

The Coffee Index: Using Everyday Consumer Goods to Dispel Perceived Inflation

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Abstract

Perceived Inflation is a term used in behavioral economics to address the public's hypersensitivity to their local and national economies, often believing the inflation rates are higher than they actually are. Mass pattern thinking like this can be dangerous to markets, resulting in panic both in consumer purchasing and policymaking both. With the political stage being in a state of constant flux and turbulence both domestically and abroad, dispelling perceived inflation should be a prime directive of financial education given to the public and policymakers alike.

This study aims to dispel the idea of perceived inflation existing in the particular local market of Cincinnati, Ohio using one of the most frequently traded goods in the United States as an indicator of actual inflation, coffee. From a sample of 50 of Cincinnati's independently owned coffee establishments, we collected 2020 & 2024 prices for two particular products, the house coffee, and the house cappuccino, and used regression analysis to show a positive effect on the current prices from those in 2020. We also show the annualized rate of inflation for both products being a suitable indicator of actual inflation in the local market, leading to the result that coffee is a good predictor of local market inflation, as it is priced in accordance with actual, rather than perceived inflation.

Keywords: Perceived inflation, coffee, inflation, consumer price index, local market, policymaking, Cincinnati

1. Introduction

Since the onset of the COVID-19 pandemic, the public has held a newfangled hypersensitivity to the economy's health, leading to a widespread gap in the perception of the state of inflation and its role in the economy, both in the U.S. and abroad. In behavioral economics, we call this concept *perceived inflation*; A 2020 study by the Bank of Canada describes this decorum as an "observation that consumers, on average, think inflation is higher than what is measured and reported by statistical agencies"; this gap has been regularly observed in Canada as well as in other jurisdictions, such as the United States and the United Kingdom" (Schembri, 2020). Studies conducted by the European Insurance giant Allianz SE on Germany and its neighbors show "perceived inflation in the eurozone is almost three times as high: it was recently close to 17%, about a whopping 9 percentage points (pp) higher than the actual inflation rate this quarter" (SE Communications, 2023).

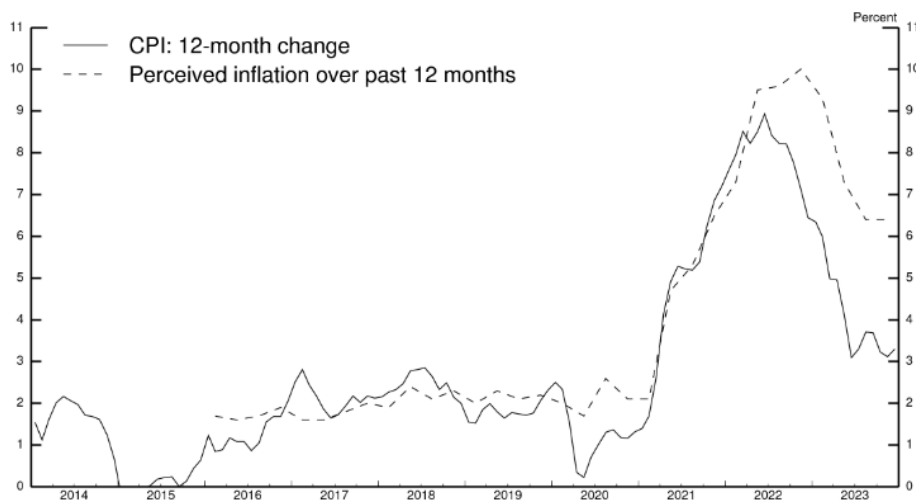
This perception can lead to considerable consequences in local markets especially, in environments of independent firms that do not operate under a chain-style management; perceived inflation may prompt firms in the local market to increase their prices beyond a reasonable percentage point, thinking that their competition is doing the same or that they will soon face a supply crisis and as such, react to the panic of the perceived inflation rate. A 2022 article from the IMF shows "central bankers and academic economists view inflation partly as a self-fulfilling prophecy, if consumers believe prices will rise at a faster pace, they may behave in ways—buying a refrigerator or asking for a raise—that will fuel more inflation" (Pizzinelli, 2022).

