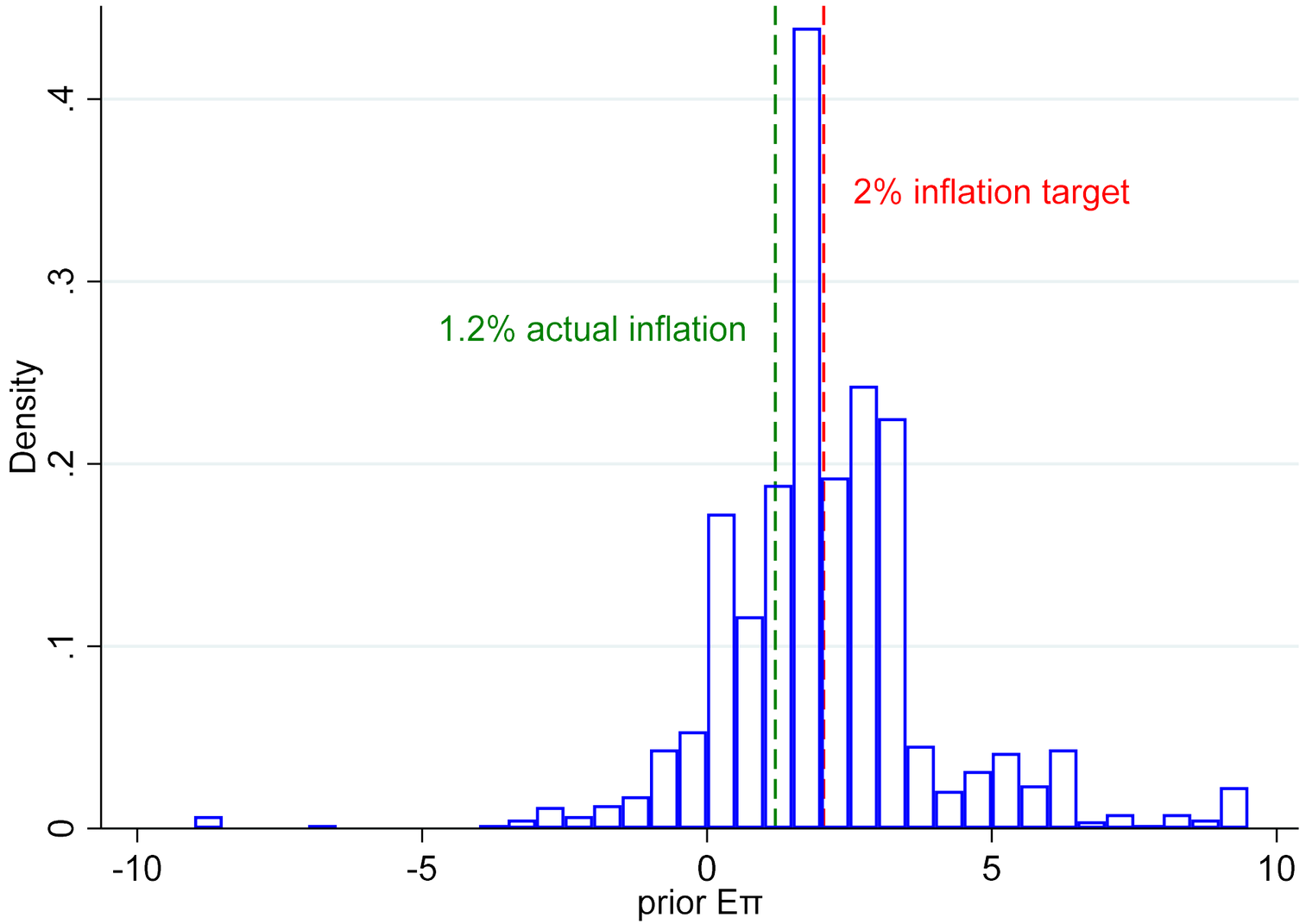
TREATMENTS

- Control group (1/3 sample)

- Treatment A ["public" signal] (1/3 sample)
  "Before we proceed, we would like to share the following information with you. In a public release **available to all Dutchmen** at no charge, the Dutch Statistical Office recently reported that the percent increase in consumer prices in February compared to 12 months earlier in the Netherlands was 1.2%".

