

The Expected Price of Keeping up with the Joneses

Olivier Armantier Antonio Filippin Michael Neubauer Luca Nunziata*

May 15, 2020

Abstract

Inflation expectations elicited in surveys have been found to exhibit large dispersion across individuals. Although several explanations have been proposed, none fully explain this puzzle. We explore in this paper a new behavioral factor: social comparison. Using original survey data, we find that respondents who feel they are falling behind compared to their peers report significantly and substantially higher inflation expectations. We argue that this result is consistent with an experience based belief formation model in which those unable to “keep up with the Joneses” overweight the high prices of “aspiration” goods they are unable to purchase.

Keywords: Inflation Expectations, Social Comparison, Inequality,

JEL classification numbers: E31, E21, E03, D63.

*Olivier Armantier: Federal Reserve Bank of New York, USA, olivier.armantier@ny.frb.org. Antonio Filippin, Department of Economics, University of Milan, Via Conservatorio 7, 20122 Milano, Italy, e-mail: antonio.filippin@unimi.it. Michael Neubauer, Federal Reserve Bank of New York, e-mail: Mike.Neubauer@ny.frb.org. Luca Nunziata. Department of Economics and Management, University of Padua, Via del Santo 33, 35121, Padua, Italy, e-mail: luca.nunziata@unipd.it.

We are grateful to Rachel Pomerantz for dedicated research assistance. We thank Ulrike Malmendier for helpful comments. We also thank seminar and conference participants at the 9th meeting of the Southern European Experimentalist Team (SEET) in Lecce (Italy). The views expressed do not represent the views of the Federal Reserve Bank of New York or the Federal Reserve system.

1 Introduction

Inflation expectations are central to macroeconomic theory and monetary policy. In theory, inflation expectations should drive individuals' decisions about consumption, saving, borrowing, wage bargaining, and in turn, realized inflation. How individuals form and update their inflation beliefs has therefore been the focus of several recent studies (see e.g. Coibion et al. 2018a for a review). A key result from this literature is that the distribution of inflation expectations is highly heterogeneous across individuals (Mankiw et al. 2003, Coibion et al. 2018b, Sharma 2019). Understanding the source of this heterogeneity in beliefs is important as it can have serious consequences for macroeconomic dynamics (Sims 2009, Guzman and Stiglitz 2016).

Several hypotheses have been formulated to rationalize the dispersion in inflation expectations across agents including differences in information access or processing (e.g. Woodford 2001; Branch 2004; Reis 2006; Mankiw and Reis 2007). Additionally, more behavioral explanations, based on personal experience (Malmendier and Nagel, 2016; Angelico and Di Giacomo, 2019), salience theory (Bordalo et al. 2012; 2013) or rational inattention (Sims, 2003) have been proposed. Finally, Bruine de Bruin et al. (2010) find that demographic characteristics, **such as household income, education or financial literacy, are strongly correlated with inflation expectations. This paper focusses on a previously unexplored behavioral factor: social comparison. Namely, we test whether inflation expectations are linked to how individuals compare their standard of living with that of their peers, and, in particular, an (in)ability to “keep up with the Joneses.”**

The motivation for investigating the effect of social comparison on inflation expectations stems from Filippin and Nunziata (2019) who find empirical evidence that relative inequality plays a role in shaping perceived (realized) inflation. To explain this result the authors argue that, in a scenario of growing inequality, it becomes more difficult to keep up with richer agents. Consumers who cannot match their aspiration level of consumption experience a sense of frustration and financial distress that can be confounded with a perceived loss of their currency's purchasing power, i.e. with higher inflation perceptions. Such a mechanism is consistent with a form of self-serving bias, the tendency to blame external factors for negative outcomes in order to preserve one's self esteem.¹ In this case, a consumer's loss of purchasing power relative to his/her peers would be attributed to a change in prices (the external condition), rather than to the deterioration of his/her relative economic and social status. By extension, consumers may blame their inability to “keep up with the Joneses” on

¹ This cognitive bias has been studied extensively in social psychology (see Mezulis et al., 2004, and references therein) and has been detected in various decision frameworks, including consumer choice (Moon, 2003).

rising prices, leading to higher expected inflation.

This hypothesis may be rationalized under the salience theory of attention and choice proposed by Bordalo et al. (2012; 2013). The theory hinges on two assumptions: When forming inflation expectations agents (i) rely on personal shopping experience and (ii) overweight the price of a subset of *salient* goods. Salient goods are typically considered to include frequently purchased goods (Angelico and Di Giacomo, 2019), but they could also include *aspiration* goods, i.e. goods one aspires to purchase to maintain the same standard of living as his/her peers, but is unable to do so. In that case, people who are falling behind and who are trying to keep up with their peers would focus on the price of aspiration goods they are unable to afford. Then, those unable to keep up with the Joneses would tend to forecast higher inflation because they overweight high price aspiration goods in their belief formation process. Hence, social comparison could influence inflation expectations under salience theory.

Although this paper also focusses on social comparison and inflation, it differs from Filippin and Nunziata (2019) along four dimensions. First, while Filippin and Nunziata (2019) use aggregate data, we rely on microdata from a representative survey of U.S. household heads, the Survey of Consumer Expectations (SCE). Second, instead of using measures of relative inequality based on disposable income, we exploit questions specifically added for this study to the SCE to measure subjective social comparison, i.e. how a respondent compares his/her standard of living with that of his/her peers. Third, we investigate whether the impact of social comparison extends from inflation perceptions to inflation expectations, a variable considered of direct relevance for monetary policy. In fact, Bernanke (2004) argues that “an essential prerequisite to controlling inflation is to control inflation expectations.” Thus, a better understanding of the factors that can shape the public inflation expectations has direct policy implications. Fourth, while we focus on inflation expectations, we also examine the effect of social comparison on the entire distribution of inflation beliefs, and in particular on a measure of individual inflation uncertainty.

