

Framing Effects in Consumer Expectations Surveys

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28. November 2024

CNB Workshop on Households' Inflation Expectations
Measuring Households' Inflation Expectations: Theory, Practice, Implications

Surveys as a valuable source of expectations data

- Studying subjective expectations of households helps better understand the expectation formation process and how agents act on their beliefs
- Allows for designing more effective fiscal and monetary policy tools (D'Acunto and Weber, 2024)
- Since 1978 the Michigan Survey of Consumers asks for a **point forecast for changes in prices in general**
- 2010s: FRB NY Survey of Consumer Expectations introduces **probabilistic 'bin' question about the inflation rate**, Canadian Survey of Consumer Expectations, Chicago Booth Expectations and Attitudes Survey
- 2020s: FRB Cleveland Daily Survey of Consumer Expectations, Deutsche Bundesbank BOP-HH, ECB's Consumer Expectations Survey

How does survey design influence expectations data?

Survey design as a potential source of heterogeneity in subjective expectations:

- administration mode (Bruine de Bruin et al., 2017)
- wording (Bruine de Bruin et al., 2012, 2017; Coibion et al., 2020)
- question ordering (Phillot and Rosenblatt-Wisch, 2024)
- response scale (Becker et al., 2023a,b)
- guided vs. non-guided questions (Hayo and Méon, 2022)

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- guided vs. non-guided questions (Hayo and Méon, 2022)

Using an RCT embedded in a nationally representative survey in Germany, this paper:

- tests the effects of different wording for probabilistic inflation expectations
- explores an alternative format for eliciting beliefs distributions and documents how it fares against the standard 'bin' question

Standard approach: Probabilistic 'bin' format

A lot of large-scale consumer surveys (SCE, CSCE, BOP-HH) use the following format to elicit probabilistic expectations for future inflation ('default')

Q: In your view, what do you think is the percent chance that, over the next 12 months the rate of inflation (deflation) will be...

- above 12%
- between 8% and 12%
- between 4% and 8%
- between 2% and 4%
- between 0% and 2%
- \vdots
- less than -12%

▸ Details

Standard approach: Probabilistic 'bin' format

Pros:

- very informative
- provides the full subjective distribution
- allows computing measures for individual uncertainty (Armantier et al., 2017; Krüger and Pavlova, 2024; Ryngaert, 2022)

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Pros:

- very informative
- provides the full subjective distribution
- allows computing measures for individual uncertainty (Armantier et al., 2017; Krüger and Pavlova, 2024; Ryngaert, 2022)

Cons:

- cognitively demanding
- relies on the assumption that respondents can think and express themselves using numerical probabilities (focal point responses (Hurd, 2009), rounding)
- potentially priming (Coibion et al., 2021)
- highly dependent on the underlying response scale (Becker et al., 2023a,b)
- strong assumptions and discontinuity when fitting a distribution to the data (Krüger and Pavlova, 2024)

Experiment on framing effects: Format

Instead of asking for probabilities, ask for the expected minimum, maximum and mode of the distribution:

Question 1: In your opinion, what is the most likely outcome for the inflation (or deflation) rate over the next 12 months? What is the minimum and maximum outcome? [Details](#)

Experiment on framing effects: Format

Instead of asking for probabilities, ask for the expected minimum, maximum and mode of the distribution:

Question 1: In your opinion, what is the most likely outcome for the inflation (or deflation) rate over the next 12 months? What is the minimum and maximum outcome? [Details](#)

- fit a triangular distribution to the points - provide the full distribution!
- viable alternative to the probabilistic question
- free of numerical probabilities (compare Altig et al. (2022); Christelis et al. (2020); Coibion et al. (2024))
- no symmetry assumption - fits expectations better (Ryngaert, 2023)
- endpoints of support are self-reported - no need for assumptions on the unbounded intervals
- eliminates priming effects based on definitions of a response scale

Experiment on framing effects: Wording

Manski (2018) highlights the 'importance of careful attention to question wording when eliciting expectations'

Two competing question wordings across leading surveys:

- *prices in general*: easy-to-read, understandable option used in MSC; but leads to high upward bias and large disagreement in expectations, possibly due to diffuse interpretations (Bruine de Bruin et al., 2010)
- *inflation rate*: widely used in several large-scale consumer surveys; increases the percentage of respondents thinking about the inflation rates; however, different socio-economic groups have a different understanding of the term 'inflation' (Leiser and Drori, 2005)

→ This paper: differences in probabilistic expectations by wording: does the response scale offset biasing effects of simpler wording such as 'prices in general'?
Are differences present in other formats?

