# Do banks gain from inflation? Evidence from inflation surprises.

Nathan Converse & Anil K. Jain

Federal Reserve Board of Governors

Abstract: Using a high-frequency event study, we examine the effect of inflation on bank value by analyzing banks' risk-adjusted stock returns in a narrow time window around U.S. consumer price inflation (CPI) releases. We find that bank stock prices outperform the broader stock market on higher-than-expected CPI prints. Moreover, we find that this relationship is substantially larger during periods of high inflation. We find evidence that the key channel for this outperformance of bank stock prices is through higher-than-expected inflation causing interest rates to rise and, consequently, bank profits to increase because of incomplete pass-through of higher rates to bank deposit rates.

Keywords: Inflation, banks, inflation surprises
JEL codes: G12, G21, E31

---

Date: June 2024

We thank seminar and workshop participants at the Federal Reserve Board, International Finance and Banking Society (Oxford University), the 9th Stress Testing conference (Federal Reserve Bank of Boston), 6th Annual IMF Macro-Financial Research Conference (IMF), 8th RCEA International Conference in Economics, Econometrics, and Finance (Brunel University) for their comments and improvements. The findings and conclusions in this paper are the sole responsibility of the authors and should not be interpreted as reflecting the views of the Board of Governors of the Federal Reserve System or the views of any other person associated with the Federal Reserve System.

# 1. Introduction

As global inflation surged between 2021 and 2023, interest in how inflation may affect bank value has grown because a well-functioning banking sector is crucial for economic growth and financial stability. However, the theoretical effects of inflation on bank value are both complicated and time varying. First, banks play a key role in intermediating credit with the interest rate being closely tied to expected inflation. Second, the value of a bank's assets and liabilities is highly sensitive to interest rate changes. Over the short term, bank profitability, and possibly solvency, can be pressured by inflation because inflation-induced higher interest rates will reduce the value of the bank's existing fixed-income assets and necessitate greater provisioning in anticipation of more defaults. In contrast, over the longer term, banks should benefit from higher interest rates through larger net interest margins (the average difference in bank lending and borrowing rates), especially as interest rates rise significantly above the zero lower bound. Banks can also be affected by macroeconomic changes that are associated with higher inflation; for instance, if productivity declines are causing higher inflation, rising nonperforming assets, slowing fee revenue, and slowing loan growth will likely reduce bank revenue and increase bank losses.

Taken together, the multifaceted theoretical effect of inflation on banks raises an important question: Are bank profits relatively more sensitive to higher inflation than those of other firms—both through the direct effect of higher inflation and the indirect macroeconomic effects associated with inflation? Because these theoretical channels work in different directions and over different time horizons, empirical analysis can shed light on how inflation affects bank profits, on net.

Our paper studies the effect of inflation on bank value by examining how bank stock prices move following the release of inflation data.[1] We find that higher inflation causes most stock prices to fall with large heterogeneity across industries, and strong evidence that higher inflation erodes bank profits relatively less than those of other firms. Moreover, we find that this divergence between banks and other firms widens during periods of high inflation. We find evidence that the key channel for the outperformance of bank stock prices is through higher-than-expected inflation causing the yield curve to shift upward. Higher interest rates in turn boost bank profits relative to other industries because of the incomplete pass-through of higher rates to bank deposit rates.

[1] The change in bank stock prices captures the net effect of the various channels through which inflation affects bank profits as well as the expected net effect over all future periods. An alternative approach would be to look at how quarterly bank profits change in response to inflation shocks; we leave this exercise for future research. We prefer our method of analyzing bank value through stock price changes because there's strong evidence that stock prices are a leading indicator for profitability (Campbell and Shiller 1988).

