A Data Appendix

A.1 Alternative Inflation Indicator in Argentina (2006-2015)

The Table below shows the main alternative inflation indicators available during the period 2006 and 2015 in Argentina. There are two main kinds of indices, public and private. The public indices were produced by provincial statistical offices that are manged by local provincial governments. Many of these provincial indices were discontinued over time after the federal government pressured the local governments. Second, there were a large number private estimates produced by economic consulting firms. Many of these consulting firms were fined in 2011 and could not longer publicly release their data, but their information were used by members of the opposition in Government to produce the "Congress Price Index" from 2011 to 2015. The longest lasting private statistic is the daily index produced with online data by PriceStats, a firm co-founded by one of the authors of this paper. See Cavallo and Rigobon (2016) for details on the use of online data to produce inflation indices.

Table A.1: Argentina Alternative Inflation Statistics

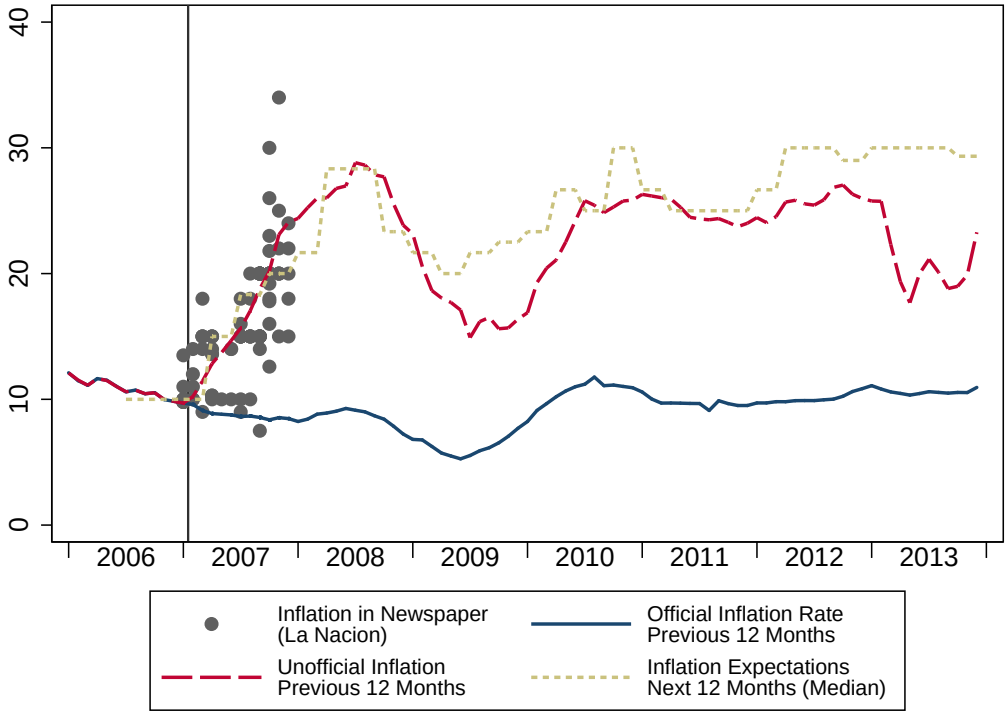
Active	Type of Institution	Institution	Area	Frequency	Public	Start Date	End Date	Public Start Date	Public End Date	Numer of Products	Fined by Moreno	Data Source
No	Private	Inflacion Verdadera	GBA	Daily	Yes	Nov-07	Aug-12	Nov-07	Aug-12	450		Online Prices
Yes	Private	PriceStats	National - Argentina	Daily	Yes	Oct-07	Today	Mar-11	Today	120,000		Online Prices
No	Private	Centro de Estudios Buenos Aires City	GBA	Monthly	Yes	Jul-08	Dec-09	Apr-09	Dec-09	n/r*		
Yes	Private	Elypsis	National - Argentina	Monthly	Yes	Apr-13	Today	Apr-13	Today	n/r		Online Prices + Estimation + Survey
Yes	Private	Elypsis	CABA	Monthly	Yes	Apr-13	Today	Apr-13	Today	n/r		Online Prices + Estimation + Survey
No	Private	Analytica	CABA, GBA	Monthly	Yes	Mar-07	Mar-10	Mar-07	Mar-10	n/r		Survey (by the provinces)
Yes	Private	FIEL	CABA	Monthly	No	Jan-08	Today	-	-	3,500	Yes	Survey + Online Prices + Receive information directly from retailers
n/r	Private	Ecolatina	CABA, GBA	Monthly	No	n/r	n/r	n/r	n/r	n/r	Yes	Survey
Yes	Private	Estudio Bein & Asociados	GBA	Monthly	No	Jan-08	Today	Jan-08	Jun-11	800	Yes	Survey
Yes	Private	Abeceb	GBA	Monthly	No	Jan-07	Today	-	-	400	Yes	Survey
n/r	Private	Economia y Regiones	n/r	Monthly	No	n/r	n/r	n/r	n/r	n/r	Yes	n/r
Yes	Private	Orlando J Ferreres & Asociados	n/r	Monthly	No	Jan-07	Today	-	-	n/r	Yes	Survey + Online Prices