Experiment on framing effects: Forming expectations

Question 2: (adapted from Bruine de Bruin et al. (2010))

What came to mind for you, in particular, when you answered the questions about the rate of inflation (changes in prices in general)?

- Prices of essential goods (food, gasoline)
- Prices paid by households in Germany
- Germany's inflation rate
- Changes in the cost of living
- Other prices (*please name*)

Data

RCT embedded in the Bundesbank Online Panel Households (BOP-HH) in September 2020

- representative, monthly internet-based survey since early 2020
- contains a qualitative, point forecast and a probabilistic question 12-m ahead
- between-subjects design to minimize cognitive load
- large sample size of about 4,000 respondents (1,000 per treatment arm)
 - Group A1: probabilistic question about the inflation rate ('default')
 - Group B1: min-max question about the inflation rate
 - Group C1: probabilistic question about changes in prices in general
 - Group D1: min-max question about changes in prices in general
- set of socio-demographic characteristics: age, income, education, home-ownership
- quantify the probabilistic histograms following Engelberg et al. (2009) and for the min-max question simply fit triangular distribution

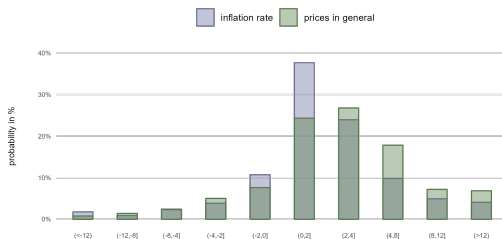
Comparison of derived measures

Table 1: Averages of moments, endpoints, and percentiles

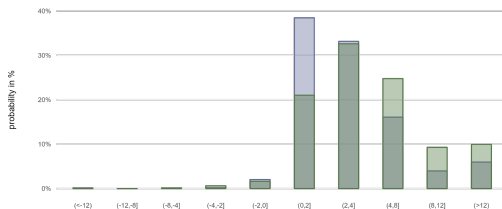
	$E[\pi_{t+12}]_i$ (1)	$\sigma_i^{\pi_{t+12}}$ (2)	S_l (3)	S_r (4)	$p5$ (5)	$p25$ (6)	$p50$ (7)	$p75$ (8)	$p95$ (9)
probabilistic question									
A1: 'inflation rate'	2.09	1.84	-3.31	8.49	-0.87	0.74	2.06	3.41	5.14
C1: 'prices in general'	3.50	2.07	-2.25	11.13	0.22	1.96	3.44	4.99	6.97
min-max question									
B1: 'inflation rate'	4.31	0.87	2.20	6.28	2.85	3.67	4.33	4.96	5.71
D1: 'prices in general'	5.51	1.34	2.24	8.54	3.25	4.53	5.54	6.52	7.67

Note: Columns (1) to (9) report the averages per treatment group for the following measures: implied mean, standard deviation, left endpoint, right endpoint, 5%-, 25%-, 50%-, 75%- and 95%-percentiles.

Probability distributions



probabilistic format (default)



min-max format

Figure 1: Average subjective probabilities for different ranges for inflation

Effects on implied means

Table 2: Effects on implied means

	$E[\pi + 12]_i = \alpha + \beta \text{min-max}_i + \gamma \text{prices}_i + \delta \text{joint}_i + \varepsilon_i$		
	(1)	(2)	(3)
default	2.088*** (0.216)	2.193*** (0.219)	1.838*** (0.074)
min-max	2.222*** (0.311)	2.459*** (0.315)	1.076*** (0.107)
prices	1.412*** (0.305)	1.285*** (0.310)	0.984*** (0.105)
joint effect	3.425*** (0.308)	4.239*** (0.310)	2.334*** (0.105)
Observations	3,686	3,686	3,549
Robust linear		✓	
Controls			✓

Note: * p<0.1; ** p<0.05; *** p<0.01. Robust standard errors in parentheses. Survey weights are used to ensure representativeness. 'Robust linear' refers to Huber-robust regression specification. 'Controls' refers to a set of socio-demographic controls.