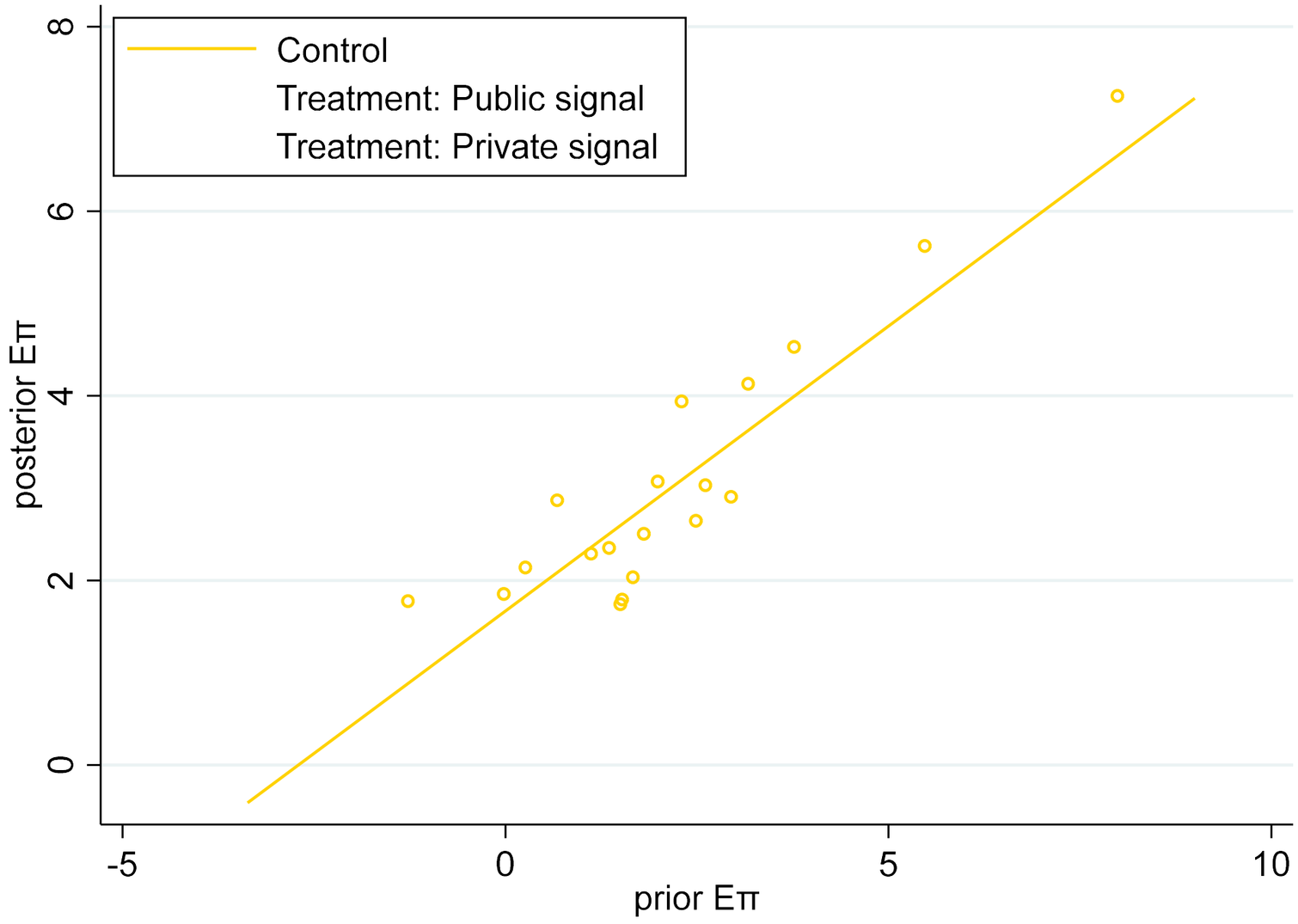
- Treatment B ["private" signal] (1/3 sample)
  "Before we proceed, we would like to share the following information **only with you** and a few other households. The Dutch Statistical Office recently reported that the percent increase in consumer prices compared in February to 12 months earlier in the Netherlands was 1.2%".

INFLATION EXPECTATIONS



1-year ahead inflation expectations

INFORMATION TREATMENTS AND INFLATION EXPECTATIONS



Binscatter of prior vs posterior 1-year ahead inflation expectations

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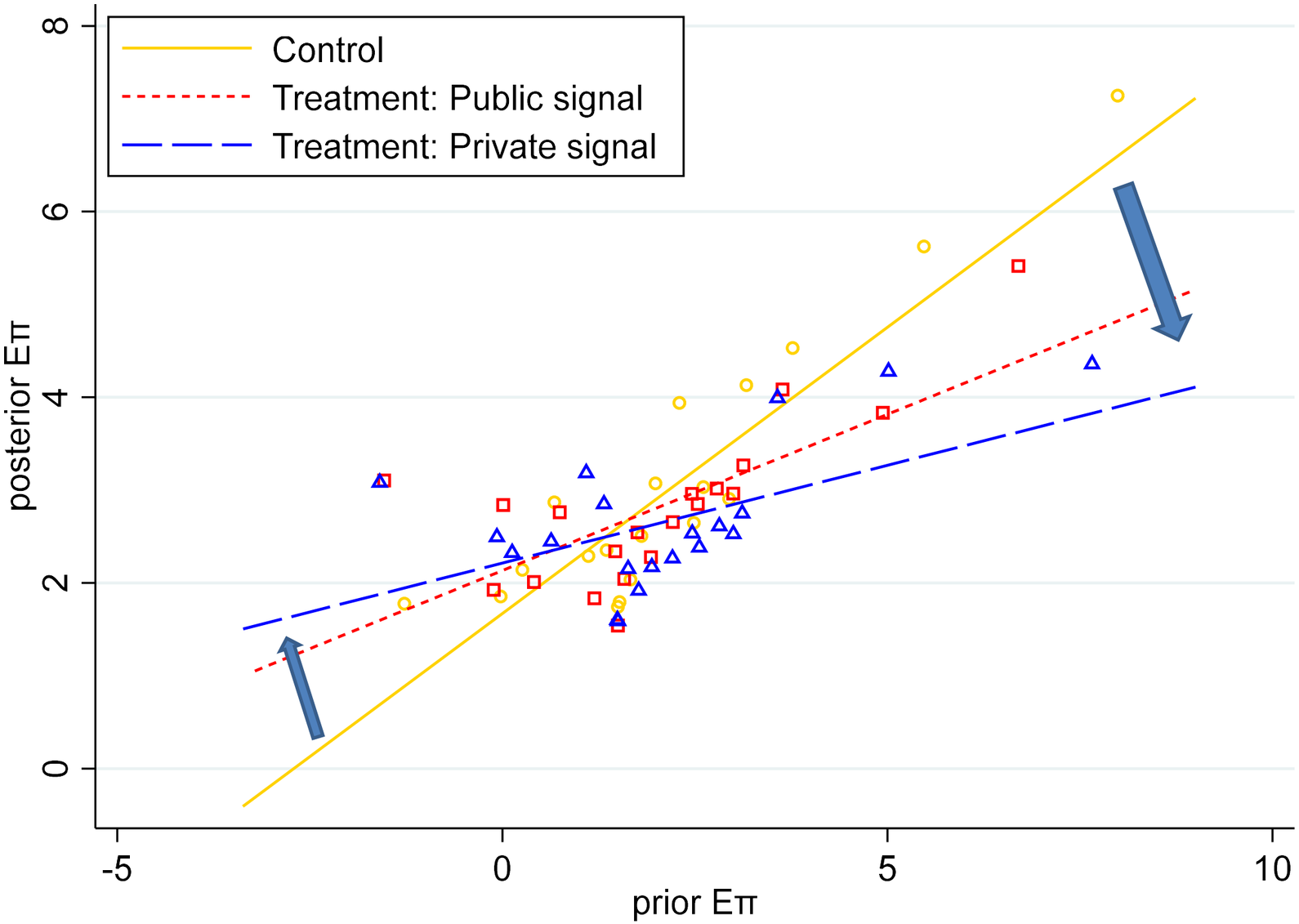