Yes	Private	M&S Consultores	CABA, GBA	Monthly	No	Apr-02	Today	-	-	n/r	Yes	Survey + Receive information directly from retailers
n/r	Private	Finsoport	n/r	Monthly	n/r	n/r	n/r	n/r	n/r	n/r	Yes	n/r
n/r	Private	Rubinstein & Asociados	GBA	Monthly	n/r	n/r	n/r	n/r	n/r	n/r	Yes	n/r
n/r	Private	Econviews	n/r	Monthly	n/r	n/r	n/r	n/r	n/r	n/r	Yes	n/r
No	Public	Centro de Estudios para el Desarrollo Argentino (CENDA)	Jujuy, NeuquÃ©n, Entre RÃos, Chubut, Salta, La Pampa, RÃo Negro	Monthly	Yes	Oct-06	Dec-11	Oct-06	Dec-11			Survey (by the provinces)
Yes	Public	Direccion Provincial de Estadistica y Censo - Neuquen	Neuquen Capital	Monthly	Yes	Jan-80	Today	Jan-80	Today			Survey
Yes	Public	Gobierno de la Ciudad de Buenos Aires	CABA	Monthly	Yes	Feb-03	Today	Feb-03	Today	628		Survey + Online Prices + Phone Survey
No	Public	Sistema de Informacion Socioeconomica de Posadas	Posadas	Monthly	Yes		Apr-12		Apr-12			
Yes	Public	Direccion Provincial de Estadistica y Censo - San Luis	Provincia de San Luis	Monthly	Yes	Oct-05	Today	Oct-05	Today	301		Survey
No	Public	Direccion Provincial de Estadistica y Censo - Chubut	Trelew - Rawson	Monthly	Yes	Jan-75	Dec-13	Jan-75	Dec-13	100		Survey
Yes	Public	Direccion Provincial de Estadistica y Censo - Provincia de Tierra del Fuego	Ushuaia y Rio Grande	Monthly	Yes	Jul-13	Today	Jul-13	Today			Survey
No	Public	Direccion de Estadistica de la Provincia de Tucuman		Monthly	Yes	Jan-68	Mar-08	Jan-68	Mar-08			Survey
No	Public	Direccion Provincial de Estadistica y Censo - Jujuy		Monthly								
No	Public	Gobierno de la Provincia de Salta		Monthly								
No	Public	Gobierno de la Provincia de Chaco		Monthly								
No	Public	Entre Rios		Monthly								
No	Public	Gobierno de Rio Negro	Viedma	Monthly								
No	Public	La Pampa	Santa Rosa	Monthly								
No	Public	Direccion Provincial de Estadistica y Censo - Catamarca		Monthly								
No	Public using private sources	Congreso Nacional		Monthly	Yes	May-11	Oct-15	May-11	Oct-15			Private Consultants' Estimations

*No response

A.2 Newspaper articles mentioning the inflation rate in 2007

Figure A.1 replicates Figure 3 with the addition of the annual inflation rates mentioned by newspaper articles on the topic published in "La Nacion" during the year 2007. Each dot in the figure is a different article. Inflation expectations increased in line with the annual rates mentioned for unofficial indicators during 2007.

