

Daniel F. Heuermann* and Andreas Krämer

Perceived Inflation in Germany: Determinants and the Role of the Basket of Goods

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Abstract: In times of high price increases, the perceived ('subjective') inflation rate is of particular importance for decisions on monetary, distributional, and growth policies. This paper measures the perceived inflation rate in April 2022 and again 12 months later using a representative sample for Germany and examines differences among various population groups. The findings indicate that perceived inflation rose strongly between 2022 and 2023 to more than three times the official inflation rate across most spending categories. Significant differences prevail, however, with regard to individual education level, age, and gender. More frequently purchased types of goods seem to be assigned a higher weight and, hence, have a larger influence on perceived inflation. Finally, a counterfactual analysis shows that the difference between perceived inflation and the official rate is only to a minor extent driven by deviations of individual consumption structures from the statistical basket of goods.

Keywords: perceived inflation; prices; consumption structure

JEL Classification: D83; D84; E21; E31

1 Perceived Inflation in Germany and the EU

With quickly rising inflation rates between 2021 and 2024, the measurement of perceived inflation has once again gained prominence. Understanding the dynamics, causes, and group specific differences between officially measured and individually perceived changes in prices is not only of scientific interest but also of significance for monetary and fiscal policies, partly because perceived inflation and expectations on the evolution of prices affect the level, timing and structure of household consumption (D'Acunto et al.

***Corresponding author: Daniel F. Heuermann**, Department of Business Studies and Economics, University of Europe for Applied Sciences, IZA, Dessauer Str. 3-5, 10963 Berlin, Germany, E-mail: daniel.heuermann@ue-germany.de

Andreas Krämer, Exeo Strategic Consulting AG, Wittelsbacherring 24, 53115 Bonn, Germany, E-mail: andreas.kraemer@exeo-consulting.com

2023). In addition, recent studies have shown that individual perceptions of excessively high inflation rates may lead to discontent, mistrust in public institutions and, potentially, extreme voting behavior (Alesina et al. 2020; Stantcheva 2024).

In Germany and other countries of the European Union, the issue of subjective inflation has received particular attention with the changeover from national currencies to the Euro in January 2002. Several studies show that price perceptions during this time started to deviate notably from the officially measured inflation rate, which has remained largely constant at around 2 % (see e.g., Brachinger (2005, 2008), Jungermann et al. (2007) and Aucremanne et al. (2007); Antonides (2008) provides a survey of the literature). From mid-2002 onward, perceived inflation started to decrease again in Germany and the EU; with annual average values between 5 and 10 % it remained, however, persistently above the officially measured rate (Arioli et al. 2017; Abildgren and Kuchler 2021). In the face of substantially rising prices from 2021 onward, perceived inflation once again deviated from the officially measured rate, although with significant variation between countries (European Central Bank, 2024). In a study for Germany, Krämer et al. (2022) report a perceived inflation rate of 13 % in April 2022, which exceeded the then prevailing official rate of nearly 7 % by a factor of two.

The present paper contributes to this literature in a number of ways. First, based on representative survey data, we examine whether the trend towards a growing gap between subjective and objective inflation has further intensified during the recent period of quickly rising prices. We explicitly compare our results for the high-inflation years to earlier periods where prices have remained largely stable. Second, we examine whether differences prevail between population groups in Germany with regard to their perception of changes in prices. In this regard, several studies for the United States have shown that subjective inflation perceptions decrease with age, income, and education level and are lower for men than for women (see D'Acunto et al. (2023), Weber et al. (2022), and Angelico and Di Giacomo (2024) among others). Addressing this question in the German context, we apply a regression approach to explore whether the perception of inflation varies with individual characteristics. Third, we address the question whether a relationship exists between individual expenditure structures and perceived inflation. Finally, we examine by means of a counterfactual analysis to which extent the difference between subjective and official inflation rates can be related to deviations of individual consumption structures from the underlying basket of goods.

In summary, we provide the following results: first, we show that there is a growing divergence between the perceived and the officially measured rate of inflation. In 2023, the perceived rise in prices exceeds the official inflation rate by a factor of three. Low-income households report to feel particularly affected by rising prices. Second, subjective inflation rates vary substantially between demographic groups. The regression results show that the average perceived inflation rate decreases with age and educational attainment and tends to be lower among men than

women. In addition, the results confirm findings from the literature that inflation perceptions across consumption categories rise with the frequency of purchases. Last but not least, we show that differences between the statistical basket of goods and individual consumption structures contribute only marginally to the deviation of the perceived from the official inflation rate.

The next section provides a description of the survey and summarizes the characteristics of the sample. Section 3 presents the findings regarding the evolution of the subjective inflation rate in Germany between 2022 and 2023. The insights from the regression analysis regarding differences in perceived inflation between population groups are provided in Section 4. In addition, the section contains the findings on the link between expenditure structure and perceived inflation as well as the results from the counterfactual analysis with different baskets of goods. Section 5 provides a summary along with a comparative discussion of the findings.

2 Data and Descriptive Statistics

2.1 Data

The data on perceived inflation used in this paper are based on the representative OpinionTRAIN survey for Germany, which has been conducted in five waves since 2020. Appendices A.1 and A.2 provide a detailed description of the survey as well as of the resulting data set. In essence, the survey data contain responses from nearly 2,000 individuals who were asked about various aspects of their professional and personal lives. In the two most recent survey waves conducted in April 2022 and April 2023, explicit questions about perceived price changes as well as about consumption and saving behavior were included. In the 2023 survey, participants were additionally asked to specify their monthly expenses across different consumption categories and to assess the price changes within each of the categories over the past 12 months. The descriptive analyses in Sections 3 and 4.1 include responses from 1,888 participants who provided complete and plausible answers regarding subjective inflation and expenditure structure. Due to missing covariates, the number of observations used for the regression analysis in Section 4.2 decreases to 1,723 (see Appendix A.2 on the issue of selection and non-response bias).