We find that individual inflation expectations **are linked to** relative standard of living for those who are unable to “keep up with the Joneses.” Namely, people who feel they are falling behind their peers expect one-year ahead inflation to be almost a full percentage point higher, whereas no effect is found for respondents who feel their standard of living is ahead of their peers. **These results illustrate more precisely the role of social comparison as compared to Filippin and Nunziata (2019), who find a similar pattern for inflation perceptions relying upon aggregate data on inequality at the country level.**

In addition, our evidence suggests that inflation expectations are also affected by the interaction between social comparison and a measure of change in one’s financial condition

over time. Indeed, the largest inflation expectations by far are reported by respondents who experience simultaneously a worsening standard of living in absolute terms while lagging behind their peers. However, social comparison is found to **have a large and significant impact on inflation expectations**, while changes in absolute levels of standard of living have a limited additional effect. **Similarly, while we find evidence that those lacking confidence in the economy report higher inflation expectations (consistent with Kamdar 2019), we show that this correlation does not explain our results, as the effect of social comparison on inflation expectations remains essentially unchanged when we control for economic pessimism.**

Our results are also robust to the adoption of alternative measures of inflation expectations. Further, we find that in addition to expectations, social comparison appears to shift the entire distribution of a respondent's inflation belief. Finally, beyond inflation, social comparison is also found to be correlated with other economic expectations.

The paper is organized as follows: Section 2 introduces the data used in the analysis, Section 3 presents our main empirical findings, Section 4 discusses a set of robustness checks. **Finally, Section 5 concludes with a discussion of the possible implications of our results and an acknowledgment of the limitations of our study.**

2 The Data

2.1 Data Source

The Survey of Consumer Expectations (SCE) is a monthly, internet-based survey produced by the Federal Reserve Bank of New York since June 2013. It is a 12-month rotating panel (respondents are asked to take the survey for 12 consecutive months) of roughly 1,300 nationally representative U.S. household heads. The main objective of the survey is to collect expectations (both point predictions and density forecasts) for a wide range of economic outcomes (e.g. inflation, income, spending, household finance, employment and housing). The survey also collects a rich array of socio-demographic variables from each respondent. Data from the SCE have been used to address both policy and research questions.²

The data on relative standard of living come from two special surveys **we conducted specifically** for this study in August 2017 and April 2018. The social comparison question was answered a single time by 1,741 respondents (874 in August 2017 and 867 in April 2018) and twice by 234 respondents. The data on inflation expectations come from the core survey conducted each month. For each respondent who answered one of the social comparison question we consider each of their reported inflation expectations over their 12 months of

²See e.g. Armantier et al. (2015; 2016) or Armona et al. (2018).

participation. As is usual with such surveys, not all respondents stay in the panel for 12 months. Panel attrition in the SCE, however, occurs mostly during the first two months of participation (see Armantier et al., 2017). To limit selection effects, we therefore focus on respondents who remain in the panel for at least 3 months. Combining all the data, we have panel of 1,975 respondents who reported a total of 16,741 inflation expectations between November 2016 and February 2019.

2.2 Measures of Inflation Expectations

The SCE elicits different measures of inflation expectations: a point prediction and a density forecast, a short and a medium term measure. A respondent’s short term point prediction is elicited using the following two-stage format. First, the respondent is asked: “*Over the next 12 months, do you think that there will be inflation or deflation? (Note: deflation is the opposite of inflation).*” Second, depending on the response in the first stage, the respondent is asked: “*What do you expect the rate of [inflation/deflation] to be over the next 12 months? Please give your best guess.*”

The medium term point prediction refers to the three-year ahead one-year inflation. It is elicited with the same two-stage approach as the short term point prediction except that “*Over the next 12 months*” is replaced by “*Over the 12-month period between M+24 and M+36,*” where M is the month in which the respondent takes the survey. For instance, a respondent taking the survey in February 2019 is asked: “*Over the 12-month period between February 2021 and February 2022, do you think that there will be inflation or deflation?*”

SCE respondents are also asked to report their short and medium term density forecasts. More specifically, a respondent is asked to state the percent chance that the rate of inflation will be within each of the following intervals:]-12% or less], [-12%,-8%], [-8%,-4%], [-4%,-2%], [-2%,0%], [0%,2%], [2%,4%], [4%,8%], [8%,12%], [12% or more[. A visible running sum gives respondents the ability to verify that their answers add to 100%. Following Engelberg et al. (2009), a generalized beta distribution is fitted to each respondent’s density forecast, from which an individual density mean and median are derived. Further, the interquartile range of the respondent’s density forecast is used as a measure of individual inflation uncertainty. The baseline model estimated in Section 3 relies on the short-term density mean, the headline number reported monthly by the New York Fed (see <https://www.newyorkfed.org/microeconomics/sce>). A battery of robustness checks are then conducted in Section 4 using other short-term inflation measures, the medium-term density mean, the short-term inflation uncertainty and the entire density forecast.

2.3 Measures of social comparison

To test the hypothesis that inflation expectations are influenced by social comparison, we elicit a subjective measure of relative standard of living. Namely, each respondent is asked: “*How would you compare your household’s standard of living with that of your peers (such as family, friends, or neighbors)?*” The respondent can choose among three possible responses: i) above, ii) below, or iii) about the same as my peers. In addition to this qualitative measure, we also elicit a quantitative measure of social comparison by asking respondents who select i) or ii) for a “compensating income.” Namely, if the respondent selects ii), then he is asked: “*How much more income would you need for your household to have a similar standard of living as your peers?*” Conversely, if the respondent selects i), then he is asked: “*How much more income on average would your peers need to have a similar standard of living as your household?*”

Two points are worth noting about our qualitative and quantitative measures of relative standard of living. First, for these measures to be comparable across respondents, the notion of “peers” needs to be the same for all respondents. There is a tension when defining which peers the respondents should focus on. A narrow definition (e.g. your neighbors) is risky as it may not capture the relevant social group to which some respondents compare themselves. In contrast, a broad definition would let respondents pick their own comparison group, which could differ endogenously as a function of their current social status (e.g. respondents who struggle financially could choose to focus on a subgroup of peers who share the same difficulties). To strike a balance, we chose to provide respondents with three specific examples of peer groups: family, friends and neighbors. We believe these examples are both specific enough to ensure that respondents focus on similar sets of peers, yet general enough to ensure that every respondent can find a peer in one of those categories. Nevertheless, when discussing the implications of our results, we will need to be cognizant of the fact that respondents may have slightly different peers in mind.