Effects on uncertainty

Table 3: Effects on individual uncertainty

	$\sigma_i^{\pi+12} = \alpha + \beta \text{min-max}_i + \gamma \text{prices}_i^{\dagger} \delta \text{joint}_i + \varepsilon_i$		
	(1)	(2)	(3)
default	2.011*** (0.099)	1.286*** (0.028)	2.806*** (0.307)
min-max	-1.018*** (0.120)	-0.620*** (0.033)	-1.008*** (0.122)
prices	0.387*** (0.147)	0.406*** (0.055)	0.367** (0.144)
joint effect	-0.373** (0.158)	-0.230*** (0.038)	-0.389** (0.163)
Observations	3,686	3,686	3,549
Robust linear		✓	
Controls			✓

Note: *p<0.1; **p<0.05; ***p<0.01. Robust standard errors in parentheses. Survey weights are used to ensure representativeness. 'Robust linear' refers to Huber-robust regression specification. 'Controls' refers to a set of socio-demographic controls.

Effects of wording on forming expectations

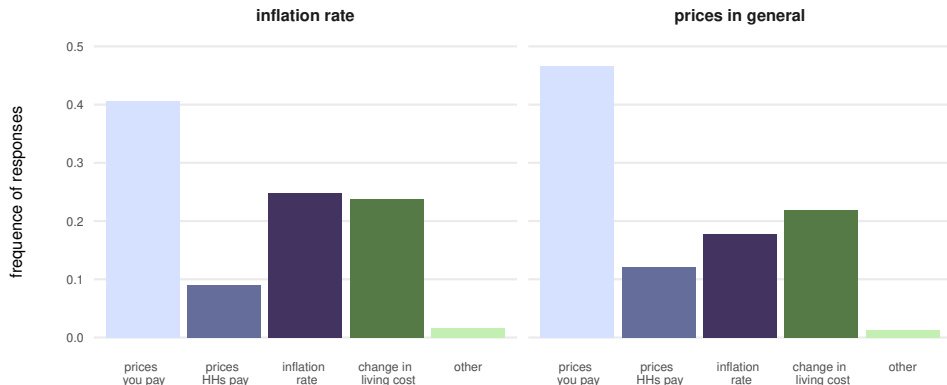


Figure 2: Effect of wording on forming expectations

Table 4: Response patterns across treatments

	probabilistic question		min-max question	
	<i>inflation</i>	<i>prices</i>	<i>inflation</i>	<i>prices</i>
<i>Consistency</i>				
PP not in support	10.3	13.8 ^{p5}	14.2 ^{m1}	8.2 ^{p1,m1}
$P(PP \in (X_{pp}, Y_{pp})) = 0$	16.3	15.6		
contain disjoint regions	3.3	2.4		
Corr(PP, $E[\pi_{t+12}]_i$)	0.54	0.65	0.45	0.68
<i>Item non-response</i>	6.7	6.6	13.4 ^{m1}	9.6 ^{p1,m5}
<i>Bin usage</i>				
sparse histogram	52.2	42.2 ^{p1}		
using 50-50% responses	7.7	7.1		
at least one outer bin	19.4	26.8 ^{p1}		
mean number of bins	3.2	3.5 ^{p1}		
<i>Rounding</i>				
Mode is multiple of 5			19.6	36.1 ^{p1}
Min is multiple of 5			16.3	24.9 ^{p1}
Max is multiple of 5			24.3	43.5 ^{p1}
Observations	944	948	879	915

Note: ^{p1}, ^{p5}, ^{p10} indicate that the corresponding measure is significantly different in the 'prices in general' vs. the 'inflation rate' wording at the 1, 5, and 10%-level. ^{m1}, ^{m5}, ^{m10} indicate that the corresponding measure is significantly different in the 'min-max' vs. the 'probabilistic format' at the 1, 5, and 10%-level. Shares and probabilities are reported in percentage points. The reported differences are based on χ -squared, Wilcoxon-Mann-Whitney, or Kolmogorov-Smirnov tests, depending on the nature of the underlying variable. X_{pp} and Y_{pp} are the endpoints of the interval that contains the point prediction (PP).