Binscatter of prior vs posterior 1-year ahead inflation expectations

EFFECT OF TREATMENT ON EXPECTATIONS

	Post-treatment point prediction for inflation in:
	Wave 1
	(1)
Prior	0.540***
	(0.031)
Prior×Treatment	-0.187***
	(0.038)
Treatment	0.094
	(0.086)
Constant	1.272***
	(0.071)
Observations	1,778
R-squared	0.339
F-stat for treatment	26.65

Prior is from wave 1 pre-treatment. Treatment is "pooled".

Treatment results in significantly less weight assigned to prior beliefs.

PERSISTENCE OF THE EFFECT

	Post-treatment point prediction for inflation in:			
	Wave 1	Wave 2	Wave 3	Wave 4
	(1)	(2)	(3)	(4)
Prior	0.540***	0.110***	0.258***	0.250***
	(0.031)	(0.029)	(0.029)	(0.033)
Prior×Treatment	-0.187***	0.161***	0.032	-0.016
	(0.038)	(0.036)	(0.035)	(0.039)
Treatment	0.094	-0.357***	-0.057	-0.010
	(0.086)	(0.092)	(0.091)	(0.098)
Constant	1.272***	2.151***	1.765***	1.760***
	(0.071)	(0.077)	(0.077)	(0.082)
Observations	1,778	1,543	1,533	1,500
R-squared	0.339	0.112	0.170	0.126
F-stat for treatment	26.65	10.24	0.411	0.265

Prior is from wave 1 pre-treatment. Treatment is "pooled".

Treatment effects on inflation expectations are short-lived (similar to other experiments)

CONSUMPTION RESPONSE

$$S_{i,t+h}^{cat} = \alpha + \beta \times F_{i,t}\pi_{t+12} + \gamma \times F_{i,t-}S_{i,t+h}^{cat} + \delta \times F_{i,t-}\pi_{t+12} + \theta \times \boldsymbol{X}_{i,t} + e_{i,t+h}$$

i and t index households and time

$S_{i,t+h}^{cat}$ (log) spending in category cat (non-durable/ durable) by household i in month $t+h$ reported in survey at time $t+h$;

$F_{i,t}\pi_{t+12}$ the 12-month ahead inflation forecast of household i at the end of wave 1 (time t) after treatments ["posterior"]

$F_{i,t-}\pi_{t+12}$ forecast prior to the treatment (time t-) ["prior"];

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CONSUMPTION RESPONSE

Dep. var. is indicated in the title of the panel	Actual spending, horizon, month			
	$\ln(C_1)$	$\ln(C_2)$	$\ln(C_3)$	Pooled
	(1)	(2)	(3)	(4)
Panel A. Spending on non-durable goods, log(spending)×100.				
Posterior inflation expectations	6.91	6.74	26.34*	11.33
	(8.58)	(7.78)	(13.34)	(7.28)
Observations	945	924	888	2,735
1st stage F-stat	15.37	14.53	12.06	15.17
p-value (weak IV robust)	0.57	0.45	0.06	0.17

- Statistically weak (but large economically) positive response of spending on non-durables to elevated inflation expectations

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	$\ln(C_1)$	$\ln(C_2)$	$\ln(C_3)$	Pooled
	(1)	(2)	(3)	(4)
Panel B. Spending on durable goods, extensive margin, linear probability model.				
Posterior inflation expectations	-0.17*	-0.29***	-0.33***	-0.21***
	(0.10)	(0.11)	(0.11)	(0.07)
Observations	1,088	999	940	3,014
1st stage F-stat	10.62	8.136	10.10	12.07
p-value (weak IV robust)	0.09	<0.01	<0.01	<0.01

- Strong negative ("stagflationary") response of spending on durables (extensive margin) to elevated inflation expectations, similar to other evidence for households (USA, e.g. Kamdar 2018) and firms (Italy, e.g. Coibion et al. 2018).
- Persistent effect on actions even with a transitory effect on beliefs (similar to other evidence, e.g., Italian firms)

CONSUMPTION RESPONSE

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	(1)	(2)	(3)	(4)
Panel C. Spending on durable goods, intensive margin, log(spending)×100.				
Posterior inflation expectations				-60.31
				(35.81)
Observations				329
1st stage F-stat				12.05
p-value (weak IV robust)				0.14

- Negative response of spending on durables (intensive margin) to elevated inflation expectations.