Second, what contributes to one’s standard of living is clearly multi-dimensional. It includes monetary (e.g. income, debts, purchasing power) and non-monetary (job satisfaction, health, family life) elements. How to measure one’s relative standard of living quantitatively is therefore a difficult problem. In the spirit of the “compensating variation” literature, we decided to ask respondents to report a “compensating income,” i.e. the additional amount of money they would need so that their standard of living would become similar to that of their peers. Although imperfect, we believe this measure is a first order approximation that should capture quantitative differences in standard of living across respondents.

2.4 Individual characteristics

To tease out the effect of social comparison in the econometric estimation, we control for standard socio-demographic characteristics such as income, age, gender, race, educational attainment, marital status, and household composition (i.e. whether or not the household includes children). In addition, we take advantage of the rich array of household level information collected in the SCE to control for behavioral factors such as a measures of the respondent’s financial literacy (adapted from Lusardi and Mitchell, 2007),³ liquidity constraints (the reported probability of coming up with \$2,000 if the need arose) and subjective risk tolerance (based on Dohmen et al., 2011).⁴ Finally, we control for local economic conditions using the year-over-year change in gas prices in the respondent’s zip code, the year-over-year change in unemployment rate in the respondent’s county, as well as state dummies.⁵ For an precise definition of the variables used in the paper, see the glossary in Appendix.

2.5 Descriptive statistics and prima facie evidence

As shown in Table 1, slightly less than half of the respondents (the household head or co-head) are female. Two out of three respondents are married or living with a partner and 39% of households have children currently living with them at home. The average respondent is 51 years old and most respondents have a Bachelor’s degree. Consistent with the analysis conducted by Armantier et al. (2017), respondents are essentially representative of the U.S. population of household heads with respect to gender, race, income and geography, but they are slightly older and more educated than in the 2017 American Community Survey.⁶

We can see in Table 2 that most respondents (61%) report that their standard of living is similar to that their peers. In contrast, 23% of respondents feel like that they are falling behind, while the remaining 17% consider their standard of living to be higher than that of their peers. Table 3 provides evidence that social comparisons are fairly stable over time.

³ Here is an illustration of the type of questions we asked to elicit financial literacy: “*If you have \$100 in a savings account, the interest rate is 10% per year and you never withdraw money or interest payments, how much will you have in the account after: one year? two years?*”.

⁴ Respondents are asked to assess their willingness to take risk regarding financial matters using a Likert scale ranging from 1 (not willing at all) to 7 (very willing). This instrument has been shown to produce meaningful measures of risk preferences. In particular, Dohmen et al. (2011) find that the risk tolerance reported on this scale correlates with actual (i.e. non-experimental) financial behavior and with the risk preference elicited with a financially incentivized lottery-type experiment.

⁵ The most disaggregate measure of the Consumer Price Index is only available for each of the 4 census regions (Northeast, Midwest, South, and West). To get a more disaggregate measure, we use zip code level gas prices as a proxy for local prices.

⁶ We refer the reader to Armantier et al. (2017) for a discussion of the SCE technical features, such as sample frame, implementation, response rate, representativeness, and panel stability.

Out of the 236 respondents who answered the social comparison question twice, eight months apart (in August 2017 and April 2018), 158 (or 66.9%) selected the same response in both surveys. Further, almost all remaining respondents (75 of the remaining 78) moved to an adjacent group (e.g. from the “equal to peers” group to the “below peers” group). The fact that only 3 out of 236 respondents moved from one of the two extreme groups (“below peers” and “above peers”) to the other provides evidence that respondents took the survey seriously and did not answer randomly.

Table 2 provides **prima facie evidence supporting the hypothesis** that social comparisons influence inflation expectations. Indeed, we can see that respondents who feel they cannot “keep up with the Joneses” (i.e. those in the “below peers” group) expect near term inflation to be about a full percentage point higher than respondents in the other two groups. A t-test reveals that the difference in inflation expectation is significant at the 1% level between the “below peers” group and each of the other two groups ($P < 0.01\%$ for both comparisons).⁷ With an average inflation expectation of 3.4% in the population,⁸ a difference of a full percentage point for the “below peers” group can be considered large. Consistent with our hypothesis, average inflation expectations are also slightly lower for respondents in the “above peers” group. However, the difference with respondents in the “equal to peers” group is not statistically significant at the 5% level. To sum up, we find a **highly significant and large association** between social comparison and inflation expectations that operates only through people who feel like their standard of living is falling behind. This result is consistent with Duesenberry (1949), who argues that social comparison is asymmetric and upward-looking in nature.

The difference in inflation beliefs across groups can also be appreciated in Figure 1 where we plot the average inflation expectations in every survey month for each social comparison group.⁹ **In almost every month, average inflation expectations are higher** for respondents whose standard of living is below their peers, and often slightly lower for respondents whose standard of living is above their peers. These differences appear robust to the inflation measures considered. Indeed, we can see in Figures 1.1 and 1.2 in Appendix that similar patterns emerge when using the respondents short-term point predictions and medium term

⁷ To control for individual specific effects, we conduct the t-tests using each respondent’s average inflation expectation across all the surveys the respondent completed.

⁸ **Between November 2016 and February 2019, respondents in our sample made predictions about 1-year ahead inflation. For the period predicted (i.e. November 2017 to February 2020), realized inflation averaged 1.8% and never exceeded 2.5% (in July 2018). Thus, respondents’ expectations were biased upward.** This result is consistent with a large body of literature documenting a similar systematic bias in inflation expectations elicited in surveys (see e.g. the discussion in Coibion et al., 2018a)

⁹ We exclude in this chart the first and last two months of the sample for which we have fewer respondents who responded to the social comparison question either in August 2017 or in April 2018.

(3-year ahead) density means. In the next section we conduct an econometric analysis aimed at investigating the exact link between social comparison and inflation expectations. Our model controls for socio-demographic, economic and behavioral variables in order to tease out more precisely the magnitude of the association.

3 Econometric Analysis

3.1 Baseline Models

The objective of the econometric estimation is to identify the link between a respondent’s subjective assessment of his/her standard of living and his/her inflation expectations. The dependent variable in the baseline model is the respondent’s year-ahead inflation density mean. The explanatory variables of interest are qualitative measures of the respondent’s relative standard of living. Specifically, we define two dummy variables, “below peers” and “above peers,” equal to one when a respondent reports a standard of living below or above his/her peers, respectively. To test econometrically the robustness of the link between social comparison and inflation expectations we adopt an incremental approach. Namely, we gradually augment the model’s specification by adding more comprehensive sets of controls that may correlate with inflation expectations.