Further aspects

- **consistency** - simpler wording and format yield more internally consistent answers (68% for min-max + prices vs 54% for default)
- **item non-response** - the probabilistic question has higher response rate, but potentially more noise due to SDB or uninformed guesses
- **rounding** - no 'excessive' rounding in the min-max framework
- **bin usage** - 'prices in general' wording causes people to use more bins

Heterogeneity

- Women and individuals born in East Germany before 1990 report different expectations in the standard probabilistic setup.
- The min-max question affects women differently than men, as well as individuals with different educational backgrounds.
- No asymmetries are found in the effect of wording, except for those living in East Germany before 1990 (2.5 pp)
- The joint effect is larger for below-median income households, with a 2.5 pp difference in expectations compared to the top 50% of income earners.
- The difference by educational background is smaller (1.3 pp).
- The differences in individual uncertainty are less pronounced across groups.

Conclusion and Outlook

Using a probabilistic format is very informative and has been adopted by multiple large-scale consumer expectation surveys

- increases cross-country comparability
- priming effect of bin definitions on responses
- rethink assumptions
- a stable, tractable set of bins over time difficult as inflation fluctuates
- use alternative formats as a 'sanity check' important (e.g. min-max, Goldfayn-Frank et al. (2024))

Respondents are capable of processing more complex wording such as the 'inflation rate'

- independent of wording, more than 40% of respondents still think about specific prices such as those of food and gas
- provide additional information such as the central bank target rate or the latest observed inflation rate

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Appendix

Probabilistic 'bin' question

904A1	CORE	Inflation expectations probabilistic	infexprob_[a-j]
Group filter: <code>drandom1 = 1</code>			
<p>The programming of the question requires the sum of the 10 variables to be 100. The current sum of all entered points is shown to the respondent when answering the question. Respondents are asked to correct their responses if the sum does not equal 100.</p>			
<p>QUESTION: In your opinion, how likely is it that the rate of inflation will change as follows <u>over the next twelve months?</u></p>			
<p>Note: The aim of this question is to determine how likely you think it is that something specific will happen in the future. You can rate the likelihood on a scale from 0 to 100, with 0 meaning that an event is completely unlikely and 100 meaning that you are absolutely certain it will happen. Use values between the two extremes to moderate the strength of your opinion. Please note that your answers to the categories must add up to 100.</p>			
<ul style="list-style-type: none"> a The rate of deflation (opposite of inflation) will be 12% or higher. b The rate of deflation (opposite of inflation) will be between 8% and 12%. c The rate of deflation (opposite of inflation) will be between 4% and 8%. d The rate of deflation (opposite of inflation) will be between 2% and 4%. e The rate of deflation (opposite of inflation) will be between 0% and 2%. f The rate of inflation will be between 0% and 2%. g The rate of inflation will be between 2% and 4%. h The rate of inflation will be between 4% and 8%. i The rate of inflation will be between 8% and 12%. j The rate of inflation will be 12% or higher. 			

Min-max question - Inflation wording

904B1	CORE/Pro c18	Inflation expectations probabilistic 2	inf_mode, inf_min, inf_max
Group filter: drandom1 = 2			
<p>QUESTION: What do you think the rate of inflation (or rate of deflation) is most likely to be <u>over the next twelve months</u>? What will the rate of inflation be as a maximum and minimum value?</p> <p>Note: If it is assumed that there will be deflation, please enter a negative value.</p> <p>Values may have a maximum of one decimal place.</p> <p>Please use a <u>full stop</u> rather than a <u>comma</u> as the decimal separator.</p> <p>Most likely inflation rate/deflation rate [Input field] percent</p> <p>Minimum [Input field] percent</p> <p>Maximum [Input field] percent</p>			

Min-max question - Prices wording

904B2	CORE/Pro c18	Inflation expectations probabilistic 2	inf_mode, inf_min, inf_max
Group filter: <code>drandom1 = 4</code>			
<p>QUESTION: By what percentage do you think prices in general are most likely to increase or decrease <u>over the next twelve months</u>? What will the price change be as a maximum and minimum value?</p> <p>Note: If it is assumed that prices will fall, please enter a negative value.</p> <p>Values may have a maximum of one decimal place.</p> <p>Please use a <u>full stop rather than a comma</u> as the decimal separator.</p> <p>Most likely price change [Input field] percent</p> <p>Minimum [Input field] percent</p> <p>Maximum [Input field] percent</p>			