Figure A.1: Newspapers Articles, Official Unofficial Statistics and Inflation Expectations



Notes: The vertical line represents the start of the intervention of the national statistical agency (INDEC) in January 2007. Each gray dot in 2007 represent the annual inflation rate mentioned in an article in La Nacion Newspaper. "Official Inflation" is the annual inflation rate reported by INDEC. The "Unofficial Inflation" indicator is computed by PriceStats (please see notes to Figure 2 for more details). The mean of inflation expectations for the following 12 months are quarterly averages of the monthly series from the Encuesta de Expectativas de Inflación (carried out since August 2006 by the Centro de Investigación en Finanzas, Universidad Torcuato Di Tella). This survey collected information on the inflation expectations for the following 12 months among the general population of Argentina, based on a standard question for this type of survey ("What do you expect the annual rate of inflation will be during the next 12 months?").

B Model Appendix

B.1 Main Result

This section provides details for the model of Bayesian learning in presence of potentially biased statistics described in Section 3.1. The following proposition has the main result:

Proposition 1. *Let the prior belief about inflation and government bias be given by the bi-variate normal distribution with mean* $\begin{bmatrix} \pi_0 \\ b_0 \end{bmatrix}$ *and variance-covariance matrix* $\begin{bmatrix} \sigma^2_{\pi,0} & \sigma_{\pi b,0} \\ \sigma_{\pi b,0} & \sigma^2_{b,0} \end{bmatrix}$*. Given the signals* $\bar{u}$ *and* $\bar{o}'$*, the posterior belief is distributed bi-variate normal,* $\mathcal{N}(\Upsilon, \Delta)$*, with:*

$$\Delta = \left(\begin{bmatrix} \sigma^2_{\pi,0} & \sigma_{\pi b,0} \\ \sigma_{\pi b,0} & \sigma^2_{b,0} \end{bmatrix}^{-1} + \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix}^T \begin{bmatrix} \sigma^2_u & 0 \\ 0 & \sigma^2_o \end{bmatrix}^{-1} \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix} \right)^{-1}$$

$$\Upsilon = \Delta \left\{ \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix}^T \begin{bmatrix} \sigma^2_u & 0 \\ 0 & \sigma^2_o \end{bmatrix}^{-1} \begin{bmatrix} \bar{u} \\ \bar{o}' \end{bmatrix} + \begin{bmatrix} \sigma^2_{\pi,0} & \sigma_{\pi b,0} \\ \sigma_{\pi b,0} & \sigma^2_{b,0} \end{bmatrix}^{-1} \begin{bmatrix} \pi_0 \\ b_0 \end{bmatrix} \right\}$$

Proof. See B.2. □

The mean posterior beliefs are an average between the average prior beliefs, $\begin{bmatrix} \pi_0 \\ b_0 \end{bmatrix}$, and the signals, $\begin{bmatrix} \bar{u} \\ \bar{o}' \end{bmatrix}$, weighted by a weighting matrix that involves a combination of their respective variance-covariance matrices. We focus on the case where the prior beliefs for the inflation rate and the bias are orthogonal, $\sigma_{\pi b,0} = 0$. Focusing on this case does not mean that we believe the assumption $\sigma_{\pi b,0} = 0$ to hold. Indeed, even if we started out with orthogonal beliefs a rational individual would still end up with a posterior belief where $\sigma_{\pi b,0} \neq 0$. The intuition for the case where $\sigma_{\pi b,0} \neq 0$ would be similar, only that the formula would include several additional second-order terms that make corrections for the fact that the prior beliefs about π and b are correlated.

Replacing the orthogonality condition, $\sigma_{\pi b,0} = 0$, and finding the expected values for π_1 and b_1:

$$E \begin{pmatrix} \pi_1 \\ b_1 \end{pmatrix} = \left(\begin{bmatrix} \sigma^2_{\pi,0} & \sigma_{\pi b,0} \\ \sigma_{\pi b,0} & \sigma^2_{b,0} \end{bmatrix}^{-1} + \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix}^T \begin{bmatrix} \sigma^2_u & 0 \\ 0 & \sigma^2_o \end{bmatrix}^{-1} \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix} \right)^{-1}$$
$$\left\{ \begin{pmatrix} 1 & 0 \\ 1 & 1 \end{pmatrix}^T \begin{pmatrix} \sigma^2_u & 0 \\ 0 & \sigma^2_o \end{pmatrix}^{-1} \begin{pmatrix} \bar{u} \\ \bar{o}' \end{pmatrix} + \begin{pmatrix} \sigma^2_{\pi,0} & 0 \\ 0 & \sigma^2_{b,0} \end{pmatrix}^{-1} \begin{pmatrix} \pi_0 \\ b_0 \end{pmatrix} \right\}$$