The main empirical challenge in identifying how inflation affects bank profits is that changes in inflation are partially expected and, hence, are already partially priced into bank stock prices. To overcome this challenge, we use a high-frequency event study; specifically, we estimate the relationship between bank stock price excess returns over a market benchmark and consumer price inflation (CPI) surprises in a narrow window around CPI releases. We construct CPI surprises by calculating the difference between the realized CPI print and the Bloomberg median expected headline CPI print. Because CPI data are released before the stock market opens, we calculate returns of bank stocks using the change in price between the previous night's close and the market opening on the day of the print.[2] Given the macroeconomic importance of inflation, the CPI release is widely tracked and forecasted. Moreover, the difference between realized and expected inflation can cause large changes in equity and bond prices because higher inflation will cause the redistribution of economic value from creditors to debtors, reduce economic purchasing power, and likely influence monetary policy. Our preferred measure is stock price *excess*—rather than *absolute*—returns because excess returns allow us to control for the average effect of inflation on U.S. firms, thereby facilitating the identification of the disproportionate effect of inflation on banks.

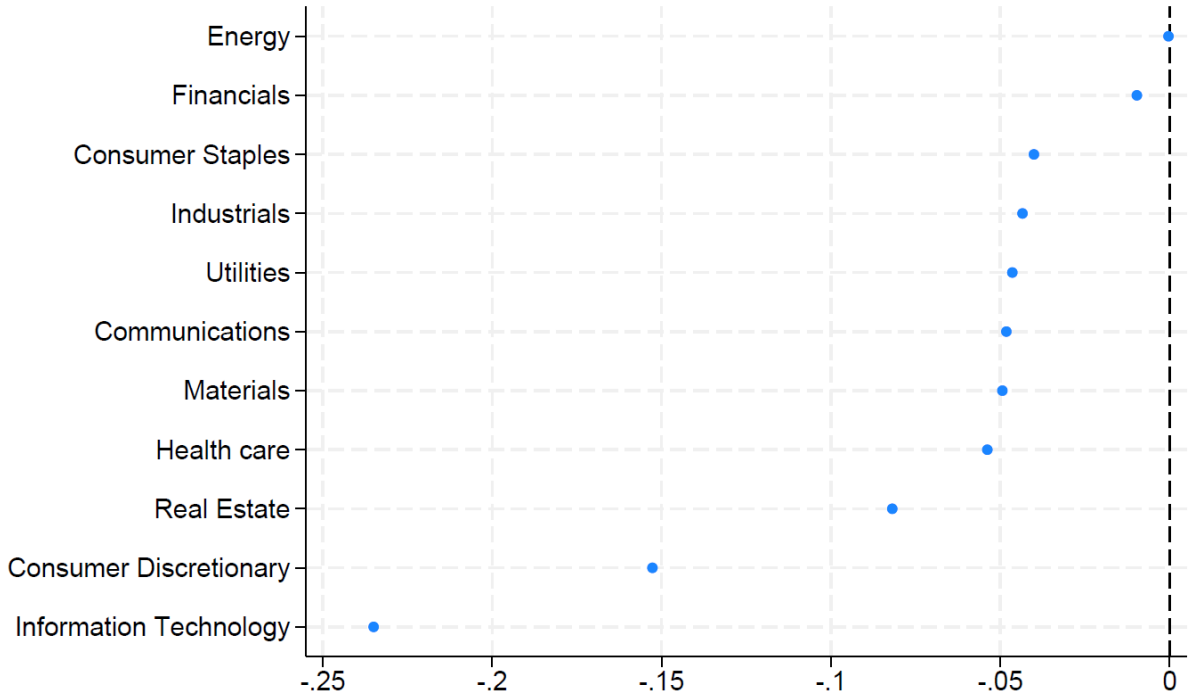
We further motivate our focus on banks' stock performance by comparing the performance of the 11 sectors in the S&P 500 around the inflation surprises in our data set. Figure 1 summarizes the results of this exercise by plotting the effect of a one percentage point CPI surprise on close-to-open stock returns. We find that positive CPI surprises are associated with negative returns for all 11 sectors—an unsurprising result given that higher inflation will likely lead to tighter monetary policy, and consequently, higher interest rates that will reduce the discounted value of future firm cash flows. At the same time, we find substantial dispersion across sectors, with financial firms outperforming all but one sector.[3] In the remainder of this paper, we carefully document the outperformance of a particular subset of financial firms, banks, and investigate the causes of this outperformance.