We start with Model 1 in Table 4 by controlling only for time (i.e. survey months) fixed effects. We find a positive and highly significant association between the “below peers” variable and inflation expectations. The magnitude of the point estimate is large. It indicates that respondents whose standard of living is below their peers have inflation expectations that are 0.86 percentage points higher than their counterparts whose standard of living is equal to their peers. In contrast, no significant effect is found for the “above peers” group. These results confirm the *prima facie* evidence presented in the previous section: The link between social comparison and inflation expectations is substantial, highly significant, but it operates only through those who feel they are falling behind. Next, we test the robustness of these results to the inclusion of additional controls.

We control for standard demographic variables in Model 2 of Table 4. Consistent with (e.g.) Souleles (2004), Pfajfar and Santoro (2009), Bruine de Bruin et al. (2010) or D’Acunto et al. (2019), we find that gender, age, ethnicity and marital status are significantly correlated with inflation expectations. Namely, men as well as respondents who are younger, white and married all have lower inflation expectations. In contrast, the presence of children in the household does not have a significant effect. More importantly, the point estimate associated with “below peers” remains highly significant, although the magnitude of the effect declines

slightly.

In Model 3 we control for additional individual characteristics measuring a respondent’s educational attainment, financial literacy and risk attitude. Consistent with Lusardi and Mitchell (2008) and Bruine de Bruin et al. (2010), low numeracy is associated with significantly higher inflation expectations. In contrast, and perhaps surprisingly, respondents with lower education (no more than a high school diploma) are found to have significantly lower inflation expectations. This result contrast with most of the literature (e.g. Souleles, 2004, Blanchflower and MacCoille, 2009, Pfajfar and Santoro, 2009 or Bruine de Bruin et al., 2010) where a negative relationship between education and inflation expectations is typically documented. An analysis of the SCE time series suggests that this shift is a relatively new phenomenon. Indeed, Figure 1.3 in the appendix shows that low education respondents consistently had the highest inflation expectations until mid 2015 (consistent with the usual finding in the literature). After that, a clear shift occurred and low education respondents have had the lowest inflation expectations consistently since then.¹⁰ In contrast, with financial literacy and education, risk attitude is found to be statistically insignificant, consistent with Bruine de Bruin et al. (2010). Finally, the link between social comparison and inflation expectations remains stable with respect to both significance and magnitude.

We control for the respondent’s household income in Model 4. The objective of this specification is to try to disentangle the effect of a respondent’s relative standard of living (i.e. relative to his/her peers), from the effect his/her absolute standard of living, which we assume can be proxied by the purchasing power generated by the respondent’s household income. The coefficients of the two income dummies are not statistically significant, while the effect of “below peers” remains highly significant and decreases only slightly in magnitude (from 0.73 to 0.69). Thus, we find support for the hypothesis that inflation expectations are linked to *relative*, rather than *absolute*, measures of standard of living.

We now turn to Model 5 where we control for differences in local economic **conditions. In particular, we include** a measure of the change in local prices. Because the CPI is only available at the census region level, we control for the year-over-year change in average monthly gas prices in the respondent’s ZIP code. Further, we control for the year-over-year change in monthly unemployment rate in the respondent’s county and we include a set of dummies for the respondents’ state of residence. Consistent with the literature suggesting that personal inflation experiences shape inflation expectations (e.g. Malmendier and Nagel, 2016, Kaplan and Schulhofer-Wohl, 2017, D’Acunto et al. 2019), we find a positive and significant relationship between local changes in gas prices and individual inflation expectations. In

¹⁰ Armantier et al. (2019) argue that this shift is the consequence of the political polarization in expectations that followed the 2016 presidential election in the U.S.

contrast, measures of local labor market conditions have no significant effect. More importantly, the point estimate associated with “below peers” remains positive and significant, and the magnitude of the effect is essentially unchanged.¹¹

To sum up, we find robust evidence that inflation expectations **are linked to** relative standard of living for those who are unable to “keep up with the Joneses.” Namely, all else equal, people who feel they are falling behind financially compared to their peers expect substantially higher inflation. In contrast, we find no effect of social comparison on inflation expectations for the group of respondents who feel they are getting ahead of their peers. These results are consistent with Filippin and Nunziata (2019) who identify similar patterns for inflation perception using data aggregated at the country level. In the next section we explore whether the effect of keeping up with the Joneses is robust to the consideration of changes in the absolute level of the standard of living.

3.2 Relative Levels versus Absolute Changes in Standard of Living

So far, we have focussed on how inflation expectations is related to a respondent’s standard of living relative to his peers. We now explore an alternative channel: changes in absolute level of standard of living over time. To do so, we use a question in the SCE that asks whether the respondent’s current financial situation is better, worse or about the same as a year ago.

The descriptive statistics in Table 5 provide prima facie evidence that inflation expectations are correlated with both measures of standard of living. That is, in almost every row and column, average inflation expectations decrease monotonically with the relative level and the absolute change in standard of living. Further, the group of respondents who are falling behind both in levels and changes (i.e. those who report being “worse off” and “below their peers”) have by far the highest average inflation expectations. Finally, we find the same asymmetric pattern as before, whereby the change in inflation expectations is most pronounced for respondents whose standard of living is either relatively lower or has declined in absolute terms.

To formalize these results, we turn to an econometric estimation in which we control simultaneously for the relative level and the absolute change in standard of living using our

¹¹ Using levels in local gas prices and unemployment rates, in addition to changes, do not affect the results. Similarly, using the CPI at the census region level lowers the fit of the model, but it does not change the nature of the results. In all cases, the point estimate associated with “below peers” remains essentially unchanged and highly significant. Finally, the results remain qualitatively unchanged when we control for additional demographic characteristic such as detailed employment status (e.g. unemployed, retired, full time, part time, self employed, number of jobs held, hours worked weekly), health status (in levels and changes), homeownership, savings (in safe or risky assets), or population density in the respondent’s zip code.

favorite specifications (i.e. the specification from Model 5 of Table 4 which has the highest adjusted R-squared). The respondent of reference in this model, is a household head whose standard of living has remained stable and similar to his/her peers (and thus selects “about the same” and “equal to peers”).