2.2 Descriptive Statistics

Table B.1 in the Appendix summarizes the unweighted characteristics of the respondents surveyed in April 2023. The age range spans from 18 to 87 years with an

average age of 49.4 years. Men and women are represented almost equally in the data. About four-fifths of the respondents live in Western Germany. Less than 10 % receive social assistance benefits. Regarding monthly household net income, the largest group earns between 2,000 and 3,000 Euros with the distribution being right-skewed, which is in line with the overall population. More than half of the respondents hold a college or high school degree as their highest level of education, while nearly 17 % exhibit only basic schooling with or without an apprenticeship. 6 % of respondents are currently in training and 58 % are employed full or part-time. 28 % are retired and approximately 9 % are neither in training, employed, nor retired. With regard to city size, all types of municipalities in Germany are represented approximately equally.

3 Perceived Inflation in Germany, 2022 and 2023

Based on this sample, we determine in a first step the perceived inflation rate as of April 2023 and compare it to the figure from the previous year (April 2022). Consistent with the *Business and Consumer Survey* (European Commission, 2023), respondents in both survey waves were initially asked whether they felt that prices had increased a lot, moderately, slightly, stayed about the same, or have fallen over the last 12 months. Table 1 summarizes the distribution of responses. Already in April 2022, 72 % of respondents reported that they perceived prices to have risen a lot, while another 20 % reported moderate price increases, and only 8 % felt that prices had risen slightly, remained stable, or had fallen. This distribution shifted further upwards over the following 12 months. In April 2023, a total of 85 % of respondents stated that they perceived prices to have risen a lot, 13 % reported moderate increases, and 2 % felt that prices had increased only slightly. With a total of 7 responses, equal to 0.37 %, answers indicating price stability or a decline in prices were practically nonexistent. Compared to the responses from April 2022, the perception of rising prices has thus intensified considerably. The left panel of Figure 1 shows that the officially measured inflation rate increased from 6.3 % in April 2022 to 7.2 % in April 2023 and briefly even rose to nearly 9 % between September 2022 and February 2023. These results support the persistence of perceived inflation rates as documented by Aucremanne et al. (2007) and Abildgren and Kuchler (2021) among others.

In a subsequent question, respondents were asked to complement these trend indications by assigning a concrete numerical value to the question of how many percent consumer prices had increased or decreased from their perspective. The right panel in Figure 1 shows the cumulative distribution of the responses and compares the results from the two waves of the survey. Both curves exhibit jumps at multiples of 5, which are well-known from the literature (Appendix A.3 contains

Table 1: Perceptions of changes in consumer prices.

Perceived inflation	April 2022	April 2023
Prices have risen a lot.	72 %	85 %
Prices have risen moderately.	20 %	13 %
Prices have risen slightly.	5 %	2 %
Prices have stayed about the same.	2 %	0 %
Prices have fallen.	1 %	0 %

The table shows the distribution of responses to the question: ‘How do you think that consumer prices have developed over the last 12 months? Compared to last year, they have ...’. Source: exeo Strategic Consulting AG / Rogator AG; own calculation.

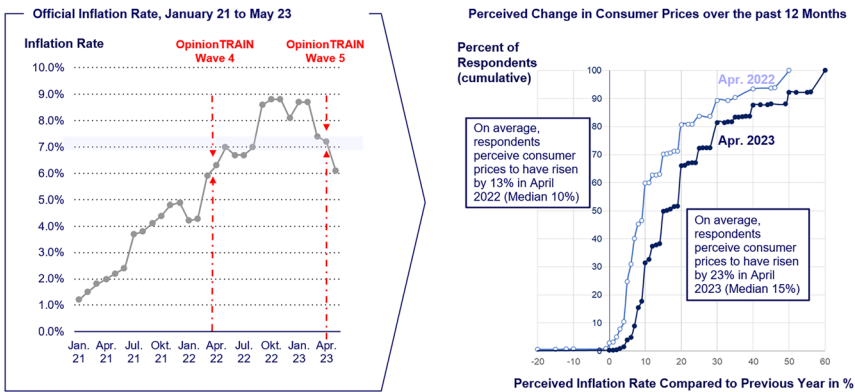


Figure 1: Official and perceived inflation rates in Germany. Left panel: Evolution of the consumer price index (percentage change relative to month of prior year); Right panel: Cumulative distribution of the responses to the question ‘By how many percent do you think consumer prices have gone up/down over the past 12 months?’. The light blue line provides the results for April 2022, the dark blue line for April 2023. Sources: Destatis (2024b); exeo Strategic Consulting AG / Rogator AG (right); own figures.

a discussion of the causes and consequences of such discontinuities). Consistent with the results from Table 1, the dark blue curve for April 2023 is located to the right of the light blue curve for April 2022 at all points of the distribution. The average value for the later point in time is 23 %, which is 10 % points higher than the average of 13 % for April 2022. With a value of 15 % in 2023 compared to 10 % in 2022, the difference in the two medians is slightly smaller but also positive and of substantial size. In summary, based on the answers to both questions, the results show that the perceived rate of inflation has significantly increased over the course of one year and ranged well above the officially measured rate of around 6 to 7 % at both points in time.

4 Differences in Perceived Inflation

4.1 Heterogeneity in Inflation Perceptions Between Income Groups

A central question in the design of fiscal and distributional policies during times of high inflation is whether certain population groups are more than proportionately affected by rising prices compared to others. With regard to income, the literature unanimously shows that lower-income households are on average more strongly hit by inflationary pressures than households with higher incomes (see, e.g., European Central Bank (2022) for Europe, and Penn Wharton (2021) for the US). According to both studies, this can partly be assigned to the fact that low-income households spend a larger share on goods that are subject to particularly high price increases and at the same time difficult if not impossible to substitute (like food, energy, and shelter). While we cannot directly measure whether lower-income households are *de facto* more severely affected by rising inflation rates, based on the survey data we are able to examine whether these households *feel* more affected by rising prices.¹ To do so, we have segmented the responses to the question of how much respondents perceive prices to have changed over the past 12 months by household net income as well as by