---

[2] The New York Stock Exchange opens at 9:30 a.m. and closes at 4:00 p.m. Therefore, to calculate the "close-to-open" bank stock excess return, we calculate the percentage change in each bank stock from market close (that is, 4:00 p.m.) the day before the CPI release date to market open (that is, 9:30 a.m.) the day of the CPI release date (so a time window of close to 17.5 hours) and subtract this number from the percentage change in the S&P 500 broad stock index over the same period.

[3] We conjecture that energy firms outperform all other firms because their profits are correlated with energy price shocks that push up headline CPI inflation, but we leave it to other researchers to explore this relationship.

*Figure 1: The effect of a 1 percentage point CPI surprise on close-to-open stock returns, by S&P 500 sector*




*This figure plots the estimated return for each S&P 500 industry index in a small window around CPI releases (from the close of the prior business day to the open of the next—the day of the CPI print). The figure shows that the returns for financial and energy firms are larger than those of other sectors. Results are for the period February 2003 to January 2023.*

Our analysis yields two key results. First, we estimate that a one standard deviation CPI surprise (corresponding to a realized CPI print 15 basis points higher than the Bloomberg consensus estimate) causes bank stock prices to outperform the broader stock market by 14.5 basis points.[4] Moreover, we find that this positive relationship is stronger during periods of high inflation.

Second, shedding light on *why* banks gain from higher inflation, we find strong evidence that banks gain from expectations of higher future inflation and hence higher interest rates. Specifically, we find that a CPI surprise of 100 basis points causes expectations of average CPI over the next five years to rise by 14 basis points. Consistent with higher inflation precipitating tighter monetary policy, the level of the U.S. Treasury yield curve also rises. A CPI surprise of 100 basis points is associated with the five-year U.S. Treasury bond yield rising by nearly 10 basis points. To provide additional evidence that the effect of higher inflation on bank stock prices is transmitted through a higher yield curve, we analyze differences in stock prices between

[4] For reference, over our sample period, the largest headline CPI surprise was 60 basis points.

investment and retail banks. Consistent with changes in future interest rates driving the outperformance of bank stocks, we find that investment banks (banks that derive the majority of their profits from capital market activities) outperform less than commercial banks (banks whose profits are driven more by maturity transformation) in response to higher-than-expected inflation. Finally, we show that banks that hold fewer trading assets and have larger deposit funding benefit most from inflation surprises, reinforcing the evidence that banks benefit through higher interest rates boosting their deposit franchise values.

Our paper is closely related to ongoing policy debates with little academic research. In an environment where global inflation is running at levels unseen in decades, our paper aims to understand a key potential financial stability concern: Does higher inflation significantly depress bank profits? To date, this question has received relatively little attention. Several papers (for example, Demirgüç-Kunt and Huizinga, 1999; Athanasoglu et al., 2008; De Jonghe and Oztekin, 2015) regress inflation on bank characteristics and find that higher inflation is associated with higher bank profits and faster capital adjustments. However, changes in inflation are often expected and correlated with other macroeconomic fundamentals, such as changes in employment, productivity, and output. Therefore, it is difficult to form a causal interpretation of the effect of inflation on banks from these papers. We overcome this challenge by estimating the effect of inflation on bank profits through inflation surprises. Therefore, this method avoids the issue that some of the changes in inflation are expected and, consequently, changes in stock prices may already be priced in. Moreover, by exploiting inflation surprises, we estimate both the direct effect of inflation (higher interest rates in the future) as well as the indirect effect of inflation (changes in the macroeconomic environment that are correlated with higher-than-expected inflation).