CONSUMPTION RESPONSE

Dep. var. is indicated in the title of the panel	Actual spending, horizon, month			
	$\ln(C_1)$	$\ln(C_2)$	$\ln(C_3)$	Pooled
	(1)	(2)	(3)	(4)
Panel D. Spending on durable goods, IV Tobit, log(spending).				
Posterior inflation expectations	-3.90**	-5.77***	-8.26***	-4.90***
	(2.02)	(2.36)	(2.23)	(1.43)
Observations	945	924	888	2,735
1st stage F-stat	21.74	15.50	24.15	26.92
p-value (weak IV robust)	0.04	0.01	<0.01	<0.01

- Negative response of spending on durables to elevated inflation expectations.

CONSUMPTION RESPONSE

Dep. var. is indicated in the title of the panel	Actual spending, horizon, month			
	$\ln(C_1)$	$\ln(C_2)$	$\ln(C_3)$	Pooled
	(1)	(2)	(3)	(4)
Panel E. Total spending, log(spending)×100.				
Posterior inflation expectations	-13.41	-7.14	-20.53*	-13.95**
	(11.12)	(11.89)	(17.82)	(9.15)
Observations	809	762	702	2,262
1st stage F-stat	13.67	10.70	8.474	13.18
p-value (weak IV robust)	0.13	0.44	0.06	0.04

- The negative response of spending on durable goods dominates the positive response of spending on non-durable goods so that the net effect for total spending is *negative*.

RESPONSE OF OTHER EXPECTATIONS RIGHT AFTER TREATMENT

$$E_i^{post} X_{t+1} = b_0 + b_1 E_i^{post} \pi_{t+1} + b_2 E_i^{prior} \pi_{t+1} + b_3 E_i^{prior} X_{t+1} + controls_i + e_i$$

where

$E_i^{post} X_{t+1}$ is the post-treatment expectation for the variable of interest X,

$E_i^{prior} X_{t+1}$ is the pre-treatment expectation for X.

RESPONSE OF OTHER EXPECTATIONS RIGHT AFTER TREATMENT

	Household net income	Household spending on non-durable goods	Economy-level spending on non-durable goods	Higher-order expectations: Economy-level spending on non-durable goods
$E_{it}^{post}\pi_{t+1}$	0.11 (1.10)			
Observations	1,175			
1st stage F-stat	17.40			
p-val (weak IV)	0.97			

$$E_i^{post}X_{t+1} = b_0 + b_1 E_i^{post}\pi_{t+1} + b_2 E_i^{prior}\pi_{t+1} + b_3 E_i^{prior}X_{t+1} + controls_i + e_i$$

Expected nominal income does not rise, so expected real income is falling.

RESPONSE OF OTHER EXPECTATIONS RIGHT AFTER TREATMENT

	Household net income	Household spending on non-durable goods	Economy-level spending on non-durable goods	Higher-order expectations: Economy-level spending on non-durable goods
$E_{it}^{post}\pi_{t+1}$	0.11	-2.93**		
	(1.10)	(1.29)		
Observations	1,175	1,157		
1st stage F-stat	17.40	18.63		
p-val (weak IV)	0.97	0.02		

$$E_i^{post}X_{t+1} = b_0 + b_1 E_i^{post}\pi_{t+1} + b_2 E_i^{prior}\pi_{t+1} + b_3 E_i^{prior}X_{t+1} + controls_i + e_i$$

Respondents predict their spending will fall in the future.

RESPONSE OF OTHER EXPECTATIONS RIGHT AFTER TREATMENT

	Household net income	Household spending on non-durable goods	Economy-level spending on non-durable goods	Higher-order expectations: Economy-level spending on non-durable goods
$E_{it}^{post}\pi_{t+1}$	0.11 (1.10)	-2.93** (1.29)	-3.12** (1.52)	-3.46** (1.63)
Observations	1,175	1,157	1,093	1,018
1st stage F-stat	17.40	18.63	14.35	18.14
p-val (weak IV)	0.97	0.02	0.03	0.02

$$E_i^{post}X_{t+1} = b_0 + b_1 E_i^{post}\pi_{t+1} + b_2 E_i^{prior}\pi_{t+1} + b_3 E_i^{prior}X_{t+1} + controls_i + e_i$$

Their expectations of aggregate spending in the economy (as well as their higher order expectations) also decline.