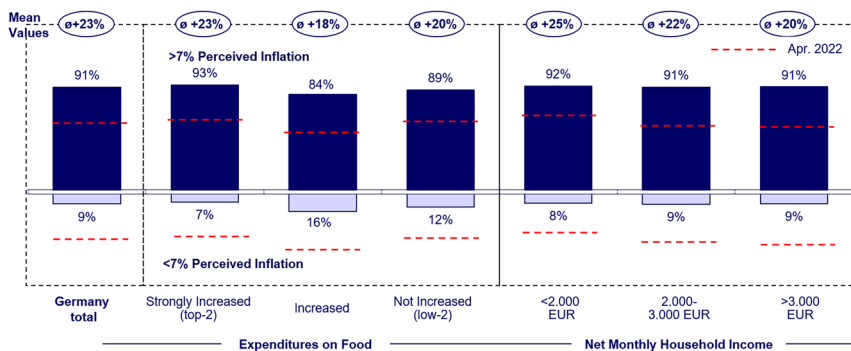


Figure 2: Subjective inflation by population groups (April 2023). The figure shows the perceived inflation rate by population group based on the answers to the question ‘By how many percent do you think consumer prices have gone up/down over the past 12 months?’. Dark blue bars in the histogram indicate the share of respondents who reported a perceived inflation rate above the official rate of 7 %, while light blue bars represent the opposite. Red dashed lines provide the values from April 2022. Source: exeo Strategic Consulting AG / Rogator AG; own calculation.

¹ When doing so, we acknowledge the argument by Hayo (2023) that households that report to be particularly hit by rising prices need not necessarily be those that are *de facto* affected the most.

perceived changes in their expenditures on food. The dark blue bars in Figure 2 show the share of respondents in 2023 who have reported a value above the official inflation rate of 7 %, light blue bars the opposite. Red dashed lines show the respective value for the previous year.

The following insights can be derived from Figure 2. With values between 84 and 93 %, the share of persons reporting a subjective inflation rate above the official rate of about 7 % is high across all groups. The group-specific averages range between 18 and 25 %. Hence, the high inflation rates in 2022 and 2023 seem to subjectively affect all income groups. Notably, the share of persons who report a perceived rise in prices above the official inflation rate has increased throughout. At the same time, despite similarities in average values and proportions, moderate differences exist between population groups. With a value of 25 %, persons living in low-income households report the highest average perceived inflation rate. In addition, individuals who indicate that their expenditure on food had strongly increased report the second-highest rate at 23 %.² In the next section, we examine whether this first indication that persons living in lower-income households feel more than proportionally affected by rising prices continues to hold when other individual characteristics are being controlled for.

4.2 Individual Determinants

Intuitively, it seems unlikely that inflation perceptions are uniformly distributed across the population. Consistently, the theoretical literature has argued that they are likely to differ along various dimensions.³ D'Acunto et al. (2023) among others explain that historical experiences and in particular exposure to earlier periods of inflation may be relevant for the formation of subjective views on current price changes. Similarly, an understanding of the institutional setup of the financial system as well as the capacity to process information about monetary policies (termed 'financial literacy' by Bruine de Bruin et al. (2010)) may influence inflation perceptions. In addition, persons with higher incomes may feel less affected by inflation as they face less difficulties in financially

² Z-tests for mean comparisons confirm that the differences are significant at the 1 % level.

³ The observation that perceived inflation for most periods and countries tends to exceed the officially measured rate is commonly related to *Prospect Theory* formulated by Kahneman and Tversky (1979) and Tversky and Kahneman (1981, 1991). According to this theory, rather than formulating rational expectations as posited by Lucas (1972, 1973), individuals tend to assign a higher weight to losses than to gains ('loss aversion'), which in turn leads to an overestimation of inflation. The relevance of this idea has been confirmed by Brachinger (2008) and Jungermann et al. (2007) among others; similarly, Draeger et al. (2014) provide evidence for a link between individual loss aversion and inflation perception.

compensating higher prices (D'Acunto et al. 2016). One somewhat special dimension in this context is the one of gender as there is ex ante no theoretical rationale why men and women should perceive changes in prices differently. Despite this, the empirical literature has consistently found that women tend to report higher subjective inflation rates than men. We discuss potential reasons for this finding in the context of presenting our own results below. Finally, regional differences may prevail between different regions due to local variations in the underlying basket of goods or the magnitude of price changes for certain goods and services (e.g., housing and mobility).

Since the seminal contribution by Jonung (1981), the empirical literature has confirmed the relevance of each of these factors. Studies for the United States by D'Acunto et al. (2023), Weber et al. (2022), and Angelico and Di Giacomo (2024) among others provide evidence that perceived inflation decreases with age, education level, and household income, and is generally higher among women than men. For Germany, Treu and Hartwig (2022) report similar findings. Taking the theoretical considerations as well as these empirical findings as a point of departure, we examine the relationship between subjective inflation and individual characteristics for Germany for the year 2023 by means of the following regression model:

$$I_i = \alpha + X\beta + \epsilon_i \quad (1)$$

where the dependent variable I_i is the perceived inflation rate. X denotes the matrix of individual characteristics, which includes information on age, employment status, net household income, educational attainment, gender, and city size. β represents the vector of estimated coefficients, α is the intercept, and ϵ_i the error term.

The first column in Table 2 provides the results from the regression. The significance of the coefficients shows that consistent with the existing literature individual age, gender, and education have a significant influence on perceived changes in prices. When interpreting the size of the coefficients, it needs to be kept in mind that age is measured in full years, while all other variables are of categorical nature. The reference categories for each of the binary variables are described at the bottom of the table. The results indicate that each additional year of age is associated with a 0.11 % point decrease in perceived inflation.⁴ Hence, an increase in age by one decade lowers inflation perceptions on average by 1.1 % points. This finding provides support for the theoretical argument by D'Acunto et al. (2023) that lifetime experience and exposure to different economic phases support the formation of a more realistic perception of the current economic situation. Furthermore, in line with the existing

⁴ We have also tested for non-linear effects by inserting a squared age term. As the results were insignificant throughout, we report only the results for the model without the squared term.