Using the results of a time series study completed by the Michigan Surveys of Consumers (MSC), researchers have been able to use surveys to gauge public impressions from 2016 until late 2023. The study finds that "before the pandemic, the MSC median household perceptions of 12-month inflation were about in line with published CPI inflation, [yet] in the latest reading, for November 2023, the median respondent perceived inflation to have been 6.4 percent over the past year, well above the 3.1 percent change in the headline CPI over the twelve months ending in November" (Lebow & Peneva, 2024). While the results of the study confirm a decreasing trend in the rate of perceived inflation since the pandemic began to end, the public's puffed perspicacity into inflation has only begun.

This study aims to dispel the idea of perceived inflation existing in the particular local market of Cincinnati, Ohio using one of the most frequently traded goods in the United States as an indicator of actual inflation, coffee. From a sample of 50 of Cincinnati’s independently owned coffee establishments, we collected 2020 & 2024 prices for two particular products, the house coffee, and the house cappuccino, and used regression analysis to show a positive effect on the current prices from those in 2020. We also show the annualized rate of inflation for both products being a suitable indicator of actual inflation in the local market, leading to the result that coffee is a good predictor of local market inflation, as it is priced in accordance with actual, rather than perceived inflation. We would like to thank Indiana University and the Summer Research Scholar (SUMR) Program for the grant and funding used to complete this study.

2. Data

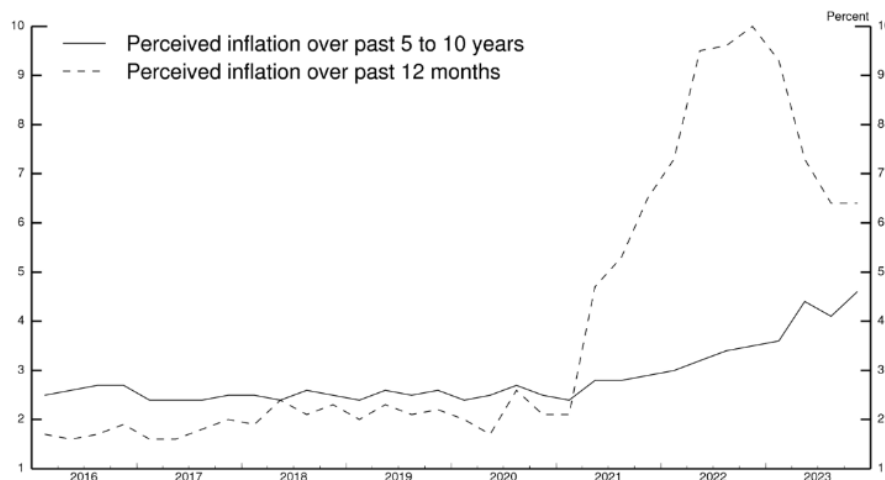
Over the last few years, especially since the cycle of the COVID pandemic, the economic and political landscapes have vastly changed, leading to prodigious changes in policies affecting many areas of the economy, inflation being a major one. In a January 2024 Times series study, researchers at the University of Michigan along with the Bureau of Labor Statistics concluded a seven-year survey-based experiment on “inflation perceptions—what people believe inflation to have been—that are worded symmetrically with their long-standing questions on inflation expectations [and] are currently posed four times a year—in February, May, August, and November” (Lebow & Peneva, 2024). In the below Example One, a result of this study can be shown:



Source: University of Michigan Surveys of Consumers, Bureau of Labor Statistics.

Example One

From the results, researchers found that the perceived rate of inflation from those who completed the surveys was an astonishing 6.4% by the last survey collected in December 2023. Example Two from this study also shows the spike between these perceptions both before and after the cycle of the COVID pandemic:



Source: University of Michigan Surveys of Consumers.