After some algebra:

$$E\begin{pmatrix}\pi_1\\ b_1\end{pmatrix} = \left(\begin{bmatrix}\frac{1}{\sigma^2_{\pi,0}} & 0\\ 0 & \frac{1}{\sigma^2_{b,0}}\end{bmatrix} + \begin{bmatrix}1 & 1\\ 0 & 1\end{bmatrix}\begin{bmatrix}\frac{1}{\sigma^2_u} & 0\\ 0 & \frac{1}{\sigma^2_o}\end{bmatrix}\begin{bmatrix}1 & 0\\ 1 & 1\end{bmatrix}\right)^{-1} \left\{\begin{pmatrix}1 & 1\\ 0 & 1\end{pmatrix}\begin{pmatrix}\frac{1}{\sigma^2_u} & 0\\ 0 & \frac{1}{\sigma^2_o}\end{pmatrix}\begin{pmatrix}\bar{u}\\ \bar{o}'\end{pmatrix} + \begin{pmatrix}\frac{1}{\sigma^2_{\pi,0}} & 0\\ 0 & \frac{1}{\sigma^2_{b,0}}\end{pmatrix}\begin{pmatrix}\pi_0\\ b_0\end{pmatrix}\right\}$$

And more algebra:

$$\begin{aligned}E\begin{pmatrix}\pi_1\\ b_1\end{pmatrix} &= \left(\begin{bmatrix}\frac{1}{\sigma^2_{\pi,0}} & 0\\ 0 & \frac{1}{\sigma^2_{b,0}}\end{bmatrix} + \begin{bmatrix}\frac{1}{\sigma^2_u}+\frac{1}{\sigma^2_o} & \frac{1}{\sigma^2_o}\\ \frac{1}{\sigma^2_o} & \frac{1}{\sigma^2_o}\end{bmatrix}\right)^{-1}\left\{\begin{pmatrix}\frac{\bar{u}}{\sigma^2_u}+\frac{\bar{o}'}{\sigma^2_o}\\ \frac{\bar{o}'}{\sigma^2_o}\end{pmatrix} + \begin{pmatrix}\frac{\pi_0}{\sigma^2_{\pi,0}}\\ \frac{b_0}{\sigma^2_{b,0}}\end{pmatrix}\right\}\\ &= \frac{1}{\left|cov\begin{bmatrix}\pi_1\\ b_1\end{bmatrix}\right|_{\sigma_{\pi b,0}=0}}\begin{pmatrix}\frac{1}{\sigma^2_{b,0}}+\frac{1}{\sigma^2_o} & -\frac{1}{\sigma^2_o}\\ -\frac{1}{\sigma^2_o} & \frac{1}{\sigma^2_{\pi,0}}+\frac{1}{\sigma^2_u}+\frac{1}{\sigma^2_o}\end{pmatrix}\begin{Bmatrix}\frac{\bar{u}}{\sigma^2_u}+\frac{\bar{o}'}{\sigma^2_o}+\frac{\pi_0}{\sigma^2_{\pi,0}}\\ \frac{\bar{o}'}{\sigma^2_o}+\frac{b_0}{\sigma^2_{b,0}}\end{Bmatrix}\end{aligned}$$

Given the orthogonality condition, the determinant of the variance-covariance matrix is:

$$\left|cov\begin{bmatrix}\pi_1\\ b_1\end{bmatrix}\right|_{\sigma_{\pi b,0}=0} = \frac{1}{\frac{1}{\sigma^2_{\pi,0}\sigma^2_{b,0}}+\frac{1}{\sigma^2_{\pi,0}\sigma^2_o}+\frac{1}{\sigma^2_u\sigma^2_{b,0}}+\frac{1}{\sigma^2_u\sigma^2_o}+\frac{1}{\sigma^2_o\sigma^2_{b,0}}}$$