Our paper provides empirical support for the theoretical literature on the effects of unanticipated inflation on asset prices using new methods. Our empirical evidence is consistent with the theory of the "non-neutrality of inflation"—that is, inflation has real effects.[5] Non-neutrality of inflation, as initially formulated by Fama (1981), argues that higher unexpected inflation causes slower economic growth and lower corporate profits and therefore lower equity prices. Many other theories have proposed *how* inflation causes real effects: through the cost of external financing (Lintner, 1975); a higher effective tax rate on equity earnings (Feldstein, 1980); monetary policy (Geske and Roll, 1983; Kaul, 1987, 1990); and the revaluation of nominal debt contracts (Bernard, 1986).

[5] There are two key compelling theoretical arguments: "non-neutrality of inflation" and "money illusion." The theory of "money illusion," as described by Modigliani and Cohn (1979), postulates that investors' behavioral biases cause stock prices to underperform during periods of high inflation because investors discount real dividend flows using *nominal* discount rates.

Consistent with the theory of the non-neutrality of inflation, we show that inflation affects bank stock prices. Although higher inflation is generally detrimental to equity prices, we show that bank stock prices relatively outperform the broader stock market following unexpected inflation. Moreover, we find suggestive evidence that banks fare relatively better in response to unexpected inflation because higher inflation is associated with higher interest rates, which in turn have a positive effect on expected future net interest margins. Our finding that banks benefit from inflation is in line with the theoretical predictions of Bhamra et al. (2022). Bhamra et. al (2022) argue that higher inflation is least harmful to firms with greater leverage (banks are highly levered, with liabilities often 10 to 25 times larger than equity) and firms with less price stickiness (Neumark and Sharpe (1992) and Wang et al. (2022) show that U.S. banks have strong pricing power).

By presenting evidence that inflation surprises affect banks' stock prices because of the change in interest rates generated by those surprises, this paper also contributes to the literature on the effects of higher interest rates on banks. This literature finds that banks' stock prices fall following unexpected monetary policy tightening (English et al., 2018; Ampudia and Van den Heuvel, 2022) and that banks' stock price reaction is in line with that of the broader market (Drechler et al., 2021). In addition, previous work has shown that higher interest rates and bank value depends on institutional context (Drechsler et al. 2023) and the prior trajectory of monetary policy (Jiménez et al. 2023). We build on this literature in two ways. First, we focus on banks' relative, rather than absolute, stock returns, calculating the risk-adjusted return for banks. Second, while previous work has analyzed the relationship between bank stock prices and interest rates in a period in which banks were more tightly regulated (the 1970s) and during periods of low or moderate inflation (the 1990s through 2010s), we incorporate data from the more recent period of highly elevated inflation. We find that when inflation is high, banks outperform the broader market even as interest rates rise following positive inflation surprises. However, during periods of low and moderate inflation, we find no statistically significant overperformance of bank stocks in response to unexpected inflation. Thus, the relationship between interest rates and banks' stock prices varies not only with the level of rates (as show in Ampudia and Van den Heuvel (2022)) but also with the level of inflation.

Our empirical methodology is influenced by the large literature that has exploited unexpected financial and macroeconomic announcements to estimate causal relationships. This literature includes new economic policy announcements (for example, Hertzberg et al. (2011) and Choudhary and Jain (2015), who exploit changes in credit registry information cutoffs) and FOMC announcements (for example, Gertler and Karadi (2015) and Nakamura and Steinsson (2018) exploit Federal Reserve monetary policy announcements to assess the effects of nominal interest rate surprises on bank lending and profitability). Boyd et al. (2005) is the closest paper

methodologically to our study, but it focuses on the relationship between unemployment data releases and overall stock returns. Given that one half of the Federal Reserve's dual mandate is to pursue price stability, it is somewhat surprising there is little evidence on the effect of inflation surprises.

Section 2 describes our paper's research design, including the institutional setting, the compiled data sets, and the identification strategy. Section 3 presents the results, and section 4 provides concluding remarks.