Example Two

Example Two

Our study aims to use coffee products in the local, independently owned market as an indicator of actual inflation to show that everyday goods can be an appropriate measure of real inflation versus the aggrandized perception. Our initial hypothesis was that the annualized rate of inflation in our chosen coffee products would show that independently owned cafés in the Cincinnati market price their products according to actual, rather than perceived, inflation, making them a proper indicator, since the local cafes would price products according to true, not bloated inflation.

To establish a proper annualized rate of inflation for our two chosen products, the house drip coffee and the house cappuccino, we randomly sampled 50 independent coffee shops out of the approximate 180 (27.8%) that exist within the local Cincinnati market, as defined by the below borders which includes three KY zip codes:



From our random sample, we then collected two different price points for one normal good and one luxury good: a regular-sized (12-16oz) house drip coffee and a regular-sized (12-16oz) house cappuccino (before tax), from 2020 and then the July 2024 prices of both products. From these two price points, an annualized inflation rate was established for each product, across the entire sample. Potential bias of the data could include that of volunteer bias, as the prices were collected from employees identified as management who had worked at the establishment for at least the time period (2020-2024) being sampled. During the collection process, we also ran into seven shops that were originally chosen as part of our sample that needed to be switched due to unforeseen occurrences such as the shop being closed, part of an unknown chain (non-independent) or unwilling volunteer employees that could provide data. As a result, we sampled seven more shops until we arrived at the desired sample size.

We then accessed the Federal Reserve of St. Louis (FRED) to retrieve the monthly Consumer Price Index for all urban customers: coffee in U.S. city average, for the data used to compare the annualized inflation rates in the local market to that of the general coffee market in the United States between 2020 and June 2024. The Consumer Price Index itself provided the general overall inflation rate used to compare the inflation rate found in the sample, as shown in Figure A.

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave
2024	3.1	3.2	3.5	3.4	3.3	3.0	Avail. Aug. 14						
2023	6.4	6.0	5.0	4.9	4.0	3.0	3.2	3.7	3.7	3.2	3.1	3.4	4.1
2022	7.5	7.9	8.5	8.3	8.6	9.1	8.5	8.3	8.2	7.7	7.1	6.5	8.0
2021	1.4	1.7	2.6	4.2	5.0	5.4	5.4	5.3	5.4	6.2	6.8	7.0	4.7
2020	2.5	2.3	1.5	0.3	0.1	0.6	1.0	1.3	1.4	1.2	1.2	1.4	1.2

Figure A. Consumer Price Index 1/20-7/24 (Provided by Trading Economics Quarterly Calculator)

3. Methodology & Results

Using the Consumer Price Index provided by FRED, we can compare the annualized rates of inflation for both products to the current annual inflation rate given by the CPI of 3% in Figure B below.

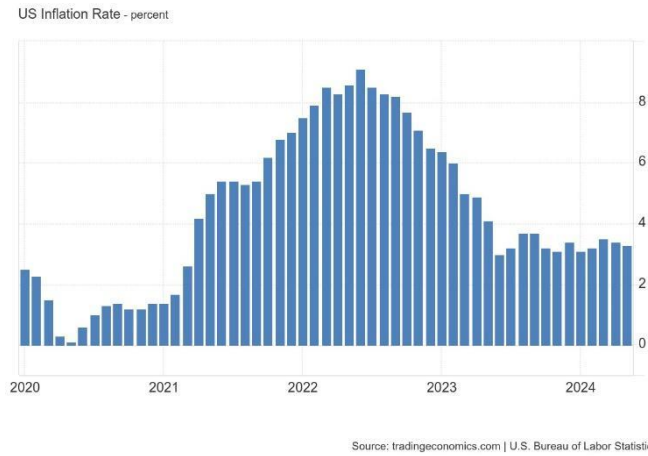
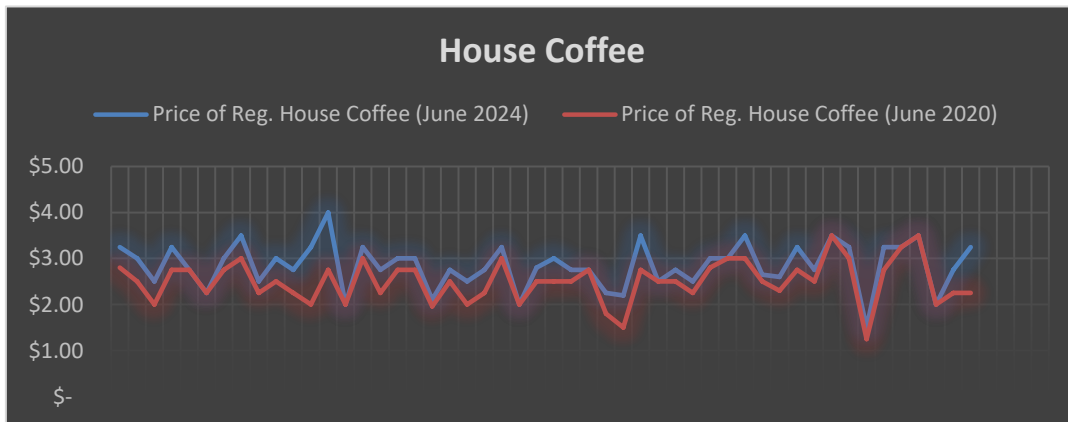


