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Inflation Illiteracy – A Micro-Data Analysis

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Inflation Illiteracy – A Micro-Data Analysis*

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Abstract

Survey data indicate that a relatively large share of households is ill-informed about the rate of inflation in the economy, with perceived and expected rates of inflation deviating substantially from official measures. Using Swedish micro-level data, we find that such *inflation illiteracy* is related to respondent characteristics, including income, education and sex.

JEL Classification: E31

Keywords: Perceived inflation; Inflation expectations; Survey data; Economic literacy

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1. Introduction

Survey measures of households' expectations of both macroeconomic and financial variables tend to show a fair amount of heterogeneity across respondents.¹ One of the explanations for this heterogeneity is varying degrees of financial literacy among households (e.g., Lusardi and Mitchell, 2014), which also affects their behaviour (Calvet *et al.*, 2009; Duca and Kumar, 2014). Understanding heterogeneity is accordingly important to both policymakers and academics.

In this paper, we study the economic literacy of Swedish households. Data are collected from Sweden's largest household survey – the *Economic Tendency Survey* of the National Institute of Economic Research (NIER). The survey contains two key variables of interest: The perceived *present* rate of inflation and the *expected* rate of inflation one year from now. Using micro-level data from the survey, we show that a substantial share of respondents gives what can be termed “ill-informed” answers – thereby being what we denote *inflation illiterate*. Probit analysis shows that this inflation illiteracy relates to key characteristics of the respondents.

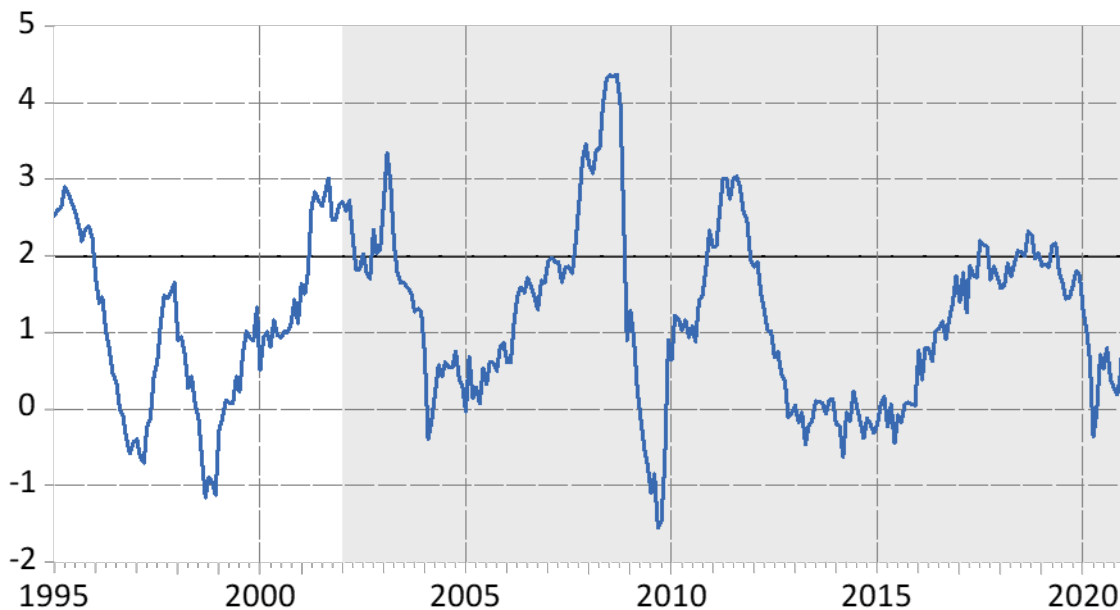
2. Data and estimation

Data on Swedish households' perceived and expected rates of inflation are collected monthly by the NIER and published in its *Economic Tendency Survey*.² Approximately 1,500 households are chosen randomly each month to participate in the survey. Answers are collected through telephone interviews and an online questionnaire. The survey was initiated in 1978 and has undergone several revisions since. Our sample covers the period from January 2002 to February 2021, which is a period characterised by low and stable inflation following the introduction of an inflation target of two percent in 1995 (see Figure 1). During this period, inflation varied between -1.6 and 4.4 percent; the average was 1.3 percent.

¹ See, for example, Malmendier and Nagel (2016), Ehrmann *et al.* (2017) and Hjalmarsson and Österholm (2019, 2020) for recent studies on inflation, interest rates and housing prices.