# 2. Research design

Our empirical strategy for examining the effect of higher inflation on banks is relatively simple. We estimate the risk-adjusted return of bank stocks relative to the broader stock market within a small time window around CPI release dates. This section describes the institutional detail on CPI releases, outlines the data sets, and the identification strategy.

## Data

To examine the effect of inflation on bank stock prices, we compile four pieces of data: data on expected and realized CPI prints from Bloomberg and the Bureau of Labor Statistics, respectively; data on bank stock prices and bank industry classification from Bloomberg; and data on inflation expectations and U.S. Treasury yields from Federal Reserve Economic Data (FRED) and Bloomberg, respectively, as well as balance sheet and income statement data for bank holding companies from the FR Y-9C. The resulting panel data set stretches from February 2003 to January 2023.

The 20-year period that we study includes notable fluctuations in headline CPI, ranging from a low of -2.1 percent (August 2009) to a high of 9.1 percent (July 2022). Figure 1 plots headline CPI during this period and shows two intervals with elevated inflation, the first from around 2006 through 2008 and the second from 2021 onwards. This large variation in inflation is useful because it allows us to examine the effect of CPI surprises on bank stock prices at different levels of inflation.

*Figure 2: Headline CPI*

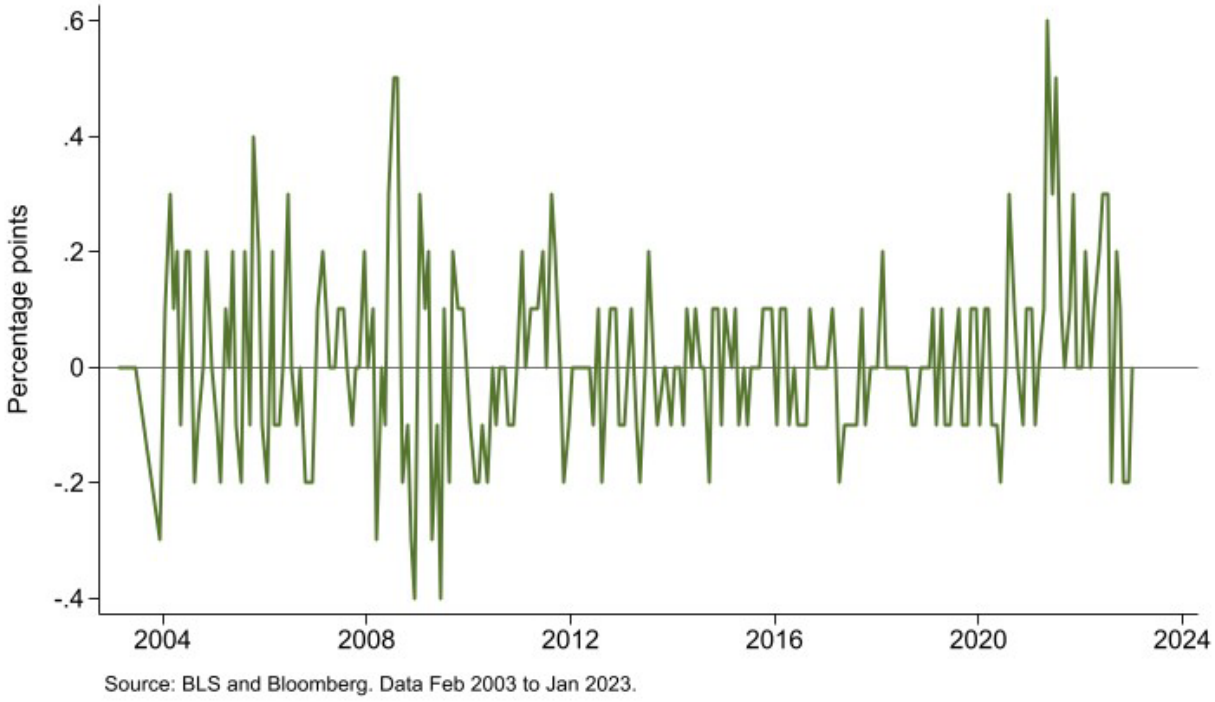

*This figure plots the time series of year-on-year headline CPI inflation over this study's sample period of 2003 to 2023.*