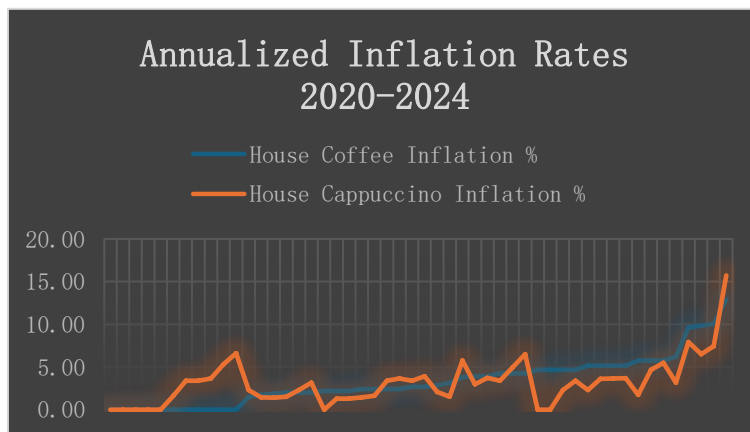
Figure B. US Inflation Rate 2020-2024

From the sample, we annualized the rate of inflation from the original 2020 price to the present 2024 price, for both items and then compared those rates. An average taken from the annualized inflation rates for both products gives us an average rate of 3.36% for a house (drip) coffee and 3.17% for house Cappuccino’s, where our standard deviations are 2.9 and 2.2 respectively, with a standard error range of 0.30-0.41. Our independently owned cafés appear to price their cappuccinos closer to the rate of actual inflation while house drip coffees are priced only minutely higher.

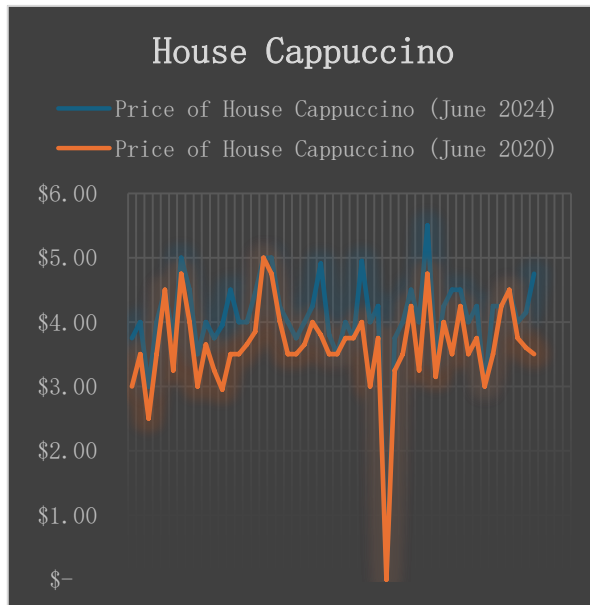
Graph A below shows this comparison between the two products, while graphs B and C show the comparisons of both products to their original 2020 and July 2024 prices, all showcasing the positive trend in affection.