literature, the results indicate that perceived inflation is on average 3.6 % points higher for women than for men. A number of contributions have aimed to rationalize this finding. One of the key arguments relates the result to the ‘Availability Hypothesis’ formulated by Kahneman and Tversky (1973), which states that price increases for frequently purchased goods are assigned a greater weight (we test this notion empirically in Section 4.3). Along these lines, D’Acunto et al. (2022) show that the gender gap in inflation perceptions exists only within households where women do the groceries while it disappears if both spouses equally share this task (see D’Acunto et al. (2023) for an overview of the related literature). Regarding the individual level of education, the results in Table 2 emphasize the profound correlation of this variable with perceived inflation. Subjective inflation declines monotonically with rising formal education and is about 11 % points lower for college graduates than for individuals with only a basic school diploma. As shown by Hayo and Neuenkirch (2018), a higher level of education correlates with a deeper knowledge about economic relations including monetary policies and the role of Central Banks. Hence, the education variables included in the regression can be regarded as proxies for this (at least in our survey data) unobservable economic understanding (see Hayo (2023) for empirical evidence on this relation). In light of the discussion on differential perception of inflation by income in Section 4.1, it is noteworthy that net household income does not exert an independent influence on perceived inflation when the individual level of education is being controlled for. This suggests that differences in the perceived inflation rate are primarily related to varying levels of financial literacy (see Bruine de Bruin et al. (2010)), which are correlated with household income. This relationship is somewhat different with regard to receiving social assistance, which has an independent effect on inflation perception amounting to about 4 % points even when controlling for education level.

As a final step in this section, we compare the regression results for the year 2023 with the ones for 2022. While the nature of the survey as repeated cross-sections inhibits panel analyses with individual fixed effects, a comparison of the estimates obtained separately for the two waves allows to examine whether the results are qualitatively stable over time. Table B.2 in the Appendix contains the regression results for the year 2022. Overall, while the coefficients are estimated less precisely, the results point in the same direction as for 2023. Consistently, since perceived inflation is on average 10 % points lower in 2022 than in 2023, the coefficients are smaller for the earlier year. As in 2023, perceived inflation in 2022 tends to fall with age, household income and education and is higher for women than for men. It is surprising to see, however, that in contrast to 2023 the level of schooling does not offset the effects from household income. Despite this, it is reassuring that the results are overall qualitatively similar and also in line with the existing theoretical and empirical literature.

Table 2: Subjective inflation and individual characteristics (I).

	<i>Infl_{total}</i>	<i>Infl_{housing}</i>	<i>Infl_{food}</i>
Age	−0.114 (0.040)**	−0.047 (0.047)	−0.107 (0.043)**
Gender	3.626 (0.917)**	2.024 (1.088)*	3.139 (0.994)**
East/West	−7.215 (5.009)	−3.394 (5.937)	−2.707 (5.424)
Social assistance	−3.813 (1.823)*	0.210 (2.141)	−2.873 (1.956)
Net household income (1.000–2.000)	−1.285 (1.953)	0.665 (2.321)	−0.959 (2.1203)
Net household income (2.000–3.000)	−1.598 (2.099)	−0.982 (2.483)	−2.761 (2.269)
Net household income (3.000–4.000)	−0.775 (2.205)	−0.372 (2.603)	−2.752 (2.378)
Net household income (4.000–5.000)	−5.372 (2.343)	−1.954 (2.770)	−5.268 (2.531)*
Net household income (>5.000)	−3.703 (2.429)	−0.747 (2.817)	−4.015 (2.574)
Basic schooling	−22.806 (7.799)**	−19.331 (9.518)*	−3.347 (0.426)
Apprenticeship	−26.664 (7.534)**	−22.776 (9.191)*	−6.369 (8.397)
Realschule	−29.664 (7.471)**	−19.997 (9.121)*	−7.384 (8.334)
A-level	−31.419 (7.448)**	−21.996 (0.093)*	−9.463 (8.308)
College	−34.032 (7.490)**	−22.089 (9.131)*	−11.524 (8.343)
In education	−3.827 (2.776)	−3.329 (3.230)	−2.358 (2.951)
Employed	0.601 (1.405)	−2.008 (1.669)	0.221 (1.525)
Not in labor force	1.967 (1.976)	−0.636 (2.362)	−0.670 (2.158)
City size (10.000–100.000)	1.228 (1.108)	0.417 (1.345)	1.001 (1.229)
City size (>100.000)	−2.257 (1.285)	−2.517 (1.442)	0.673 (1.318)

* $p < 0.05$, ** $p < 0.01$; heteroscedasticity-robust standard errors in brackets; dependent variable is the individual perceived inflation rate by expenditure category (*Infl*); reference category for schooling is 'No Degree'; reference category for 'In Education', 'Employed' and 'Not in Labor Force' is 'Pensioner'; reference category for all income brackets is '<1.000 Euro'; reference category for city sizes is '<10.000 Inhabitants'; due to missing or implausible information in one or more of the variables, all regressions are based on 1,723 observations; all regressions control for state dummies ('Bundesland').

4.3 Subjective Inflation and Consumption Structure

A related discussion in the literature pertains to the question whether a relationship exists between individual consumption structure and subjective inflation. The idea goes back to the ‘Availability Hypothesis’ (Kahneman and Tversky 1973), which if applied to the context of inflation states that inflation perceptions are determined first and foremost by changes in the prices of those goods that are purchased most frequently.⁵ The assumed underlying mechanism is that a higher exposure to price signals for those items that are bought more frequently like, e.g., groceries, will lead to a higher subjective weight of these goods in the formation of inflation perceptions. Several empirical studies provide evidence in support of this argument. Among others, Brachinger (2008), Vogel et al. (2009), Del Missier et al. (2016), and D’Acunto et al. (2021) show that perceived inflation rises with the frequency of purchases and not with the share of expenditures within single categories of goods in individual budgets.⁶ Contributing to this debate, we examine the same question for Germany based on the survey data for the year 2023. As outlined in Section 2, this wave contains differentiated questions about perceived changes in prices and expenditure shares by categories of consumer goods. These categories encompass ‘Housing’, ‘Food’, ‘Mobility’, ‘Leisure’, ‘Lifestyle’ and ‘Other Expenditures’.⁷