² Micro data from the survey have previously been used by, for example, Jonung (1981), Jonung and Laidler (1988), Hjalmarsson and Österholm (2019, 2020) to study various aspects of Swedish households' expectations formation.

Figure 1. CPI-inflation.



Note: Percent on vertical axis. Shaded area indicates the sample period for which we have micro data on inflation expectations.

Most responses to the questions regarding the perceived and expected rates of inflation fall within a range that might be considered reasonable given the historical variation of actual inflation. However, a non-negligible share of the respondents provides an answer of -5 percent or less or 10 percent or more (see Figure 2); these are the respondents we define as being inflation illiterate. The shares of illiterate respondents are on average 11 and 9 percent for perceived and expected inflation, respectively, although there is some variation over time. The distribution of answers – pooled across all surveys – of the two variables are given in Figures 3 and 4. As can be seen, most of the ill-informed responses fall within the range of 10 to 20 percent; only a very small fraction is less than -5 percent. Two percent of all responses indicate an inflation rate of 20 percent or more, with the highest response being 300 percent (truncated from the figure.)

Figure 2. Share of respondents that gives answer ≤ -5 percent or ≥ 10 percent.

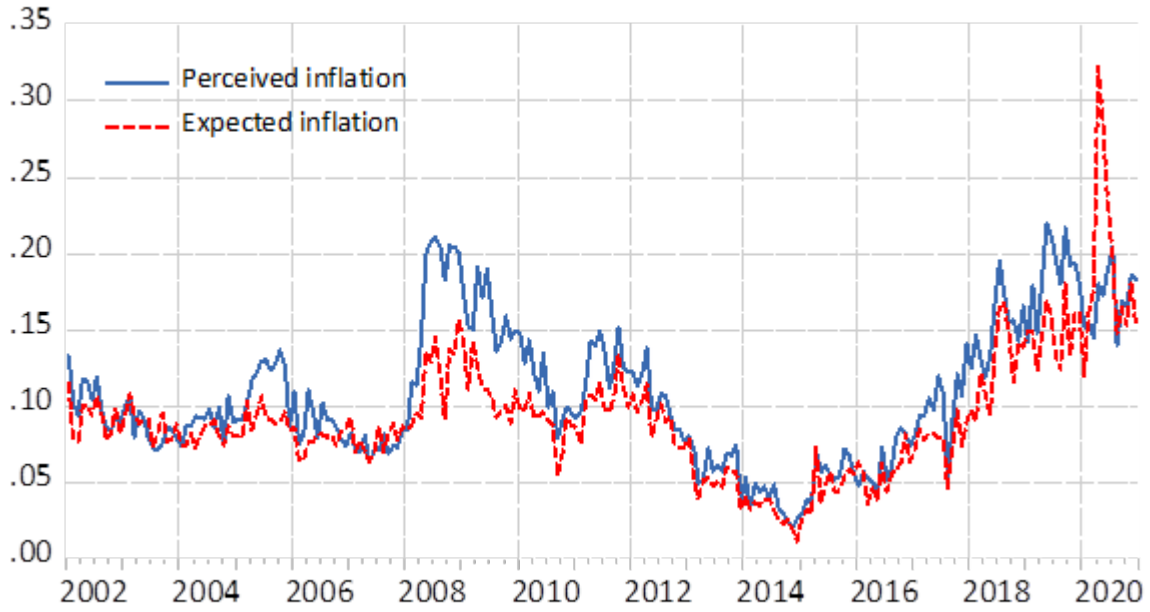
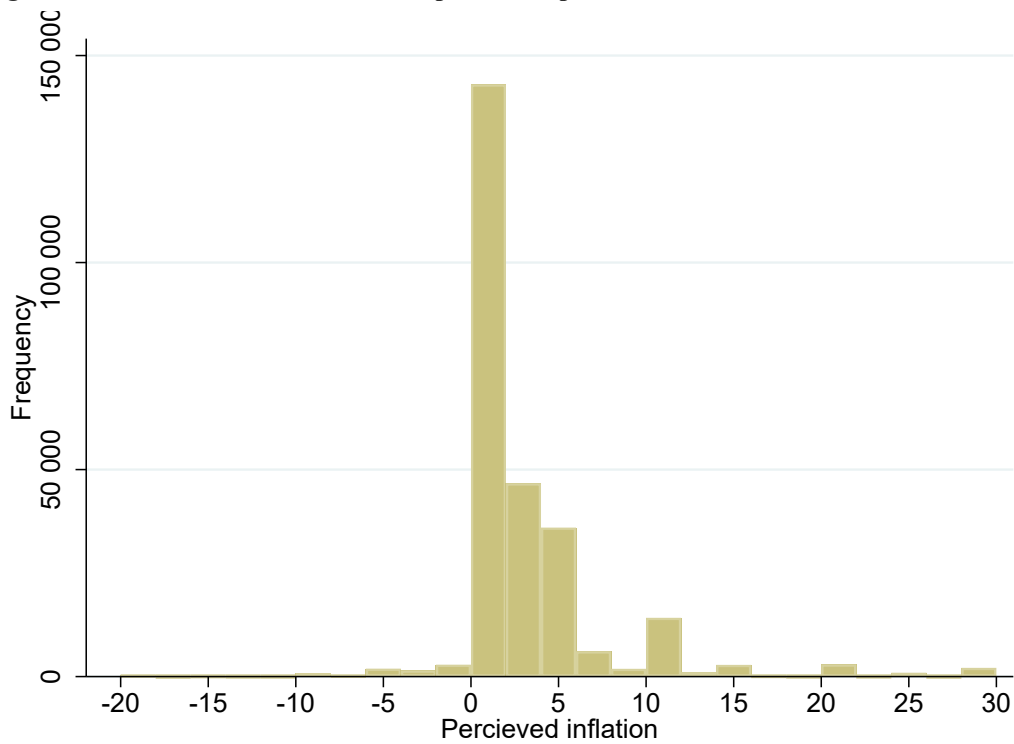
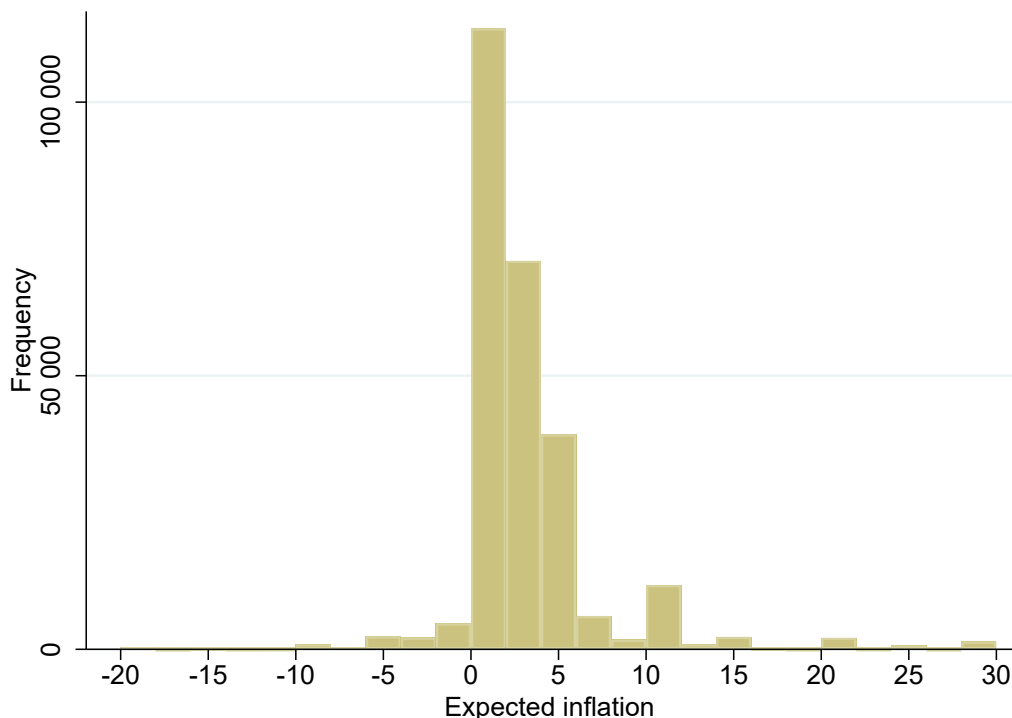


Figure 3. Distribution of answers for perceived present rate of inflation.



Note: Percent on horizontal axis. Answers pooled across all surveys. Answers above 30% and below -20% are counted as equal to 30% and -20%, respectively, when creating the diagram.

Figure 4. Distribution of answers for expected rate of inflation one year from now.



Note: Percent on horizontal axis. Answers pooled across all surveys. Answers above 30% and below -20% are counted as equal to 30% and -20%, respectively, when creating the diagram.