Solving this product, we obtain:

$$E(\pi_1) = \frac{\pi_0\left(\frac{1}{\sigma^2_{\pi,0}\sigma^2_{b,0}}+\frac{1}{\sigma^2_{\pi,0}\sigma^2_o}\right)+\bar{u}\left(\frac{1}{\sigma^2_u\sigma^2_{b,0}}+\frac{1}{\sigma^2_u\sigma^2_o}\right)+(\bar{o}'-b_0)\frac{1}{\sigma^2_o\sigma^2_{b,0}}}{\frac{1}{\sigma^2_{\pi,0}\sigma^2_{b,0}}+\frac{1}{\sigma^2_{\pi,0}\sigma^2_o}+\frac{1}{\sigma^2_u\sigma^2_{b,0}}+\frac{1}{\sigma^2_u\sigma^2_o}+\frac{1}{\sigma^2_o\sigma^2_{b,0}}}$$

$$E(b_1) = \frac{b_0\left(\frac{1}{\sigma^2_{\pi,0}\sigma^2_{b,0}}+\frac{1}{\sigma^2_{b,0}\sigma^2_u}+\frac{1}{\sigma^2_{b,0}\sigma^2_o}\right)+(\bar{o}'-\Pi_0)\frac{1}{\sigma^2_o\sigma^2_{\Pi,0}}+(\bar{o}'-u_0)\frac{1}{\sigma^2_u\sigma^2_o}}{\frac{1}{\sigma^2_{\pi,0}\sigma^2_{b,0}}+\frac{1}{\sigma^2_{\pi,0}\sigma^2_o}+\frac{1}{\sigma^2_u\sigma^2_{b,0}}+\frac{1}{\sigma^2_u\sigma^2_o}+\frac{1}{\sigma^2_o\sigma^2_{b,0}}}$$

Last, we define the following weights:

$$\omega_1 = \frac{\frac{1}{\sigma^2_u\sigma^2_{b,0}}+\frac{1}{\sigma^2_u\sigma^2_o}}{\frac{1}{\sigma^2_{\pi,0}\sigma^2_{b,0}}+\frac{1}{\sigma^2_{\pi,0}\sigma^2_o}+\frac{1}{\sigma^2_u\sigma^2_{b,0}}+\frac{1}{\sigma^2_u\sigma^2_o}+\frac{1}{\sigma^2_o\sigma^2_{b,0}}},\ \omega_2 = \frac{\frac{1}{\sigma^2_o\sigma^2_{b,0}}}{\frac{1}{\sigma^2_{\pi,0}\sigma^2_{b,0}}+\frac{1}{\sigma^2_{\pi,0}\sigma^2_o}+\frac{1}{\sigma^2_u\sigma^2_{b,0}}+\frac{1}{\sigma^2_u\sigma^2_o}+\frac{1}{\sigma^2_o\sigma^2_{b,0}}}$$

$$\varphi_1 = \frac{\frac{1}{\sigma^2_o\sigma^2_{\Pi,0}}}{\frac{1}{\sigma^2_{\pi,0}\sigma^2_{b,0}}+\frac{1}{\sigma^2_{\pi,0}\sigma^2_o}+\frac{1}{\sigma^2_u\sigma^2_{b,0}}+\frac{1}{\sigma^2_u\sigma^2_o}+\frac{1}{\sigma^2_o\sigma^2_{b,0}}},\ \varphi_2 = \frac{\frac{1}{\sigma^2_u\sigma^2_o}}{\frac{1}{\sigma^2_{\pi,0}\sigma^2_{b,0}}+\frac{1}{\sigma^2_{\pi,0}\sigma^2_o}+\frac{1}{\sigma^2_u\sigma^2_{b,0}}+\frac{1}{\sigma^2_u\sigma^2_o}+\frac{1}{\sigma^2_o\sigma^2_{b,0}}}$$

After replacing for the weights, we obtain:

$$E(\pi_1) = \pi_0(1 - \omega_1 - \omega_2) + \bar{u}\omega_1 + (\bar{o}' - b_0)\omega_2$$

$$E(b_1) = b_0(1 - \varphi_1 - \varphi_2) + (\bar{o}' - \pi_0)\varphi_1 + (\bar{o}' - u_0)\varphi_2$$

These are exactly the equations (1) and (2) from Section 3.1 in the body of the paper.

B.2 Proof of Proposition 1

This problem is a particular case of a more general problem of Bayesian learning with multivariate normal priors and multivariate signals, which produces a posterior beliefs that is multivariate normal. This is known as Bayes' Theorem for Gaussian variables:

Theorem 1. *Take a prior belief x and a signal y with distributions in the form:*

$$p(x) = \mathcal{N}\left(\mu, \Lambda^{-1}\right)$$
$$p(y|\, x) = \mathcal{N}\left(Ax + b, L^{-1}\right)$$

The posterior distribution for the signal is given by:

$$p(x|\, y) = \mathcal{N}\left(\Delta\left\{A^T L(y - b) + \Lambda\mu\right\}, \Delta\right),$$

$$\text{where } \Delta = \left(\Lambda + A^T L A\right)^{-1}$$

Proof: Bishop (2006), section 2.3.3, pages 90-94.