The results in Model 1 of Table 6 suggest that **inflation expectations react not only to relative levels**, but also to absolute changes in standard of living, consistent with Ehrmann et al. (2017). Respondents who report being worse off financially than a year ago report inflation expectations 0.8 percentage point higher than the respondent of reference. Consistent with the results in the previous section, the effect appears to be asymmetric. Indeed, we find that improving financial conditions has a substantially weaker negative effect on inflation expectations both in terms of magnitude and significance. Respondents in the “below peers” group still have significantly higher inflation expectations, but the magnitude of the effect now decreases as compared to Table 4 (from to 0.69 to 0.54 percentage point). Further, the coefficient associated with “worse off” is larger than the coefficient associated with “below peers.” Thus, it would appear that changes in financial situations affect inflation expectations more than social comparisons.

This result, however, is misleading. In Model 2 of Table 6 we include a complete set of interactions for levels and changes in standard of living to capture the joint effects. The respondent of reference in this model remains a household head with a stable standard of living (i.e. in the “equal to peers” and “about the same” groups). Observe first that the parameter associated with “worse off” becomes much lower and is no longer significant. Among the respondents who report being worse off than a year ago, only those who feel they are falling behind report significantly higher inflation expectations and the effect is large (1.3 percentage points). Further, when “Below peers” is interacted with a change in financial condition in any direction, the resulting parameter is positive, large and often significant.

To sum up, these results **support the hypothesis that social comparison (i.e. how one compares his standard of living to that of his peers) is the dominant factor in shaping inflation expectations** relative to changes in absolute level of standard of living from one year to the next, which have a limited additional effect.

3.3 Confidence in the Economy

We now explore the extent to which our results simply reflect different degrees of optimism or pessimism about the future state of the economy.¹² Indeed, it is conceivable that respondents

¹² We would like to thank an anonymous referee who suggested us to test this hypothesis.

who lack confidence in the economy could simultaneously expect higher inflation and report falling behind their peers. Note that although this hypothesis is intuitively appealing, its premise may not be supported by macroeconomic history, as economic downturns have been marked by lower than normal inflation. Nevertheless, there is recent evidence that people tend to associate high inflation with bad economic outcomes, such as higher unemployment Kamdar (2019).

To get a measure of economic confidence, we use a question in the SCE that asks respondents whether they think they will be financially better, the same, or worse off in 12 months. This question is also asked in the *Conference Board Survey* and in the *University of Michigan Survey of Consumers* to calculate the well-established *Consumer Confidence Index* and the *Index of Consumer Sentiment*, respectively.

We use this question to estimate the same two specifications as in Section 3.2. The results from Model 3 in Table 6 provide support for the hypothesis that economic confidence and inflation expectations are linked. Respondents who are pessimistic about their financial prospects report inflation expectations 0.4 percentage point higher than the respondent of reference (a household head whose standard of living has remained similar to his/her peers and who expects no change in his/her financial condition in the coming year). Observe, however, that the parameter associated with the “below peers” group remains little changed as compared to Table 4. Thus, the social comparison effect is robust to the inclusion of controls for economic optimism/pessimism. In fact, the results reported in Model 4 of Table 6, which includes a complete set of interactions, suggest that the two effects complement each other. Indeed, the inflation expectations of those who express both pessimism and that they are falling behind their peers far exceed the inflation expectations of the other categories of respondents (e.g. they are almost 2 percentage points higher than the inflation expectations of the respondent of reference).

To sum up, while we find evidence that a lack of confidence in the economy is associated with higher inflation expectations, we also find that our results cannot be explained simply by economic optimism/pessimism. Instead, we find that social comparison has a distinct and robust effect on inflation expectations.

4 Robustness checks

The object of this section is to test whether our main results are robust to alternative measures of key variables. Additionally, we examine whether differences in standard of living correlates with other measures of economic expectations.

4.1 Alternative Measures of Inflation Expectations

The baseline model in Section 3 was estimated using the respondents individual year-ahead inflation density means. Our first robustness check consists in testing whether the effect remains present for different measures of inflation expectations. In Table 7, we re-estimate the model using three alternative measures: the respondent’s year-ahead density median (Column 2), his year-ahead point prediction (Column 3), and his three-year ahead one-year density mean (Column 4). The estimation results presented in Table 7 are largely consistent with the conclusions from the baseline model (reported in Column 1 for reference). In particular, the parameter associated with “below peers” is systematically positive, significant, and of comparable magnitude across specifications.

4.2 Quantitative Measures of Relative Standard of Living

We now exploit the quantitative measure of social comparison, the “compensating income” defined in section 2.3 (e.g. the income necessary to have a standard of living similar to one’s peers). To deal with potential outliers we start with a discrete measure. For each of the two groups, “below peers” and “above peers,” we partition respondents who are above or below the median compensating income in their own group. For instance, respondents classified as “far below peers” report having a standard of living below their peers and a compensating income above the median in the “below peers” group. We partition respondents using either their absolute compensating income (i.e. the raw dollar amount they reported) or their relative compensating income (i.e. the raw dollar amount divided by the respondent’s reported annual household income). We then include in our specification two dummy variables capturing the additional effect of being far below or far above one’s peers. The results presented in Table 8 using the absolute and the relative compensating income (Models 1 and 2, respectively) reveal a relatively uniform effect among respondents who are falling behind. Indeed, while the parameter associated with “below peers” is positive and significant, there seems to be no additional effect for those falling behind far below their peers (i.e. the parameters for “far below peers” are not significant). Table 8 also confirms the absence of a non-linear effect among respondents who are getting ahead financially compared to their peers.

Next, we consider continuous measures of relative and absolute compensating income interacted with “above peers” and “below peers.” To deal with outliers in the distribution of relative compensating income (e.g. a few respondents report a relative compensating income in excess of 500%), we Winsorize the data at the 2nd and 98th percentile of relative compensating income. The results presented in Table 9 using the absolute and the relative compensating income (Models 1 and 2, respectively) confirm a relatively uniform effect

among respondents who are falling behind as the parameters associated with the forms of compensating income are insignificant.