Columns (I) and (II) in Table 4 show average expenses as well as the perceived inflation rate per category. Costs for ‘Housing’ (43.5 %) and ‘Food’ (26.1 %) are mentioned as by far the most financially significant categories. Together, they account for almost 70 % of average individual expenses. Costs for ‘Mobility’ (10.6 %), ‘Lifestyle’ (9.4 %), ‘Leisure’ (7.5 %), and ‘Other’ (2.9 %) together contribute the remaining 30 %. At the same time, with the exception of ‘Lifestyle’ and ‘Other’, differences in perceived inflation across categories are relatively moderate. Notably, however, all of them range far above the official rate of 7 %. The highest perceived inflation rates are reported within the categories ‘Food’ (24.5 %) and ‘Housing’ (21.7 %), which is in line with sharply increased prices for groceries and heating during the period of observation (Möhrle and Wibault 2023). Column (III) in Table 4 provides the correlation between expenditure shares and perceived inflation at the individual level. With the exception of the category

5 The core idea is related to the Weber-Fechner Law, which if applied to the context of inflation states that the same percentage increase in prices is perceived stronger for cheaper goods (which are also bought more frequently like, e.g., groceries) than for more expensive ones.

6 Countervailing results are, however, presented by Hoffmann et al. (2006).

7 ‘Housing’ includes net rent as well as additional housing costs like heating, water, electricity, and household equipment (4,5). The category ‘Food’ covers grocery purchases including alcohol and tobacco (1,2). ‘Leisure’ primarily refers to the areas of culture, sports, and travel (9,11). ‘Lifestyle’ encompasses clothing, telecommunication, health care, and education (3,6,8,10). Numbers in brackets provide the respective categories (*Abteilungen*) in the official weighting pattern (Destatis 2024d).

‘Other’, this relationship is practically nonexistent. Together with the fact that ‘Food’ exhibits the highest perceived inflation rate, these results support earlier findings regarding the importance of purchase frequencies for the formation of individual inflation perceptions.

Complementing this analysis, we examine in a final step whether individual determinants of perceived inflation vary across expenditure categories. The remaining columns in Table 2 and Table 3 provide the results from estimating Equation (1) separately for each category of goods. The significance of the coefficients is mostly similar across the regressions. Deviations exist, however, in the following respects: the age-specific differences observed elsewhere are not evident for ‘Housing’ and ‘Lifestyle’ (e.g., clothing), i.e. price changes in these categories are perceived in a similar way by all age groups. With regard to gender-specific differences, the same applies to ‘Mobility’ and ‘Leisure’ (culture, sports, and travel). Here, too, men and women show similar perceptions. Of further interest is the finding that the factor ‘City Size’ plays a role only in the context of mobility. Specifically, perceived price increases in cities with more than 100,000 inhabitants are, on average, about 4 % points lower than in medium-sized and small cities. This may be due to a higher availability of public transportation in urban areas, for which prices have remained largely stable. Soaring prices for fuel, which are of higher significance for mobility in rural areas, have in turn been shown to unfold a particularly strong influence on inflation perceptions (Binder 2018).

4.4 The Role of Different Consumer Baskets

The results obtained in Section 3 show that perceived inflation has exceeded the official rate in April 2023 by a factor of about three. At face value, this deviation indicates that individuals perceive the rise in prices on average as three times larger than it is measured by official statistics. Since the calculation of the official inflation rate is based on a fixed basket of goods, this deviation may, however, also partly be driven by an imperfect match between the official basket of goods and current patterns of consumption (Zekaite 2020). In light of substantial shifts in purchasing behavior as a result of the COVID-19 pandemic reported by Hagenkort-Rieger (2020) and others, this may be in particular true for the period under investigation. In addition, Mai and Egner (2023) show that already small shifts in the composition of the basket can significantly alter the measured inflation rate. Contributing to this debate, we describe in a first step to whether individual consumption structures reported in the survey deviate from the official basket of goods. Thereafter, we examine to which extent such differences contribute to the deviation between official and perceived inflation rates by calculating various combinations of consumer baskets and category-specific inflation rates.

Table 3: Subjective inflation and individual characteristics (II).

	<i>Infl_{Mobility}</i>	<i>Infl_{Leisure}</i>	<i>Infl_{Lifestyle}</i>
Age	−0.149 (0.039)**	−0.086 (0.035)**	−0.026 (0.035)
Gender	0.777 (0.906)	0.288 (0.809)	1.860 (0.797)*
East/West	6.745 (4.943)	1.612 (4.415)	−2.305 (4.349)
Social assistance	−0.795 (1.783)	−3.363 (1.593)*	−2.557 (1.569)
Net household income (1.000–2.000)	2.679 (1.932)	0.931 (1.726)	1.529 (1.700)
Net household income (2.000–3.000)	3.029 (2.068)	1.353 (1.847)	0.723 (1.819)
Net household income (3.000–4.000)	4.759 (2.167)	1.192 (1.936)	0.515 (1.907)
Net household income (4.000–5.000)	3.098 (2.307)	0.759 (2.060)	−1.184 (2.029)
Net household income (>5.000)	1.841 (2.346)	0.403 (2.095)	−0.164 (2.064)
Basic schooling	−35.709 (7.925)**	7.409 (7.078)	−12.603 (6.973)
Apprenticeship	−36.817 (7.653)**	3.411 (6.835)	−12.603 (6.973)**
Realschule	−35.732 (7.595)**	3.829 (6.784)	−20.418 (6.733)**
A-level	−38.432 (7.572)**	2.322 (6.763)	−20.956 (6.682)**
College	−40.613 (7.603)**	0.753 (6.791)	−22.299 (6.662)**
In education	−4.174 (2.689)	−1.482 (2.402)	−1.811 (2.367)
Employed	−1.361 (1.390)	2.263 (1.242)	1.186 (1.223)
Not in labor force	−0.3169 (1.967)	0.631 (1.757)	−1.592 (1.731)
City size (10.000–100.000)	−1.879 (1.119)	0.771 (1.000)	0.918 (0.985)
City size (>100.000)	−3.967 (1.201)**	0.067 (1.073)	0.212 (1.057)

* $p < 0.05$, ** $p < 0.01$; heteroscedasticity-robust standard errors in brackets; dependent variable is the individual perceived inflation rate by expenditure category (*Infl_i*); reference category for schooling is 'No Degree'; reference category for 'In Education', 'Employed' and 'Not in Labor Force' is 'Pensioner'; reference category for all income brackets is '<1.000 Euro'; reference category for city sizes is '<10.000 Inhabitants'; due to missing or implausible information in one or more of the variables, all regressions are based on 1,723 observations; all regressions control for state dummies ('Bundesland').