To explore whether inflation illiteracy is related to the characteristics of the respondents, we generate two binary variables: y_t^p , which relates to perceived inflation, and y_t^e , which relates to inflation expectations. y_t^p (y_t^e) takes on the value one if the respondent states that perceived inflation (expected inflation) is *a*) -5 percent or lower or *b*) 10 percent or higher; for values of perceived inflation (expected inflation) between -5 and 10, y_t^p (y_t^e) takes on the value 0. These variables constitute the dependent variables in the two probit models that we estimate. Explanatory variables in these regressions are dummy variables, which reflect different respondent characteristics. We present these in Table 1, where we also indicate which category has been excluded for each set of dummy variables. Also included in the estimations are time dummies to control for business cycle variations.

Table 1. Respondent characteristics.

Variable	Division in survey	Regression label
Income	First quartile	LOW_INCOME
	Second quartile	MED_LOW_INCOME
	Third quartile	MED_HIGH_INCOME
	Fourth quartile	<i>Excluded category</i>
		MISSING_INCOME
Education	Basic	LOW_EDUCATION
	Upper secondary	MED_EDUCATION
	Tertiary	<i>Excluded category</i>
Sex	Female	FEMALE
	Male	<i>Excluded category</i>
Employment	Not employed	NOT_EMPLOYED
	Employed	<i>Excluded category</i>
Age	16-24	LOW_AGE
	25-34	MED_LOW_AGE
	35-49	MED_AGE
	50-64	MED_HIGH_AGE
	65-	<i>Excluded category</i>
Type of housing	Owned apartment	<i>Combined to OWN_HOUSE_APARTMENT</i>
	Owned house	<i>Combined to OWN_HOUSE_APARTMENT</i>
	Rental apartment	<i>Combined to excluded category</i>
	Other	<i>Combined to excluded category</i>
Family	Single without children	HH_SINGLE
	Single with children	HH_SINGLE_CHILD
	Married/cohabiting with children	HH_MARRIED_CHILD
	Other	HH_OTHER
	Married/cohabiting without children	<i>Excluded category</i>
Region	Big city county	BIG_CITY
	Forest county	<i>Excluded category</i>
	Other	LOCATION_OTHER

Note: The category “MISSING_INCOME” consists of the individuals who did not respond to the question regarding income.

3. Results

Pooling the observations from all monthly surveys, we estimate probit models with y_t^p and y_t^e as dependent variables, respectively. The results, presented in Table 2, show that the estimated coefficients are mostly similar across the two specifications. Inflation illiteracy is strongly related to many of the characteristics of the respondents. In particular – and in line with the

general results from the literature on economic and financial literacy – it is evident that households with lower levels of income and education are more likely to provide an ill-informed answer; see, for example, Calvet *et al.* (2009) and Campbell *et al.* (2011).³

Table 2. Results from probit regressions.

	Dependent variable: Perceived present inflation	Dependent variable: Expected inflation one year from now
MISSING_INCOME	0.270*** (0.012)	0.307*** (0.013)
LOW_INCOME	0.321*** (0.015)	0.335*** (0.015)
MED_LOW_INCOME	0.266*** (0.012)	0.280*** (0.013)
MED_HIGH_INCOME	0.139*** (0.011)	0.153*** (0.011)
LOW_EDUCATION	0.240*** (0.011)	0.285*** (0.012)
MED_EDUCATION	0.225*** (0.008)	0.242*** (0.008)
FEMALE	0.168*** (0.007)	0.202*** (0.007)
NOT_EMPLOYED	0.067*** (0.010)	0.042*** (0.010)
LOW_AGE	0.067*** (0.013)	0.231*** (0.139)
MED_LOW_AGE	0.017 (0.014)	0.135*** (0.015)
MED_AGE	0.042*** (0.014)	0.127*** (0.015)
MED_HIGH_AGE	0.046*** (0.012)	0.109*** (0.013)
OWN_HOUSE_APT	-0.101*** (0.008)	-0.120*** (0.009)
HH_SINGLE	-0.074*** (0.010)	-0.078*** (0.010)
HH_SINGLE_CHILD	0.131*** (0.018)	0.119*** (0.018)
HH_MARRIED_CHILD	0.099*** (0.011)	0.079*** (0.012)
HH_OTHER	0.088*** (0.012)	0.083*** (0.013)
BIG_CITY	0.034*** (0.009)	0.022** (0.010)
LOCATION_OTHER	0.010 (0.010)	0.008 (0.101)
<hr/>		
Number of observations	264 725	260 903

Note: Standard errors in parentheses (). ***, ** and * indicate significance at the 1, 5 and 10 percent levels respectively. Time dummies are included in both regressions.