To sum up, while Tables 8 and 9 confirm that falling behind one’s peers increases inflation expectations significantly, they reveal no additional effect for those who are falling far below their peers.

4.3 Additional Features of Inflation Beliefs

Having shown that social comparisons influences inflation expectations, we now explore the extent to which they affect additional features of respondents’ inflation beliefs. We start with individual inflation uncertainty measured as the interquartile range of a respondent’s reported density forecast. A respondent who reports a tight distribution of beliefs (with a small interquartile range) is fairly certain about what future inflation will be. Conversely, a respondent who reports a more uniform distribution of beliefs (with a large interquartile range) expresses substantial uncertainty about future inflation. Inflation uncertainty is increasingly studied in the literature but so far, little is known about the determinant of inflation uncertainty Ben-David et al. (2019).

The descriptive statistics in Table 2 (row 3) indicate that respondents who fall behind expressed significantly higher uncertainty, while those who report they are getting ahead appear to be the most certain. The regression results in the first 3 Columns of Table 10 confirm that those falling behind have significantly higher inflation uncertainty. The effect remains positive in Columns 4 and 5, but it is no longer significant when we control for the respondents household income. Hence, unlike inflation expectations, we find no evidence suggesting that, all else equal, social comparison yields greater inflation uncertainty. Finally, observe that our regressions suggest several strong determinants of inflation uncertainty. In particular, non-white, women, and respondents with lower education or lower financial literacy all express significantly higher inflation uncertainty.

Finally, we look more generally at the effect of social comparison on the entire distribution of individual beliefs. As explained in Section 2.2, each respondent is asked state the percent chance that inflation will be within various intervals such as $[0\%,2\%]$, $[2\%,4\%]$, or $[4\%,8\%]$. We plot in Figure 2 the average of these individual density forecast across all respondents in each of the three social comparison groups. Compared to the distribution of inflation beliefs for the control group (those whose standard of living is equal to their peers) in grey, the distribution of beliefs for respondents who are falling behind (in red) clearly shifts to the right, with less mass between the 0% to 4% and more mass above 4%. The distribution is also more “spread out,” with with a substantially lower mode. This is consistent with

the statistics presented earlier showing that those who fall behind have a higher inflation expectation and higher uncertainty. Finally, the distribution of beliefs for those who are getting ahead (in green in Figure 2) does not exhibit a clear shift compared to the “equal to peer” distribution. However, it is more concentrated with more mass in the 2% to 4% bin, and less mass above 4%. Again, this is consistent with the statistics presented earlier.

4.4 Additional Economic Expectations

In the last robustness check, we examine whether the effect of social comparison is confined to inflation expectations, or if instead it extends to other economic expectations elicited in the SCE. We start with commodity specific inflation expectations, namely year-ahead price change expectations for food, medical care, college education, rent, gas and gold. As indicated in Table 11, respondents in the “below peers” group expect significantly higher price changes for every single one of these commodities except gas. The latter result may reflect the fact that gas is a very homogeneous good, commonly purchased by all, and thus non-aspirational. As a result, households in the three social comparison groups can be expected to have similar gas shopping experiences, and thus, similar expectations about future gas prices. In contrast, the parameters associated with “above peers” are insignificant for every commodity expectations. These results provide evidence suggesting that the link between social comparison and expected price changes is not limited to overall inflation. Instead, we find evidence that the effect is robust as it broad-based and applies across various goods and services.

We now turn to non-inflation economic expectations about the unemployment rate, expected financial fragility (i.e. the probability of missing a minimum debt payment over the next three months), the probability to move to a new primary residence within the next 12 months, personal earnings growth, the stock price growth in the U.S. stock market, and household spending. Except for expected financial fragility, all the other expectations are measured for the year ahead. Table 12 shows that respondents in the “below peers” group have significantly higher expectations for the first three variables, the unemployment rate, financial fragility and the moving probability. These results are consistent with the idea that those who report they are falling behind may be more likely to experience a negative economics shock and perceive a form of financial fragility. In contrast, respondents in the “above peers” group have higher expectations about their year-ahead earnings growth and about the probability that U.S. stock prices will be higher a year from now. This is consistent with the idea that these respondents are doing better financially than their peers. Interestingly, we also find that those who are getting ahead expect to increase their household spending

by significantly less than other respondents. This may reflect the fact that respondents in the other two social comparison groups intend to spend more in the future so as to increase their standard of living to the same level as those in the “above peer” group. These results complements Das et al. (2020) who find that individuals’ macroeconomic expectations are influenced by their socioeconomic status measured by (e.g.) income, or education. Our results suggest that an agent’s perceived social comparison is an additional channel that shapes individual expectations about future economic developments.

5 Conclusion

We provide new empirical evidence **suggesting** that social comparison can explain part of the large and puzzling dispersion in inflation expectations in the population. We do so using micro level data from a representative survey of U.S. household heads, the Survey of Consumer Expectations, in which we included questions specifically designed to measure subjective social comparison.

We find strong evidence **consistent with the hypothesis** that inflation expectations are shaped by relative standard of living for those who are unable to “keep up with the Joneses.” Namely, people who feel they are falling behind financially compared to their peers report significantly higher inflation expectations. The magnitude of the effect is in fact quite substantial: while their peers believe inflation will be around 3.2% in our sample, those who report they are falling behind expect inflation to be almost of a full percentage point higher. More generally, we find that beyond expectations, social comparison affects a respondent’s entire distribution of inflation belief. Namely, the average density forecast for respondents who are falling behind is right shifted (toward higher values) and more “spread out” (i.e. with a substantially lower mode and more mass in the tails). In contrast, we find no significant effect of social comparison on inflation expectations for the group of respondents who feel they are getting ahead of their peers. This asymmetric pattern is consistent with Filippin and Nunziata (2019) who studied the impact of social comparison on inflation perception.