HETEROGENEITY

Reactions of beliefs and actions may be heterogeneous along:

- Level of thinking
- Liquidity constraints
- Financial literacy
- Income
- Education
- etc…

HETEROGENEITY

Reactions of beliefs and actions may be heterogeneous along:

- Level of thinking [beauty contest game]
- Liquidity constraints [measure liquidity just before a regular paycheck arrives]
- Financial literacy ["big three" questions]
- Income [annual income]
- Education [levels of education]
- etc…

HETEROGENEITY

Reactions of beliefs and actions may be heterogeneous along:

- Level of thinking [beauty contest game]
- Liquidity constraints [measure liquidity just before a regular paycheck arrives]
- Financial literacy ["big three" questions]
- Income [annual income]
- Education [levels of education]
- etc…

Summary of results:

- the reaction of beliefs varies along some dimensions (but not with level of thinking, liquidity constraints, or financial literacy)
- the reaction of consumer spending is statistically similar across groups

COMPARISON TO FIRMS

CGK (2018) study how firms in New Zealand respond to exogenously provided information about inflation. Firms that raise their inflation expectations increase employment and investment, but do not tangibly change prices or wages. Their expectations of GDP/Unemployment are unchanged despite large changes in their inflation expectations.

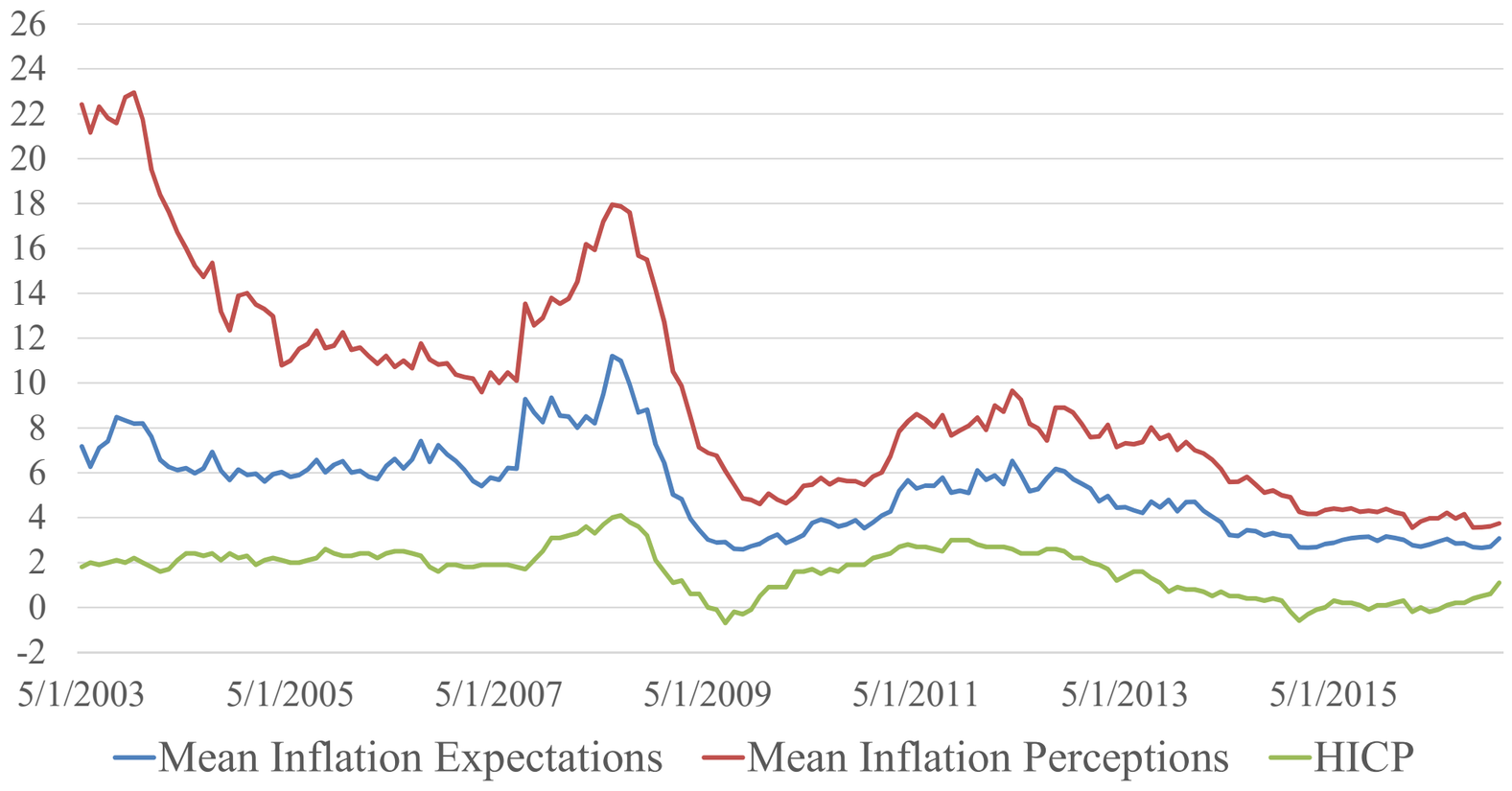
CGR (2018) study how firms in Italy respond to exogenously provided information about inflation. Firms that raise their inflation expectations reduce employment and investment while raising their prices. Their expectations of broader economic conditions significantly worsen.

CONCLUSIONS AND IMPLICATIONS

- RCT's in surveys of actual economic agents provide a promising way to address key questions in macroeconomics:
  - There is sharp identification by comparison to control and placebo groups.
  - They can be applied on a large scale.
  - The responses of both beliefs and actions can be tracked.