A comparison of columns (I) and (IV) in Table 4 shows that the deviation between subjective expenditure share and the official basket weight is largest for the categories ‘Housing’ (+10.8 % points), ‘Food’ (+10.7 % points), and ‘Leisure’ (−7.6 % points). At the same time, in line with the results from Section 4.3, the perceived inflation rates in column (II) exceed the official rates in column (V) across all categories. Based on these data, we examine the relative importance of deviations of actual consumption from basket weights on the one hand and differences in category-specific inflation rates on the other hand. To do so, we calculate all possible combinations of baskets and inflation rates and examine to which extent this alters the overall inflation rate. Table 5 provides the results. The first row (‘Scenario 1’) shows the inflation rate for April 2023 calculated from official numbers on price increases and weights by category. Importantly, replacing the official weights of the consumer basket with the expenditure shares by category as they are reported in the survey data yields almost no change in the inflation rate (comparison between Scenarios 1 and 2). A much larger shift of around 11 % points occurs, in contrast, when the official basket weights are combined with subjective inflation rates (‘Scenario 3’). Finally, combining subjective inflation rates with the expenditure shares from the survey data yields an overall subjective inflation rate of 21.1 % (‘Scenario 4’), which closely aligns with the average reported subjective inflation rate of 23.2 % (‘Scenario 5’). The key insight from these scenarios is that differences in the underlying baskets of goods have only a negligible influence on the gap between perceived and official inflation rates. Instead, the deviation between both rates is almost exclusively driven by consistently higher reported inflation rates across all spending categories as compared to officially measured numbers.

Table 4: Consumption structure, basket weights, and inflation.

Category	(I) Expenditure share	(II) Perceived inflation	(III) Correlation	(IV) Weight in basket	(V) Official inflation
Housing	43.5 %	21.7 %	0.02	32.7 %	3.3 %
Food	26.1 %	24.5 %	−0.003	15.4 %	7.6 %
Mobility	10.6 %	19.4 %	0.14	13.8 %	1.1 %
Leisure	7.5 %	19.9 %	0.12	15.1 %	6.1 %
Lifestyle	9.4 %	14.6 %	0.11	13.1 %	3.8 %
Other	2.9 %	12.0 %	0.30	9.9 %	5.6 %

Columns (I) to (III) display the average expenditure shares per consumer goods category (‘Expenditure Share’), the perceived inflation rate per category (‘Perceived Inflation’), and the correlation between both on individual level (‘Correlation’) based on the survey data from April 2023; columns (IV) and (V) show the weights of each category in the official basket of goods (‘Weight in Basket’) and the respective measured rate of inflation (‘Official Inflation’). Source: Destatis (2024a,c); exeo Strategic Consulting AG / Rogator AG; own calculation.

Table 5: Inflation rates with different baskets of goods.

Scenario	Combinations of price changes and baskets of goods	Inflation rate
1	Official price changes by category weighted with official basket of goods	7.15 %
2	Official price changes by category weighted with subjective expenditures	8.35 %
3	Subjective price changes by category weighted with official basket of goods	19.55 %
4	Subjective price changes by category weighted with subjective expenditures	21.10 %
5	Overall subjective change in prices (open answers by respondents)	23.20 %

The figure shows inflation rates for April 2023 in different combinations of subjective/official price changes and underlying consumer baskets/expenditure structures. Source: Destatis (2024b,c,d); exeo Strategic Consulting AG / Rogator AG; own calculation.

5 Discussion

Based on a representative survey, the present study has examined the magnitude and evolution of perceived inflation in Germany for the years 2022 and 2023, i.e. during a period of quickly rising prices. As a first key result, it shows that the average subjective inflation rate exhibited a value of 13 % (median: 10 %) in April 2022 and rose to 23 % in April 2023 (median: 15 %). These numbers are remarkably similar to the results from the *Business and Consumer Survey* conducted by the European Commission, which uses the same question design. According to this survey, the average perceived inflation rate among consumers in the European Union amounts to 13 % and 22 % for the first quarters in 2022 and 2023, respectively. Similar findings are also reported in a study by the commercial bank Subran et al. (2023), which provides evidence for a perceived inflation rate of 18 % in Germany for May 2023. According to all three studies, perceived inflation thus exceeds the official rates of 7.2 % and 6.1 % measured for April and May 2023 (Destatis 2024a) by a factor of three. Similarly, Diermeier and Niehues (2025) report an average subjective inflation rate of 15.3 % for the year 2024. The fact that the official rate had in the meanwhile fallen to 2.2 % corroborates the notion that perceived inflation follows the official rate only with a significant time lag (see Aucremanne et al. (2007)).

At the same time, our results show that substantial differences exist between individuals with regard to their inflation perceptions. In particular, the extent to which respondents experience changes in prices varies significantly with their level of education, age, and gender. In addition, the findings support the notion that the frequency of purchases is of higher importance for the perceived inflation rate than the expenditure share of certain types of goods in the consumer basket. Finally, the data from the survey suggest that the average structure of consumption deviates from the basket of goods that is used to calculate the official inflation rate. With differences of more than 10 % points, this is in particular the case for housing and

food. The results from simulations defy, however, the notion that such deviations in the composition of the baskets play a relevant role as an explanation for the prevailing differences between official and perceived inflation rates.