Our results appear to be robust and suggest that social comparison is a singular and meaningful factor shaping inflation expectations. In particular, the effect is identified for various measures of inflation expectations (i.e. short-term and mid-term) and for price changes of specific commodities. Further, the differences we find between respondents with different social comparison status cannot be explained by differences in individual demographic characteristics including income, education or financial literacy. **We also find no evidence that our results simply reflect absolute changes in one’s standard of living, or differences in economic optimism/pessimism.** Instead, a dominant channel shaping inflation expecta-

tions seems to be how a respondent evaluates his standard of living relative to his peers. Finally, our estimations suggest that the effect of social comparison may not be confined to inflation. In particular, we find that those falling behind also hold higher expectations for unemployment.

These results, however, should be appreciated with caution, as we must acknowledge a clear limitation of our study: Because we relied on reduced form specifications, a causal link between social comparison and inflation expectations has not been formally identified. This limitation is common to most of the literature that uses regressions to study possible socio-demographic determinants of inflation expectations (e.g. Souleles, 2004, Pfajfar and Santoro, 2009, Bruine de Bruin et al., 2010 or D’Acunto et al., 2019). We note, however, that we have controlled for several possible confounding factors (including changes in absolute levels of standard of living and the extent to which respondents exhibit economic optimism/pessimism), and the social comparison channel systematically remained strongly significant. Thus, while we cannot completely rule out other possible channels, we believe the evidence put forward strongly supports the hypothesis that inflation expectations are shaped in part by social comparison.

This finding is consistent with salience theory under which agents form inflation beliefs using their personal shopping experience and overweight the price of *salient* goods. Finding that those unable to keep up with the Joneses have higher expectations suggest that “aspiration” goods are salient. That is, when they form their inflation beliefs, those who struggle to keep up with their peers focus on the goods they want to purchase but are unable to afford because their prices are too high. Salience theory also explains the asymmetric pattern we observed in the data. That is, the fact that inflation expectations are statistically different for those who are falling behind, but not for those who are getting ahead relative to their peers. Indeed, respondents who are getting ahead are likely to have fewer aspiration goods they cannot afford and these goods are unlikely to be as salient in their beliefs formation process. Finally, note that our results provide a new contribution to the literature on experience based inflation learning. While salient goods have typically been considered in the literature to be goods actually purchased (see e.g. Angelico and Di Giacomo 2019), our results suggest that the salient goods that shape inflation expectations also include non-purchased goods, such as highly desired aspiration goods.

Our findings extend the results of Filippin and Nunziata (2019) mainly along two perspectives. First, the survey data specifically collected for our study allows us to identify the role of social comparison at the individual level, rather than relying upon aggregate evidence on inequality at the country level as in Filippin and Nunziata (2019). Second and foremost, focussing on inflation expectations allows us to test a larger sphere of influence of social

comparison.. Most of the inflation learning models assume that expectations are driven by inflation realization or experience (Malmendier and Nagel, 2016; Angelico and Di Giacomo, 2019); Bordalo et al.2012; 2013). Given that individuals may hold a distorted perception of objective variables, perceptions can therefore be regarded as a primitive of inflation expectations. Hence, in this paper we expand the results based on inflation perceptions of Filippin and Nunziata (2019), by showing that the effect social comparison extends also to inflation expectations, a variable that is of direct relevance for monetary policy.

Social comparison makes aspiration goods salient by shaping what an agent considers a desirable standard of living. Technological progress, social habits, and role models continuously adjust the nature and characteristics of the goods that, when owned or consumed, define one’s status in the social ranking.¹³ The inability to purchase these goods while aspiring to do so may generate a feeling of deprivation when one’s reference group possesses them. This feeling of financial distress can emerge even when one’s financial situation is stable or improving in absolute terms. The consumer may attribute incorrectly such a feeling of financial distress to rising prices rather than to his/her (relative) economic condition, a form of self-serving bias that ascribes the inability to afford a desired basket of goods to external factors (Mezulis et al., 2004). Consequently, such aspiration goods become salient in the expectation formation.

Finally, note that our results may have consequences for monetary policy. As argued by (Bernanke, 2004), controlling inflation starts with controlling inflation expectations. This explains why many central banks have recently adopted more transparent communication policies about their inflation objectives, and why they are increasingly launching new surveys to monitor the public’s inflation expectation. Understanding the factors that shape individual inflation expectations is therefore of prime importance for monetary policy. Finding that inflation expectations are shaped in part by social comparison is useful in this respect as it may help central banks better tailor their communication to specific groups. Moreover, it has been well documented that both inequality (e.g. Piketty and Saez 2014) and perceived inequality (Hadavand 2019) have increased over the last decades. Thus, the social comparison channel we identified in this paper is likely to play a more prominent role in the coming years. In their effort to control inflation, central banks may therefore need to pay more attention to issues of social comparison and perceived inequality.

¹³ This process is often described using the metaphor of the “hedonic treadmill” introduced by Brickman and Campbell (1971). Kahneman et al. (2004) distinguishes instead between a hedonic treadmill depending on adaptation, and a satisfaction treadmill depending on aspiration. If aspirations are shaped by social comparison, the metaphor becomes that of a “social treadmill” (Stutzer, 2004; Bruni, 2009)

References

- Angelico, C., Di Giacomo, F., 2019. Heterogeneity in inflation expectations and personal experience. Tech. Rep. 3369121, SSRN.
- Armantier, O., Bruine de Bruin, W., Topa, G., van der Klaauw, W., Zafar, B., 2015. Inflation expectations and behavior: Do survey respondents act on their beliefs? *International Economic Review* 56 (2), 505–36.
- Armantier, O., Nelson, S., Topa, G., van der Klaauw, W., Zafar, B., 2016. The Price is Right: Updating Inflation Expectations in a Randomized Price Information Experiment. *Review of Economics and Statistics* 98 (3), 503–23.
- Armantier, O., Topa, G., van der Klaauw, W., Zafar, B., 2017. An overview of the survey of consumer expectations. Tech. Rep. 2.
- Armona, L., Fuster, A., Zafar, B., 2018. Home price expectations and behaviour: Evidence from a randomized information experiment. *The Review of Economic Studies* 86 (4), 1371–1410.
- Ben-David, I., Ferman, E., Kuhnen, C. M., Li, G., 2019. Expectations uncertainty and household economic behavior. Working Paper 25336, National Bureau of Economic Research.
- Bernanke, B., 2004. The economic outlook and monetary policy. Remarks to World Economy Laboratory Spring Conference, Washington, D.C., <https://www.federalreserve.gov/boarddocs/speeches/2004/200404232/default.htm>.
- Blanchflower, D. G., MacCoille, C., 2009. The formation of inflation expectations: an empirical analysis for the uk. Working Paper 15388, National Bureau of Economic Research.
- Bordalo, P., Gennaioli, N., Shleifer, A., 2012. Saliency theory of choice under risk. *Quarterly Journal of Economics* 127 (3), 1243–1285.
- Bordalo, P., Gennaioli, N., Shleifer, A., 2013. Saliency and consumer choice. *Journal of Political Economy* 121 (5), 803–843.
- Branch, W. A., 2004. The Theory of Rationally Heterogeneous Expectations: Evidence from Survey Data on Inflation Expectations. *Economic Journal* 114 (497), 592–621.
- Brickman, P., Campbell, D. T., 1971. Hedonic relativism and planning the good society.