³ Households that have chosen not to state their income (“missing income” category) also have a higher probability. As pointed out by Hjalmarsson and Österholm (2020), these individuals tend to have lower education and are more likely not to be employed, compared to the respondents who state their income.

Other socioeconomic characteristics also matter. Respondents that are not employed have a higher probability of being inflation illiterate. Single households have a lower probability of being inflation illiterate (compared to the reference category “married/cohabiting without children”), whereas the presence of children in the household – irrespective of the marital status – increases the probability of inflation illiteracy. Owning the house or apartment in which you live lowers the probability of inflation illiteracy.

Finally, we note that sex and age also tend to be significant explanatory variables. Women and younger households are more likely to be inflation-illiterate; the effect with respect to age is larger for expectations than for perceived inflation. 16-24 year olds are the most likely to provide an extreme-value answer.

4. Conclusion

We document that a relatively large share of the respondents in the NIER’s *Economic Tendency Survey* are inflation illiterate. This property is robustly related to several characteristics of the respondents, including education, income and sex.

Since the level of education matters, our results indicate that the degree of understanding of economic concepts is relevant for inflation illiteracy. However, since sex, age and children in the household are also significant explanatory variables, other channels are likely also part of the story. Differences in experiences, consumption baskets, willingness to collect and process information, or time available for processing information may all be of relevance when explaining this heterogeneity, in line with suggestions by, for example, Jonung (1980), Malmendier and Nagel (2016) and Cavallo *et al.* (2017).

Establishing the presence of inflation illiteracy and how this property is related to respondent characteristics are important issues of general interest. In addition, we want to lift two practical implications from our analysis. First, the fact that a considerable share of Swedish households might be inflation illiterate should be relevant both when modelling the economy and conducting economic policy since it is not unlikely that these households take economic decisions which are poorly founded. Second, when it comes to household surveys, extreme-value answers risk influence aggregated time series (such as the mean inflation expectation) in an unwanted way and could mislead policy makers who analyse them. Household surveys should

therefore be adjusted for outliers using a reliable method before aggregated time series are calculated.

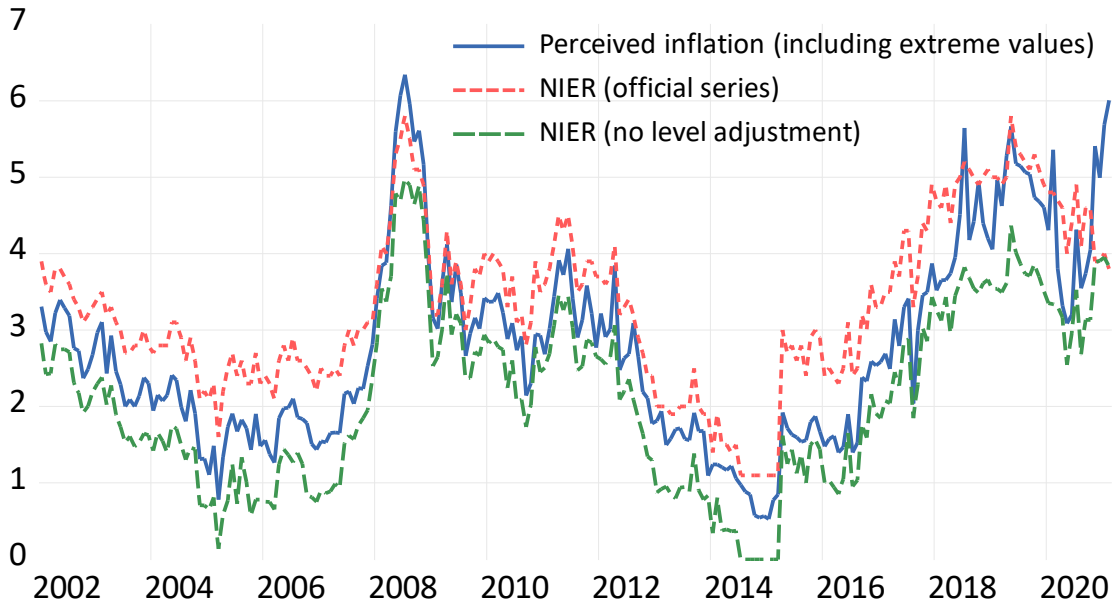
The NIER does have a procedure for the removal of outliers, in which observations that are judged as outliers according to an algorithm based on the quartiles of the data are removed.⁴ Together with a level adjustment of parts of the time series, the outlier-adjusted data are then used to calculate the official time series for perceived and expected inflation that the NIER publishes in the *Economic Tendency Survey*;⁵ these series are shown in Figures 5 and 6, where they are denoted “NIER (official series)”.⁶ The effect of outlier removal is more clearly illustrated by comparing the mean over all observations – denoted “Perceived inflation (including extreme values)” and “Expected inflation (including extreme values)” in Figures 5 and 6 respectively – to the series based on the NIER’s method for outlier adjustment but without the level adjustment; these series are denoted “NIER (no level adjustment)”. As is evident, the effect is non-negligible; if outliers were not removed, the measurements of perceived inflation and inflation expectations would be substantially higher.