In order to further contribute to the political and academic debate, it is worthwhile to compare the results to those obtained with regard to other periods of inflation. A meaningful starting point for such a comparison in the European context is the introduction of the Euro as a currency in January 2002, which was the focus of numerous studies on the relation between official and perceived inflation. As shown by Aucremanne et al. (2007) and Brachinger (2008), the two rates diverged substantially in Germany right after the changeover from the Deutsche Mark to the Euro. With a value of 6–7 %, perceived inflation exceeded the officially measured rate of 2 % by a factor of about three, which compares well with the factor identified in the present study. Hence, while the deviation measured for the year 2023 is substantially larger in absolute terms than in 2002, the factor is approximately the same. In addition, while the studies by Aucremanne et al. (2007) and Brachinger (2008) disagree with regard to the precise timing, they both conclude that official and perceived inflation rates converge at a level of 2 % one to three years after the Euro shock. Similarly, Lebow and Peneva (2024) document for the recent past that the perceived inflation rate in the US was closely aligned with the CPI until 2021 and only thereafter starts to substantially deviate from the latter. Overall, the results from these studies suggest that significant deviations of perceived changes in prices from the officially measured rate occur mainly in the context of unusual events like exceptionally high price increases, but tend to be a lot smaller in normal times. In consequence, particular caution needs to be taken at points in times when public perceptions start to decouple from official numbers as these deviations may rise to a point where discontent with rising prices may lead to protest and potentially extreme voting behavior (see, e.g., Federle et al. (2024) and Prati (2024)). As shown also in the present study, this is in particular true for low-income households, who partly due to a lower level of financial literacy (Bruine de Bruin et al. 2010) tend to feel more affected by inflation than high-income households. As a result, the recent growing discontent with rising prices reported by Stantcheva (2024) once again underscores the need for inflation-reducing monetary policies as they have been put in place since 2023. As argued by Hagenkort-Rieger (2020), this needs to be complemented by efforts from central banks regarding public communication and transparency in the calculation of the official inflation rate. Recent attempts by the German Federal Statistical Office like the Personal Inflation Calculator (Destatis 2024a) or explanatory documents and videos provide promising steps in this direction.

A Appendix

A.1 The Opinion TRAIN Survey – Frequency and Content

‘OpinionTRAIN’ is a representative study that aims to identify trends, values and perceptions in Germany, Austria, Switzerland, and Sweden. The study is based on an online survey of persons between the age of 18 and 80 years (see Appendix A.2 regarding the recruitment of participants and methods for ensuring representativeness). So far, five waves have been carried out as repeated cross-sections at different points in time. In the first two waves, a particular emphasis was put on the COVID-19 pandemic; the first one in April/May 2020 examined the situation of people at the time of the first lockdown while the second wave, which was implemented in November/December 2020, focused on the second lockdown. The third survey was carried out in April 2021, the fourth one in March/April 2022, and the fifth one in April 2023.

All five waves included questions about the financial situation of the respondents including their propensity to save as well as the type and magnitude of financial investments. In the two most recent surveys, which provide the basis for the present study, participants were additionally asked to report their perception of how prices have changed over the course of the last 12 months. This was done by means of two questions, one categorical and one numerical in nature (see Hayo and Méon (2023) for a similar approach). In order to ensure comparability, the wording of the questions is identical to the one used in the *Business and Consumer Survey* conducted by the European Commission (2023). The first question reads.

‘How do you think that consumer prices have developed over the last 12 months? Compared to last year, they have ...’.

The options to choose from were a) *Prices have risen a lot.* b) *Prices have risen moderately.* c) *Prices have risen slightly.* d) *Prices have stayed about the same.* e) *Prices have fallen.*

In a second step, respondents were asked to quantify their perception by providing a numerical answer to the following question:

‘By how many percent do you think consumer prices have gone up/down over the past 12 months?’.

Following the recommendation by Bruine de Bruin (2011) to use everyday language rather than technical terms, we have in both questions decided to ask about ‘prices’ rather than ‘inflation’. While this wording is likely to reduce the occurrence of non-response, the verbal framing in terms of ‘prices’ rather than ‘inflation’ is at the same time likely to lead to higher reported levels of perceived inflation (see Bruine de Bruin (2011) and Bruine de Bruin et al. (2017)). In order to examine inflation perceptions in greater detail, the survey in 2023 was augmented by additional questions about the

expenditure structure and subjective inflation along six different consumption categories. These encompassed 'Housing', 'Food', 'Mobility', 'Leisure', 'Lifestyle' and 'Other'. Participants were asked to provide their average monthly expenses in absolute values as well as their assessment of price changes within each of the categories.

A.2 Representativeness of the Data and Selection from Non-Response

Participants for the survey were recruited based on two different online access panels. To ensure representativeness, a stratified sample was drawn with gender, age, and region of residence ('Bundesland') being used as quota variables (Blasius and Brandt 2010). In a second step, a post-stratification weighting was applied to minimize discrepancies between population parameters and sample statistics (Kulas et al. 2018). Consistent with the suggestions by Vehovar et al. (2016), the weighting factors used comprise of social indicators (entitlement to social assistance and net household income), mobility patterns (public transport use and possession of a rail card), and consumption parameters (mobile phone contracts). Finally, the distribution of answers within some of the key variables was compared with information from the nationwide consumer survey '*Best for Planning*' (b4p), which is one of the largest consumer surveys in Germany and implemented by the '*Gesellschaft für integrierte Kommunikationsforschung*' (GiK).

With regard to representativeness, another issue arises from potential bias as a result of selective non-response to certain questions. In the fifth wave of the survey, we have received answers from 1,955 persons. Out of these, 50 had partly or fully skipped the questions regarding perceived inflation and/or their expenditure structure. Moreover, 17 persons had reported expenditures shares of 90 % or more within one single category, which we regard as not plausible and therefore have also excluded them from the analysis. This leaves a total of 1,888 answers, which were included in the descriptive analysis. Finally, information on one or more of the covariates needed for the regression analysis (age, gender, income, etc.) was missing for 166 persons. Hence, all regressions are based on the 1,723 respondents for whom a full set of information exists regarding the required variables. Addressing the issue of non-response bias, we have examined whether excluding persons with missing information poses a threat to representativeness. To this end, we have calculated the average perceived inflation rate for each of the remaining samples after excluding non-respondents. The results are contained in Table B.3. In a nutshell, there is no evidence for a statistically significant difference in the numbers across the samples, which makes it unlikely that the results from the analysis are driven by selection bias from non-response.