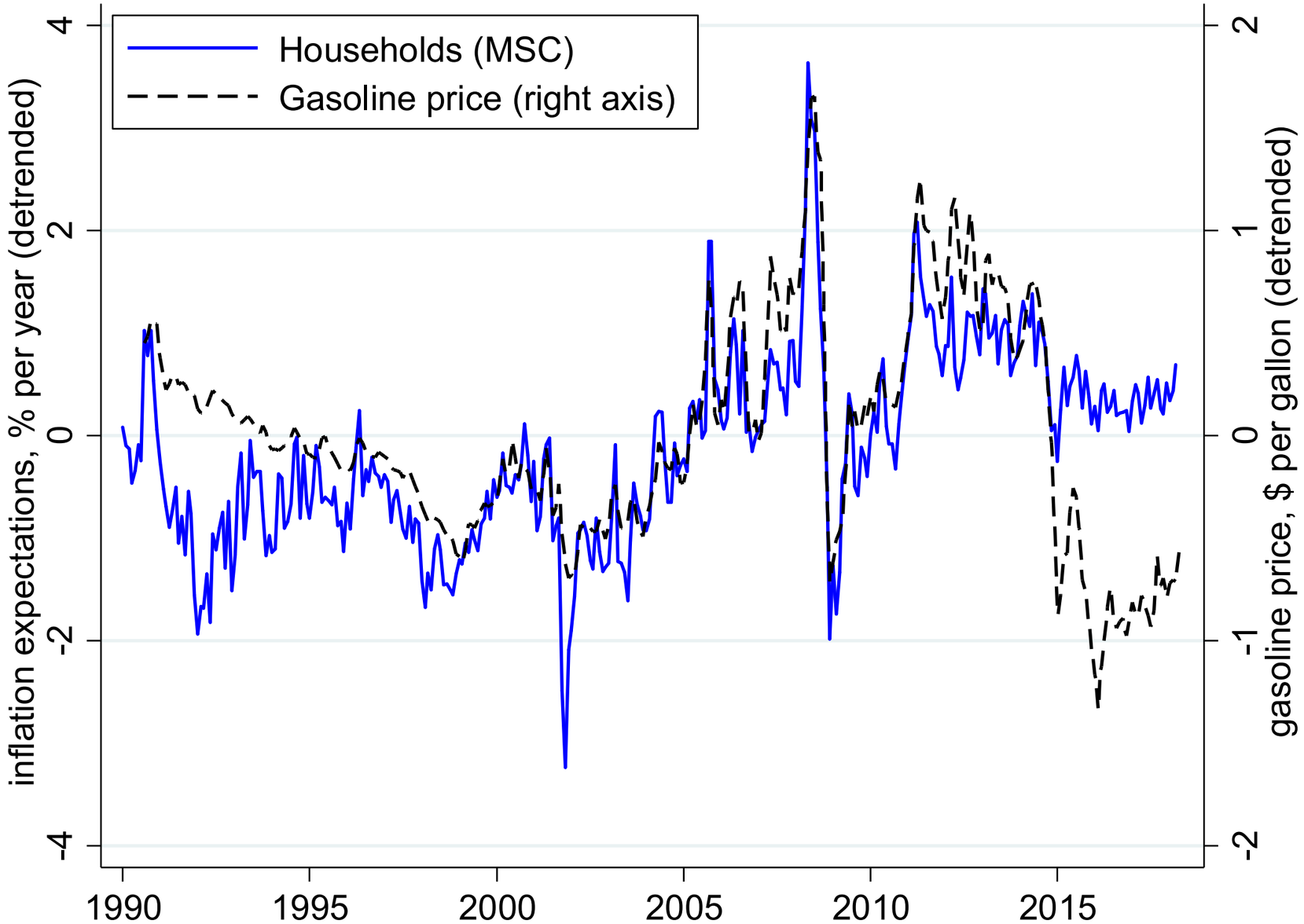
- CGW (2019) document that simple information treatments can generate large effects on the inflation expectations of agents, and CGGR (2019) find evidence that these changing expectations affect spending decisions.

- The results call for caution when considering policy scenarios in which expectations of an endogenous variable are altered: one needs to understand what inference agents will draw about the source of variation in that variable.