Typically, in the second week of each month at 8:30 a.m., the Bureau of Labor Statistics releases information on realized CPI for the prior month.[6] Given the macroeconomic importance of inflation, these data are widely tracked and forecasted. We calculate the CPI surprise as the difference between the realized headline CPI print and the expected CPI print. For CPI expectations, we use the Bloomberg median survey estimates, which are the median of all available survey estimates on Bloomberg for a given economic indicator. Our data have 232 distinct CPI surprises. Ideally, we would have collected more historical data on CPI surprises; however, data prior to 2003 is unavailable. Figure 3 shows that these CPI surprises have ranged from a low of -0.4 percentage points during the Global Financial Crisis to a high of 0.6 percentage points in 2021. Reassuringly for our econometric methodology, the CPI surprises exhibit no discernible trend over time, with surprises roughly symmetrically around zero (the median and mean CPI surprise are zero and 0.01 percentage points, respectively) and a smattering of large CPI surprises (both positive and negative) throughout the sample. Table A2 and figure A1 in the

[6] The schedule of releases is available at https://www.bls.gov/schedule/news_release/cpi.htm.

appendix, complement figure 3, by reporting more summary statistics and the distribution of CPI surprises.[7]

*Figure 3: CPI surprises*




*This figure plots the monthly time series of CPI surprises over the study's sample period (2003 to 2023). Surprises are calculated as the difference between each month's realized year-on-year headline CPI inflation and the median forecast for that release in the Bloomberg survey of forecasters.*

We collect daily opening and closing stock prices for the S&P 500, the 11 industry sector indexes for the S&P 500, and 121 banks. Our sample of banks consists of 100 U.S. Banks in the S&P Total Market Index as well as 21 non-U.S. global systemically important banks (G-SIBs) trading on the New York Stock Exchange (NYSE). To classify whether a bank is primarily an investment or retail bank, we collect the Global Industry Classification Standard (GICS) industry subcode from Bloomberg. We mark banks that are classified as "banks" as retail banks and banks that are classified as "capital market" as investment banks.

To estimate changes in inflation expectations and U.S. Treasury yields, we rely on data from FRED and Bloomberg. Specifically, we rely on daily percentage changes in five-year inflation

[7] In our baseline regressions, we restrict attention to headline CPI surprises, however, in the section "Robustness," we show that our results also hold for core CPI surprises.

expectations from FRED and the five-year U.S. Treasury yields from Bloomberg.[8] We use daily percentage changes (rather than intraday price changes) because of data availability. Summary statistics for macroeconomic variables are reported in table A2 in the appendix.

To estimate bank stock risk-adjusted returns, we calculate bank-specific alphas using the capital asset pricing model (CAPM) around CPI releases. To do so, we collect three pieces of data: individual bank returns, market returns (proxied by the S&P 500 stock index return), and daily risk-free returns (calculated using one-month U.S. Treasury bill yields).[9] As the CPI print is released prior to market open, we collect the close-to-open price changes for bank and market returns. Exploiting close-to-open changes allows us to capture the immediate market reaction to the macroeconomic surprises without including the rest of the day's activity that could conflate our results. The NYSE opens at 9:30 a.m. and closes at 4:00 p.m. Hence, to calculate the close-to-open bank stock return, we calculate the percentage change in each bank stock at market close (that is, 4:00 p.m.) the day before the CPI release date to market open (that is, 9:30 a.m.) the day of the CPI release date (that is, at 8:30 a.m.). Therefore, we calculate the change in equity prices in a time window of around 17.5 hours.