Graph A



Graph B



Graph C

Furthermore, we also wanted to test specifically if the original 2020 prices had any positive effect on the current prices in 2024, denoted by a positive increase in the coefficients of regression analysis and strengthened by solid Adjusted R Square, p-values, and T-statistics. Before we move to the results of the experiment section, I want to establish the hypotheses used for testing.

H_0 : Since the onset and conclusion of the COVID pandemic, independently owned coffee cafes in the metropolitan Cincinnati area price their products according to rates of perceived inflation (6.4%) rather than the actual current inflation rate (3.01%), making independent coffee a poor indicator of actual inflation rates in a local economy.

H_a : Since the onset and conclusion of the COVID pandemic, independently owned coffee cafes in the metropolitan Cincinnati area price their products closer to rates of the actual current inflation rate (3.01%) rather than perceived inflation rates, making independent coffee a suitable indicator of actual inflation rates in a local economy.

4. Results of Regression Analysis

Beginning with the house coffee, we wanted to see what sort of relationship (if any) existed between the dependent 2024 price and the independent 2020 price of the product from cafes gathered in the sample.

Summary Output for House Coffee				
<i>Regression Statistics</i>				
Multiple R	0.80670435			
R Square	0.650771909			
Adjusted R Square	0.643341524			
Standard Error	0.292909622			
Observations	49			
<i>Standard</i>				
	<i>Coefficients</i>	<i>Error</i>	<i>t Stat</i>	<i>P-value</i>
Intercept	0.691578007	0.233242865	2.96505536	0.004742076
2.8	0.859943426	0.091888495	9.358553835	2.60192E-12

We can see that a positive relationship between the two variables exists thanks to increasing positive coefficients as well as a statistical significance evidenced by our Adjusted R Score. A p-value of 0.001 allows us to reject the null hypothesis here.

Looking at House Cappuccino’s, we see a similar trend to that of coffee:

Summary Output for
Cappuccino’s

<i>Regression Statistics</i>	
Multiple R	0.910617989
R Square	0.829225121
Adjusted R Square	0.825591613
Standard Error	0.323476442
Observations	49

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>
Intercept	0.615914899	0.233889491	2.633359	0.011407646
3	0.95316281	0.063094852	15.10682	1.15985E-19

Once more, we can see a positive, increasing relationship in the variables which suggests that the prices of 2024 must have been affected by the prices of 2020, indicating the 2020 prices were too low for total profit to be positive, and as such, increases had to be made. This is supported by an even stronger Adjusted R Squared than House Coffee, as well as the same p-value of 0.001, allowing us to reject the null hypothesis for both products in favor of the alternative.

5. Discussion

We can see from our regression analysis that the prices had a positive effect on each other, we can also see from our annualized inflation graphs, that both products were with .5% of the actual inflation rate made available via the consumer price index. Some thoughts on these results should first focus on the difference in annualized inflation for both products. The drip coffee or house blend, while being the chosen normal good, actually had a *higher* rate of inflation at 3.36% than the chosen luxury good, cappuccino, at 3.17%. This suggests the price elasticity of demand of the normal good and the luxury good both were highly elastic, with the luxury good performing slightly better than its normal counterpart. In an experiment with more time and greater resources, we could have possibly gathered the quantity of each product sold for each year during the time period which would have allowed us to calculate a precise price elasticity of demand rate and confirm numerically the true PED.

The differences between the two products also connote another discussion on the external costs associated with each. While the house coffee is a single ingredient (ground coffee bean) the average cappuccino is a blend of items all required to create the beverage, which typically includes espresso (beans) and skim milk, though some cafes tend to add extra ingredients such as alternate milk like almond or vegan, sweeteners and cocoa powders for taste adjustments. With skim milk being the main external ingredient besides coffee beans, we also wanted to look at the inflation rates of milk in the United States for the same time period, as shown in Figure C.