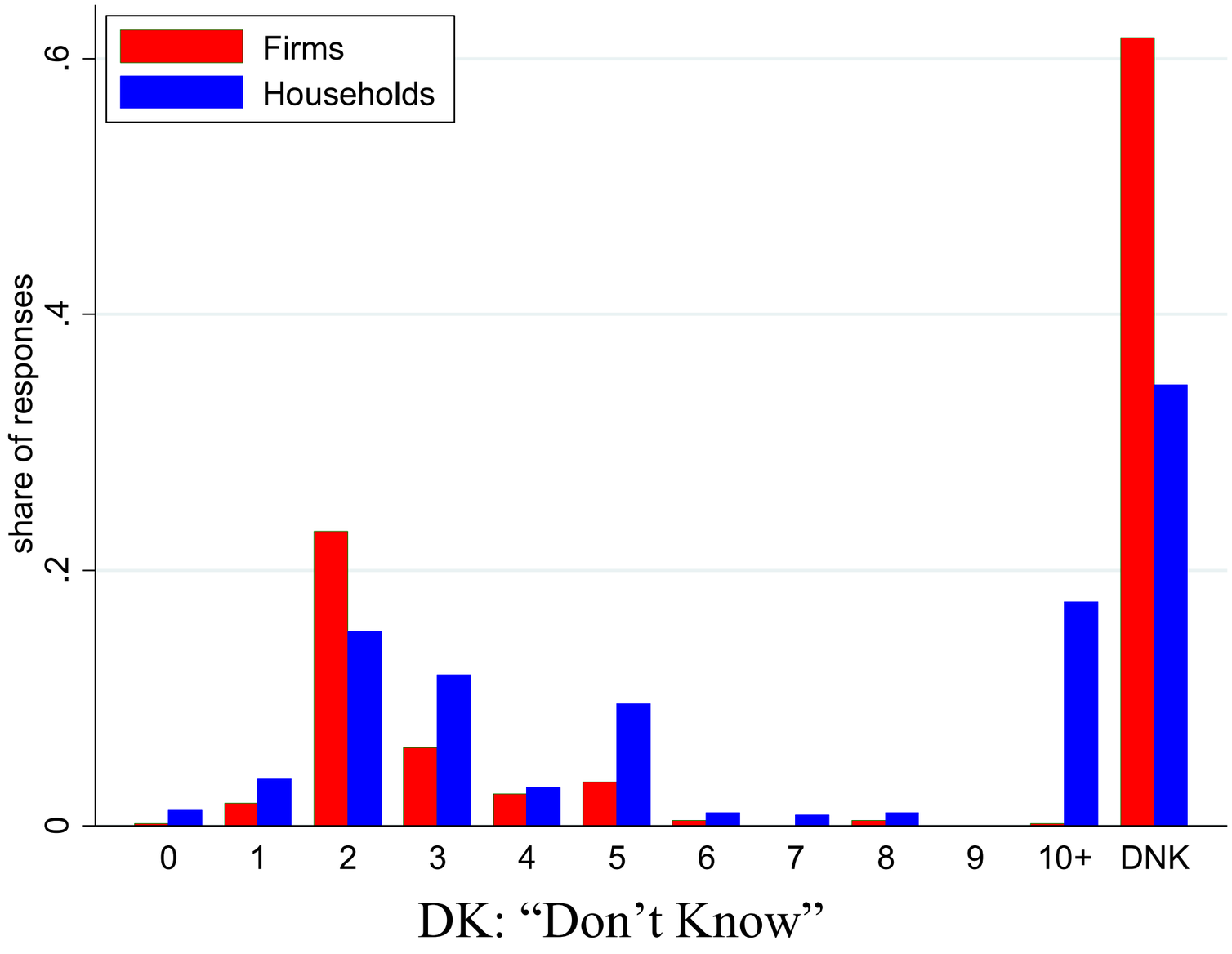
Source: European Commission data.

WHAT FORCES INFLUENCE INFLATION EXPECTATIONS?



WHAT FORCES INFLUENCE INFLATION EXPECTATIONS?

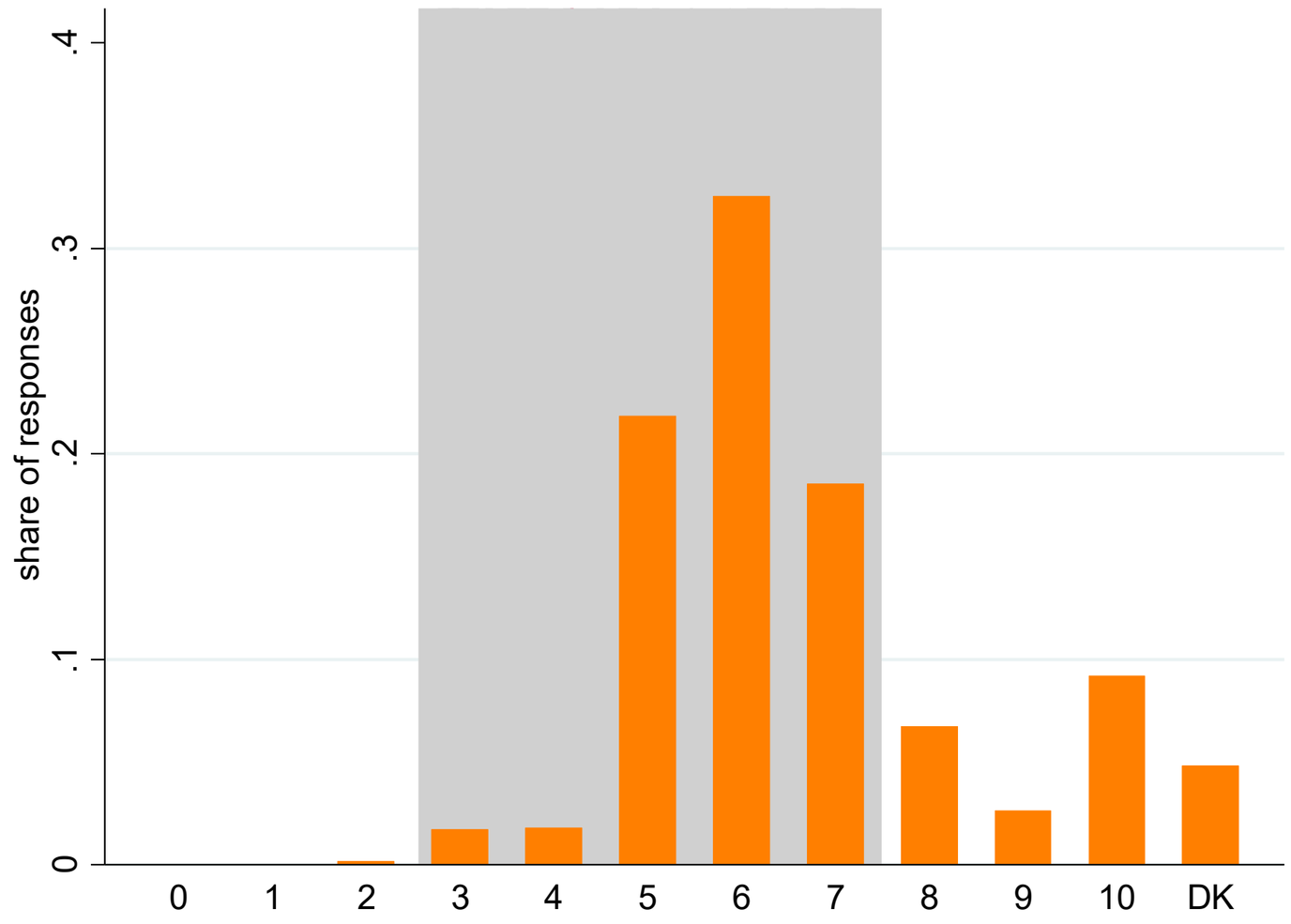
Responses to question about Fed's inflation target