Robustness

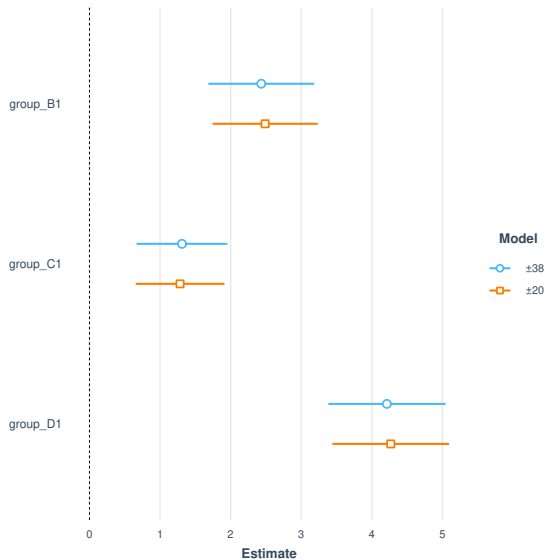


Figure A.1: Robustness to assumptions on outer bounds for GBeta

Robustness

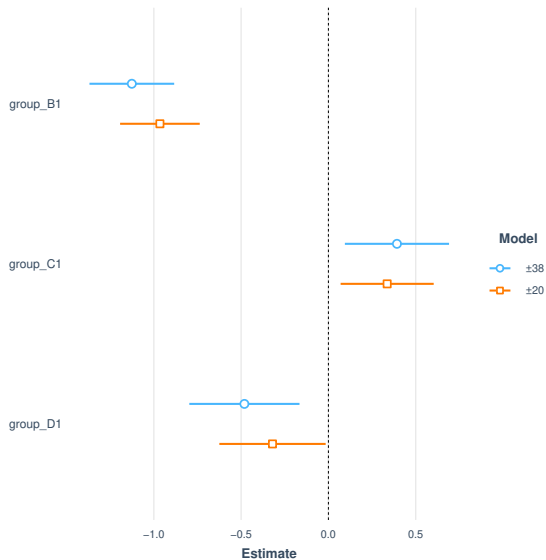


Figure A.2: Robustness to assumptions on outer bounds for GBeta

Appendix

Heterogeneity in treatment effects

	<i>Dependent variable:</i>			
	$E[\pi_{t+12}]_i$			
	(1)	(2)	(3)	(4)
format × female	1.529*			
	(0.807)			
wording × female	0.067			
	(0.656)			
joint × female	0.246			
	(0.887)			
format × college		-2.112***		
		(0.764)		
wording × college		-0.288		
		(0.602)		
joint × college		-1.975***		
		(0.748)		
format × inc_high			-1.229	
			(0.751)	
wording × inc_high			-0.383	
			(0.653)	
joint × inc_high			-2.528***	
			(0.835)	
format × eastwest1989				0.984
				(1.456)
wording × eastwest1989				2.596**
				(1.035)
joint × eastwest1989				-0.212
				(0.947)
Observations	3,549	3,528	3,549	3,549
R ²	0.111	0.110	0.108	0.113
Adjusted R ²	0.106	0.105	0.104	0.108

Appendix

Heterogeneity in treatment effects for uncertainty

	<i>Dependent variable:</i>			
	sd			
	(1)	(2)	(3)	(4)
group_B1:female	-0.232 (0.252)			
group_C1:female	-0.353 (0.299)			
group_D1:female	-0.713** (0.327)			
group_B1:college		-0.071 (0.210)		
group_C1:college		-0.149 (0.251)		
group_D1:college		-0.321 (0.268)		
group_B1:inc_high			-0.094 (0.233)	
group_C1:inc_high			-0.106 (0.288)	
group_D1:inc_high			-0.643** (0.299)	
group_B1:eastwest1989				0.370 (0.246)
group_C1:eastwest1989				0.660** (0.308)
group_D1:eastwest1989				0.164 (0.313)
Observations	3,528	3,528	3,528	3,528
R ²	0.081	0.079	0.081	0.080
Adjusted R ²	0.077	0.074	0.077	0.075