A.3 Discontinuities in Answers on Perceived Inflation

It is well documented in the literature that responses regarding both perceived and expected inflation rates tend to exhibit a clustering at multiples of five (see, e.g., Andrade et al. (2023), Axelrod et al. (2018) and Treu and Hartwig (2022)). As argued by Binder (2017), this rounding can be taken as an expression of uncertainty since most people are unable to precisely tell to which extent prices have changed.⁸ In our data set, the share of responses that exhibit multiples of five amounts to 74 % (1,392 out of 1,888 numerical answers on perceived inflation). This number is in line with existing evidence from similar studies, where the share usually ranges between 65 and 75 % (Abe and Ueno 2016; Andrade et al. 2023; Binder 2017; Reiche and Meyler 2022). Econometrically, the tendency towards rounding may have the following consequences, which need to be addresses in different ways.

First, as long as rounding is neither directed systematically in a downward or upward direction, it can be regarded as a stochastic measurement error ('white noise') in the dependent variable. As a result, the coefficients of the explanatory variables would be estimated less precisely (Baird et al. 1970; Selten and Gigerenzer 2001). While we cannot directly test this presumption, it would to some extent explain the comparatively large coefficients found in most of our regressions.

If, in contrast, rounding takes place in a systematic manner, this would indeed lead to biased, i.e. too large or too small estimates. Although to the best of our knowledge there is no evidence in the existing literature on perceived inflation that this is the case, we have addressed this concern by excluding all observations that exhibit multiples of five in the dependent variables. Overall, the results point qualitatively into the same direction as the ones in Tables 2 and 3. In particular the estimates of the education variables are, however, substantially inflated, which suggests that the remaining 26 % of observations do not satisfy the requirement of representativeness anymore since in particular persons with lower levels of education are selectively dropped, as argued in the next paragraph (regression results are available on request).

Third, it may be the case that some groups are more inclined to rounding than others. This is indeed a justified concern because existing studies show that the propensity towards rounding rises with decreasing cognitive ability (D'Acunतो et al. 2016) and, closely related, financial literacy (Rosch 1975). As a result, the variance of the error term will differ across observations, which violate the assumption of homoscedasticity in ordinary least squares regressions and leads to incorrect standard errors. Addressing this issue, all results reported in this paper are based on specifications

⁸ To some extent, the issue is related to the discussion in the literature about a 'left-digit bias' according to which people pay more attention to left-hand side digits when evaluating complex numbers (see, e.g., Heraud and Page (2024) and Garz and Larin (2024)).

which include heteroscedasticity-robust standard errors. Estimating the same regressions without this requirement does, however, change the standard errors of the coefficients only minimally and leaves their levels of significance unaltered.

B Additional Tables

Table B.1: Descriptive statistics.

Quantitative Variable	Min./Max.	Number	Mean (SD)
Age	18/87	1,888	49.4 (16.5)
Categorical Variable	Categories	Number	Coding
Gender	Male	953	0
	Female	931	1
East/West	West	1,524	0
	East	364	1
Social assistance	No	183	1
	Yes	1,705	0
Net household income	< 1,000	138	1
	1,000–2,000	378	2
	2,000–3,000	451	3
	3,000–4,000	335	4
	4,000–5,000	222	5
	> 5,000	203	6
Schooling	No degree	7	1
	Basic schooling	59	2
	Apprenticeship	261	3
	Realschule	572	4
	A-level	446	5
	College	543	6
In education	No	1,772	0
	Yes	116	1
Employed	No	798	0
	Yes	1,090	1
Not in labor force	No	1,729	0
	Yes	159	1
Pensioner	No	1,365	0
	Yes	523	1
City size	< 10,000 inhabitants	544	1
	10,000–100,000 Inh,	666	2
	> 100,000 inhabitants	678	3

The table shows the socio-demographic characteristics of the persons in the sample. ‘*Employed*’ encompasses full-time and part-time employees. ‘*Basic Schooling*’ refers to the German *Hauptschulabschluss*. Source: exeo Strategic Consulting AG / Rogator AG; own calculation.

Table B.2: Subjective inflation and individual characteristics (2022).

	Perceived inflation
Age	−0.041 (0.024)
Gender	1.087 (0.580)*
East/West	−0.078 (0.649)
Net household income (1,000–2,000)	−1.445 (1.069)
Net household income (2,000–3,000)	−4.352 (1.069)**
Net household income (3,000–4,000)	−3.601 (1.165)**
Net household income (4,000–5,000)	−5.249 (1.361)**
Net household income (>5,000)	−6.196 (1.446)**
Basic schooling	−7.158 (6.899)
Apprenticeship	−5.958 (6.815)
Realschule	−8.592 (6.799)
A-level	−8.403 (6.804)
College	−8.489 (6.819)
In education	0.739 (1.690)
Employed	1.958 (0.905)
Not in labor force	−0.111 (1.190)
City size (10,000–100,000)	1.059 (0.725)
City size (>100,000)	0.104 (0.714)

* $p < 0.05$, ** $p < 0.01$; heteroscedasticity-robust standard errors in brackets; dependent variable is the individual perceived inflation rate; reference category for schooling is 'No Degree'; reference category for 'In Education', 'Employed' and 'Not in Labor Force' is 'Pensioner'; reference category for all income brackets is '<1,000 Euro'; reference category for city sizes is '<10,000 Inhabitants'; $N = 1,267$.

Table B.3: Data cleaning and non-response bias.

Sample	N	Average Perceived Inflation (weighted)	Average Perceived Inflation (unweighted)
All respondents	1,955	23.2 %	22.7 %
Excluding missing answers to one or more expenditure categories	1,888	23.1 %	22.6 %
Excluding missing answers to one or more covariates	1,723	23.0 %	22.5 %

The table shows the number of responses that were included in each step of the analysis as well as the weighted and unweighted average perceived inflation rates reported within each of the samples. Source: exeo Strategic Consulting AG / Rogator AG; own calculation.

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