- Bruine de Bruin, W., Van der Klaauw, W., Downs, J., Fischhoff, B., Topa, G., Armantier, O., 2010. Expectations of inflation: The role of financial literacy and demographic variables. *Journal of Consumer Affairs* 44, 381 – 402.
- Bruni, L., Jan. 2009. *Civil Happiness: Economics and Human Flourishing in Historical Perspective*. Routledge.
- Coibion, O., Gorodnichenko, Y., Kamdar, R., 2018a. The formation of expectations, inflation, and the phillips curve. *Journal of Economic Literature* 56 (4), 1447–91.
- Coibion, O., Gorodnichenko, Y., Kumar, S., 2018b. How do firms form their expectations? new survey evidence. *American Economic Review* 108 (9), 2671–2713.
- D’Acunto, F., Hoang, D., Weber, M., 2019. Managing households’ expectations with simple economic policies. Working Paper 2019-106, University of Chicago.
- Das, S., Kuhnen, C., Nagel, S., 2020. Socioeconomic status and macroeconomic expectations. *Review of Financial Studies* 33 (1), 395–432.
- Dohmen, T., Huffman, D., Schupp, J., Falk, A., Sunde, U., Wagner, G. G., 2011. Individual risk attitudes: Measurement, determinants, and behavioral consequences. *Journal of the European Economic Association* 9 (3), 522–550.
- Duesenberry, J., 1949. *Income, Saving and the Theory of Consumer Behavior*. Harvard University Press, Cambridge, MA.
- Ehrmann, M., Pfajfar, D., Santoro, E., 2017. Consumers’ Attitudes and Their Inflation Expectations. *International Journal of Central Banking* 13 (1), 225–259.
- Engelberg, J., Manske, C. F., Williams, J., 2009. Comparing the point predictions and subjective probability distributions of professional forecasters. *Journal of Business & Economic Statistics* 27 (1), 30–41.
- Filippin, A., Nunziata, L., 2019. Monetary effects of inequality: lessons from the euro experiment. *The Journal of Economic Inequality*, 1–26.
- Guzman, M., Stiglitz, J. E., 2016. Pseudo-wealth and consumption fluctuations. Working Paper 22838, National Bureau of Economic Research.
- Hadavand, A., 2019. Misperceptions and mismeasurements: An analysis of subjective economic inequality. Working Papers 449, ECINEQ, Society for the Study of Economic Inequality.

- Kahneman, D., Krueger, A., Schkade, D., Schwarz, N., Stone, A., 2004. A survey method for characterizing daily life experience: The day reconstruction method. *Science* 306, 1776–80.
- Kamdar, R., 2019. The inattentive consumer: Sentiment and expectations. Mimeo, Department of Economics, Indiana University, Bloomington.
- Kaplan, G., Schulhofer-Wohl, S., 2017. Inflation at the household level. *Journal of Monetary Economics* 91, 19–38.
- Lusardi, A., Mitchell, O. S., 2007. Financial literacy and retirement preparedness: Evidence and implications for financial education. *Business Economics* 42 (1), 35–44.
- Lusardi, A., Mitchell, O. S., 2008. Planning and financial literacy: How do women fare? *American Economic Review* 98 (2), 413–17.
- Malmendier, U., Nagel, S., 2016. Learning from inflation experiences. *The Quarterly Journal of Economics* 131 (1), 53–87.
- Mankiw, N. G., Reis, R., 2007. Sticky Information in General Equilibrium. *Journal of the European Economic Association* 5 (2-3), 603–613.
- Mankiw, N. G., Reis, R., Wolfers, J., June 2003. Disagreement about inflation expectations. Working Paper 9796, National Bureau of Economic Research.
- Mezulis, A. H., Abramson, L. Y., Hyde, J. S., Hankin, B. L., 2004. Is there a universal positivity bias in attributions? a meta-analytic review of individual, developmental, and cultural differences in the self-serving attributional bias. *Psychological Bulletin* 130 (5), 711–747.
- Moon, Y., 2003. Don't blame the computer: When self-disclosure moderates the self-serving bias. *Journal of Consumer Psychology* 13 (1&2), 125 – 137.
- Pfajfar, D., Santoro, E., 2009. Asymmetries in inflation expectations across sociodemographic groups. Mimeo, Department of Economics, University of Copenhagen.
- Piketty, T., Saez, E., May 2014. Inequality in the long run. *Science* 344, 838–43.
- Reis, R., 2006. Inattentive consumers. *Journal of Monetary Economics* 53 (8), 1761–1800.
- Sharma, P., 2019. Selection of random coefficients for identifying household-level heterogeneity in expectations. Tech. rep., mimeo.

- Sims, C. A., 2003. Implications of rational inattention. *Journal of Monetary Economics* 50 (3), 665–690.
- Sims, C. A., 2009. Inflation expectations, uncertainty, and monetary policy. Working Paper 275, Bank of International Settlements.
- Souleles, N., 2004. Expectations, heterogeneous forecast errors, and consumption: Micro evidence from the michigan consumer sentiment surveys. *Journal of Money, Credit and Banking* 36 (1), 39–72.
- Stutzer, A., 2004. The role of income aspirations in individual happiness. *Journal of Economic Behavior & Organization* 54 (1), 89–109.
- Woodford, M., 2001. Imperfect Common Knowledge and the Effects of Monetary Policy. NBER Working Papers 8673, National Bureau of Economic Research, Inc.