Source: Coibion, Gorodnichenko, Kumar and Piedmonte (2018)

WHAT FORCES INFLUENCE INFLATION EXPECTATIONS?

Responses to question about Central Bank of Uruguay's inflation target

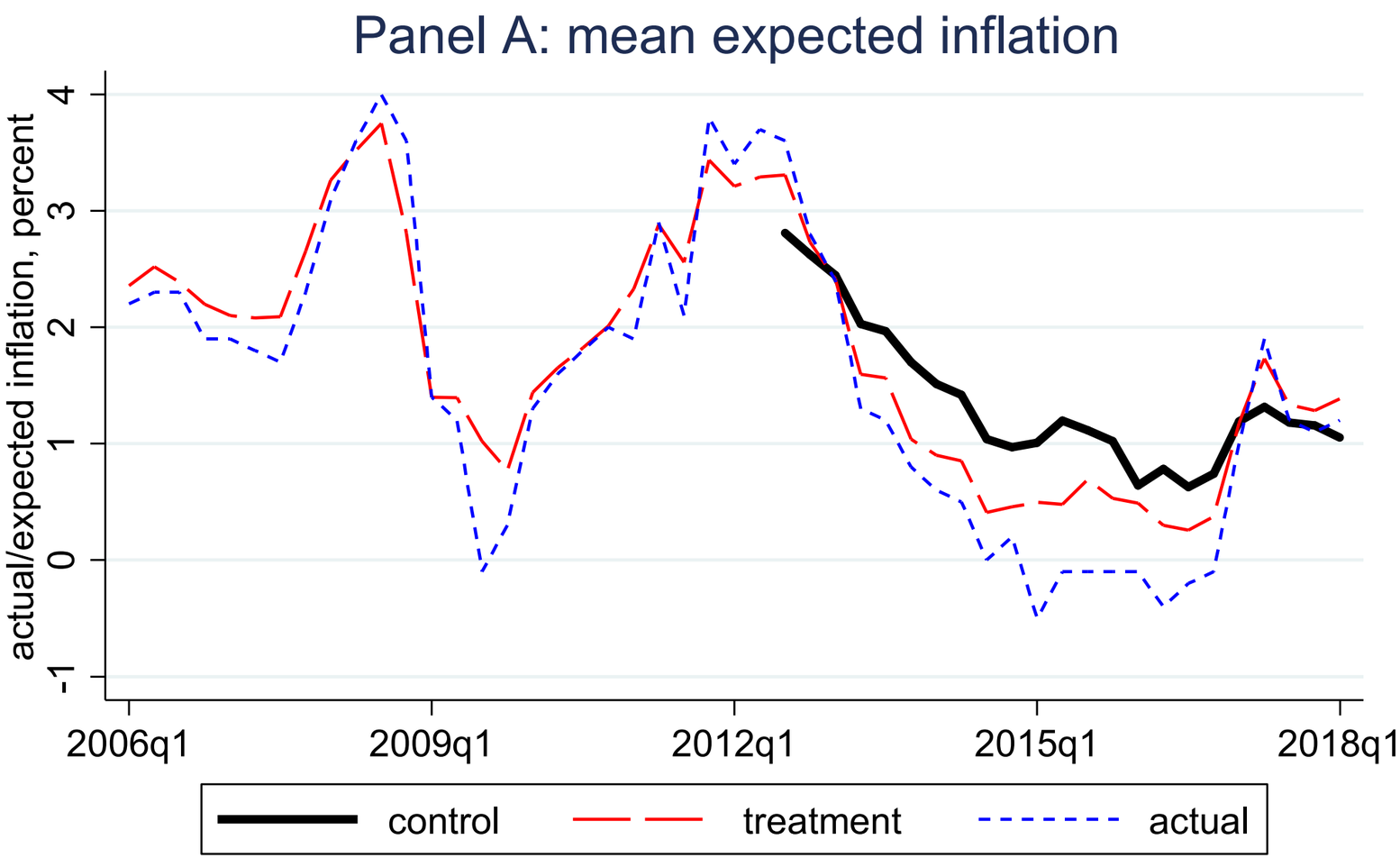


In a 2018 survey of Urugayan managers, almost 80% picked answers in the target range.

Source: Coibion, Frache, Gorodnichenko, and Lluberas (2018)

CAN WE CHANGE INFLATION EXPECTATIONS?

Example with Italian firms



Source: Coibion, Gorodnichenko and Ropele (2018)