Figure C. Inflation of U.S. Milk Prices 2020-2024

In January 2020, the average price of skim milk in the United States was \$2.95 and \$3.70, an average of \$0.75 increase. While the average price increase on cappuccinos in the sample was only \$0.45, there could be causation in the price of milk and/or the type of milk utilized by the café in the creation of the cappuccino; however, the average increase in the

house coffee was \$0.34, which debunks the causation theory just a tad. In an experiment with more resources, we could have also gathered data on the type of milk utilized in the cappuccino by each café, such as pricing and quantity in comparison to the annual number of cappuccinos sold by each café

While we had attempted to contact the local wholesale distributor for the majority of Cincinnati's independent cafes and gain access to their historical pricing, we were unable to establish a connection with them. Further studies of coffee's suitability as a true economic indicator of local markets should include any wholesale pricing available for a stronger experiment altogether.

In a review of similar research and literature, one notable 2023 experiment that looked at coffee as an identifier of the level of inflation in selected U.S. markets by examining the correlation between coffee prices and ICE Futures using a "Pearson correlation coefficient [which] confirmed the existence of a strong direct dependence" (Vochozka et al., 2023). The study uses agglomerations in three major U.S. cities between the price of coffee traded on ICE Futures and the CPI to showcase this correlation, strengthening the results of our study in a more localized market with results on a larger scale. Findings of studies like this and others "may be beneficial for the creators of fiscal and monetary policies, [as] the relationship between coffee price and CPIs is significant and can thus be helpful; Coffee, which is among the most important economically traded commodities, is also a necessary and inferior good, it is the necessity of coffee as an economic good that determines it as a suitable input" (Vochozka et al., 2022); (Vochozka et al., 2023).

Another 2024 study by the National Bureau of Economic Research (NBER) found that respondents generally align inflation "as an unambiguously bad thing and very rarely as a sign of a good economy or as a by-product of positive developments [and] there is a scant backing for monetary tightening measures" (Binetti et al., 2024) often attributing it to political policies that further drives division amongst citizens. As economists, we have been taught that inflation is primarily driven from demand, cost and expectations. The danger of perceived inflation only furthers misinformation about its origin and in the current socioeconomic landscape, unification rather division amongst the common citizens should be a common goal of research.

6. Conclusion

The phenomenon of perceived inflation can be damaging to a hypersensitive economy such as the one the whole of the United States finds itself in today, "more money chasing a fixed number of [products] will drive up their price, and more people asking for a raise will prompt employers to mark up the prices of goods or services they sell to make up for higher labor costs" (Pizzinelli, 2022). Overwrought estimations on inflation can lead to negative consequences that we can ultimately avoid through public education. Creating additional indicators of local inflation in simple, everyday products is an ample way to not only achieve this education but to end incorrect perceptions that can lead to more hyperbolic policies creating further avertible public outcries and outcomes.

The coffee index serves its purpose as an accurate measure of local inflation in the sense that even simple products, like your average coffee from the neighborhood barista, are sensitive to overall changes in larger markets and supply chain cycles. Unlike the heightened volatility in inflation cycles of more dispensable items like electronic retail consumer goods or even used automobiles, coffee beans are a product that goes through cycles much closer to the true CPI index. As Chief Powell warned in a May 2022 press conference, "We can't allow a wage-price spiral to happen, and we can't allow inflation expectations to become unanchored. It's just something that we can't allow to happen" (Transcript, 2022). Ending the spread of perceived inflation through comprehensible indicators like coffee seems like a good step.

Or as Beth Dutton from the hit television drama *Yellowstone* would tell you:

"The best measure of progress in a town is decent coffee."

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Authors' contributions

Dr. Robert F. Mulligan acted as the Project Advisor and Faculty Mentor for the project. Ashlee Streidl assisted in mapping driving routes and along with Derek Streidl in data collection. Derek Streidl is the only author.

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Competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Data sharing statement

No additional data are available.

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