We can simply apply Theorem 1 using the following replacements:

$$x = \begin{bmatrix} \pi \\ b \end{bmatrix},\ \mu = \begin{bmatrix} \pi_0 \\ b_0 \end{bmatrix},\ y = \begin{bmatrix} \bar{u} \\ \bar{o}' \end{bmatrix},\ \Lambda^{-1} = \begin{bmatrix} \sigma^2_{\pi,0} & \sigma_{\pi b,0} \\ \sigma_{\pi b,0} & \sigma^2_{b,0} \end{bmatrix},$$

$$A = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix},\ b = 0,\ L^{-1} = \begin{bmatrix} \sigma^2_u & 0 \\ 0 & \sigma^2_o \end{bmatrix}$$

As stated by the proposition, this results in a posterior belief distributed bi-variate normal, $\mathcal{N}(\Upsilon, \Delta)$, with parameters Υ and Δ equal to the ones stated in the proposition.

C Survey Appendix: English Translation of the Online Experiment Questionnaire

We include here English translations for the pre- and post-treatment questions, for all the informational treatments and for a debriefing message for all respondents included at the end of the questionnaire, which explained the use of alternative sources for the information treatments. Answer options are presented in brackets. The original questionnaire in Spanish is available upon request.

Pre-treatment questions:

- Please indicate your sex: *[Female; Male]*
- How old are you? *[0, 1, 2, ..., 99]*
- What is the highest education level you have attained? *[Primary school dropout, Completed primary school, High school dropout, Completed high school, Some tertiary education, Completed tertiary education, Some college, Completed college, Post-graduate]*
- How do you think that your personal/family economic situation is with respect to one year ago? *[Better, Worse, Same, Don't know]*
- And how do you think your personal/family economic situation will be one year from now? *[Better, Worse, Same, Don't know]*

Randomized informational treatment:

- *Control:* no message.
- *Official-10%:* "According to one of the official indicators published by INDEC, the annual inflation rate with respect to a year ago was approximately 10%".[18]
- *Official-20%:* "According to one of the official indicators published by INDEC, the annual inflation rate with respect to a year ago was approximately 20%".
- *Official-30%:* "According to one of the official indicators published by INDEC, the annual inflation rate with respect to a year ago was approximately 30%".
- *Unofficial-10%:* "According to one of the unofficial indicators published by consulting firms, analysts and research centers, the annual inflation rate with respect to a year ago was approximately 10%."

[18]INDEC stands for Argentina's "Instituto Nacional de Estadísticas y Censos." The acronym and the institution it represents are well known in Argentina and were amply covered in media outlets at the time of the survey.

- *Unofficial-20%:* "According to one of the unofficial indicators published by consulting firms, analysts and research centers, the annual inflation rate with respect to a year ago was approximately 20%."

- *Unofficial-30%:* "According to one of the unofficial indicators published by consulting firms, analysts and research centers, the annual inflation rate with respect to a year ago was approximately 30%."

Post-treatment questions:

- What do you think was the annual inflation rate with respect to one year ago? Please select the value closer to your estimate from the following drop down menu. *[0% or <, 1%, ... 100%; >100%]*

- How certain are you about your answer to the previous question? *[Very sure; Somehow sure, Not very sure; Not sure at all]*

- What do you think will be the annual inflation rate with respect to one year from now? Please select the value closer to your estimate from the following drop down menu. *[0% or <, 1%, ... 100%; >100%]*

Debriefing:

- "At some point during the questionnaire we asked about your inflation perceptions. We provided some of the respondents an approximate estimate of the annual inflation rate with respect to one year later. The provided estimate was randomly selected among one of the following sources: INDEC's official inflation indicator, private estimates of analysts close to the government, implicit inflation (gross domestic product deflactor) from INDEC, an estimate from a private research center (Universidad del CEMA), implicit inflation (wage growth coefficient) from INDEC, or the estimate from a consulting firm (food and beverages from Inflación Verdadera)."