⁴ More specifically, outliers are treated as follows in a given cross section. The first (Q1) and third (Q3) quartiles of the responses are calculated, as well as the inter-quartile range, $QR=Q3-Q1$. Responses greater than $Q3+3QR$ or smaller than $Q1-3QR$ are omitted. See National Institute of Economic Research (2022a) for details.

⁵ The method for gathering the data of the *Economic Tendency Survey* was changed in November 2019. Historically, the survey used to be conducted purely by telephone but nowadays some respondents give their answers on the telephone whereas others do it through an online form. Between October 2019 and January 2020, the two methods were used in parallel and could accordingly be compared. The differences observed during this period are used to adjust historical data to make them more comparable to those gathered by the present method; see National Institute of Economic Research (2020) for details. For perceived and expected inflation, this means that the historical (that is, prior to November 2019) cross-sectional means are shifted up by 1.65 and 0.67 percentage points respectively.

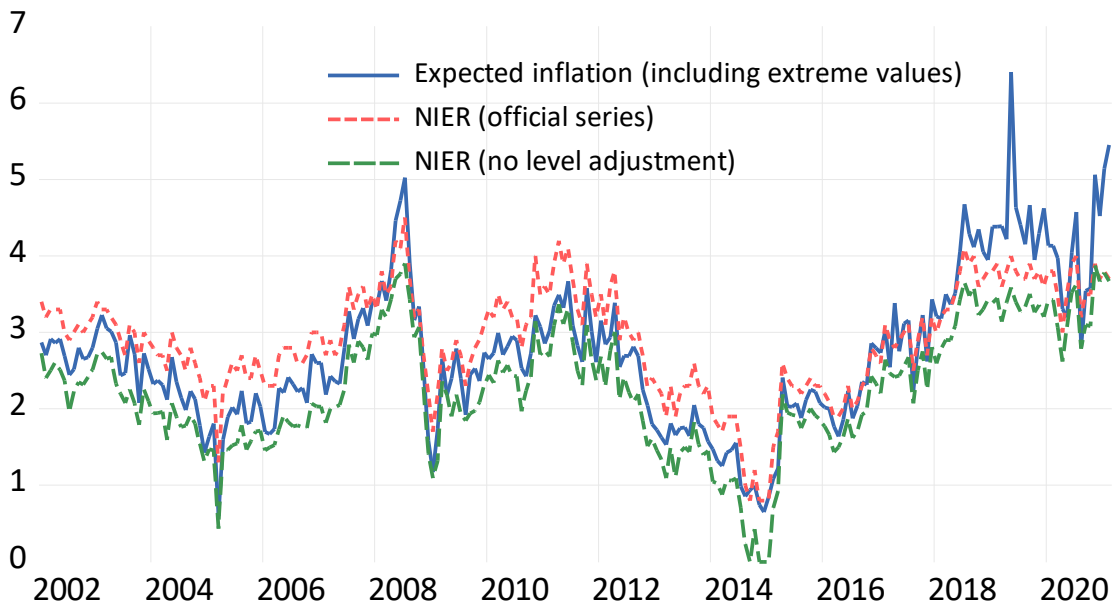
⁶ An EU harmonisation of the survey meant that the questions concerning inflation in the *Economic Tendency Survey* were changed in April 2015. At the same time, the NIER also changed its method for calculating perceived and expected inflation; see National Institute of Economic Research (2022b) for details. The time series using this new method begin in April 2015. “NIER (official series)” is therefore given by the time series which the NIER denotes as based on the “old method” between January 2002 and March 2015, and the time series using the present method between April 2015 and February 2021.

Figure 5. Perceived inflation.



Note: Percent on vertical axis.

Figure 6.



Note: Percent on vertical axis.

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