Using the bank, market, and risk-free rate returns, we calculate close-to-open *excess returns* as the difference between the bank (market) stock price "close-to-open" percent changes and the daily risk-free rate (calculated using the one-month Treasury bill rate).[10] Equation 1 (2) shows the specific calculation for bank (market) excess returns for bank $b$ around CPI releases on date $t$.

$$Bank\ excess\ return_{b,t} = \frac{bank\ open_{b,t} - bank\ close_{b,t-1}}{bank\ close_{b,t-1}} - Risk\ Free\ Rate_t \quad (1)$$

$$Market\ excess\ return_t = \frac{S\&P500\ open_d - S\&P500\ close_{t-1}}{S\&P500\ close_{t-1}} - Risk\ Free\ Rate_t \quad (2)$$

Using the excess returns, we compute betas for each bank with respect to the market using daily regressions over the prior 12 months. That is, we perform the following regression to collect $\hat{\beta}_{b,t}$ for each bank $b$ and date $t$, using data for the prior 12 months.

[8] Specifically, we use the 5-year breakeven inflation rate that represents the expected average inflation over the next five years that is derived from 5-Year Treasury Constant Maturity Securities and 5-Year Treasury Inflation-Indexed Constant Maturity Securities.

[9] We obtain daily risk-free returns from the Kenneth French Data Library.

[10] In equations (1) and (2), given that we are looking at one-day changes in stock and market returns, the inclusion of the risk-free rate over one day has a negligible effect, but we include the variable in our calculations for completeness.

$$Bank\ excess\ return_{b,t} = \beta_{b,t}\ Market\ excess\ return_t + \varepsilon_{b,t} \quad (3)$$

We then shrink the betas to between -2 and 4, per the latest econometric recommendations (Welch, 2019).[11] Together, our implementation closely follows the suggestions of Levi and Welch (2017) for predicting betas—daily regressions are more accurate than monthly regressions, and one-year horizons are better than longer. It is also important to shrink the betas to reduce outliers and measurement error.

Our final step is to calculate the bank-specific CAPM alpha for each day, which is calculated as the difference between the realized bank stock close-to-open excess return and the predicted excess return given the market excess return. That is, the bank CAPM alpha for bank $b$ and time $t$ is calculated using the following equation:

$$Bank\ CAPM\ alpha_{b,t} = Bank\ excess\ return_t - \hat{\beta}_{b,t}\ (Market\ excess\ return_t) \quad (4)$$

Summary statistics for bank-specific variables are reported in table A3 in the appendix.

### Identification strategy

We run a parsimonious event study to examine the effect of higher inflation on long-term bank profitability, estimating the following specification:

$$Bank\ CAPM\ alpha_{b,t} = \delta_0 + \boldsymbol{\delta_1}\ CPI\ suprise_t + \varepsilon_{b,t} \quad (5)$$

where $Bank\ CAPM\ alpha_{bt}$ is the bank stock risk-adjusted excess return for bank $b$ on date $t$ relative to the broader S&P 500 stock index, calculated in equation (4). $CPI\ surprise_t$ is the percentage point difference between the realized print and the median of all survey estimates for "U.S. consumer price inflation: Urban Consumers," and $\delta_0$ is a constant.

To identify the relative effect of unexpected higher inflation on banks using equation (2), we use the key assumption that the changes in bank stock prices relative to the broader stock market in the small time window around the CPI release date are solely due to the CPI surprise.

We cluster our standard errors for each date observation. Clustering at the date level is important because it is possible (and likely) that the error residuals in our regressions are correlated for each CPI surprise.

## 3. Results

Our key result is that higher-than-expected inflation is associated with the outperformance of bank stock prices relative to the broader stock index, especially during periods of high inflation.

[11] We apply this restriction to be in line with the latest financial econometric methods; however, it has no material effect on our results.

We find suggestive evidence that the channel for this outperformance of bank stock prices is through the higher-than-expected inflation causing interest rates to rise. Theoretically, this channel would be consistent with inflation-induced increases in interest rates boosting bank profits through larger net interest income due to the franchise value of deposits.

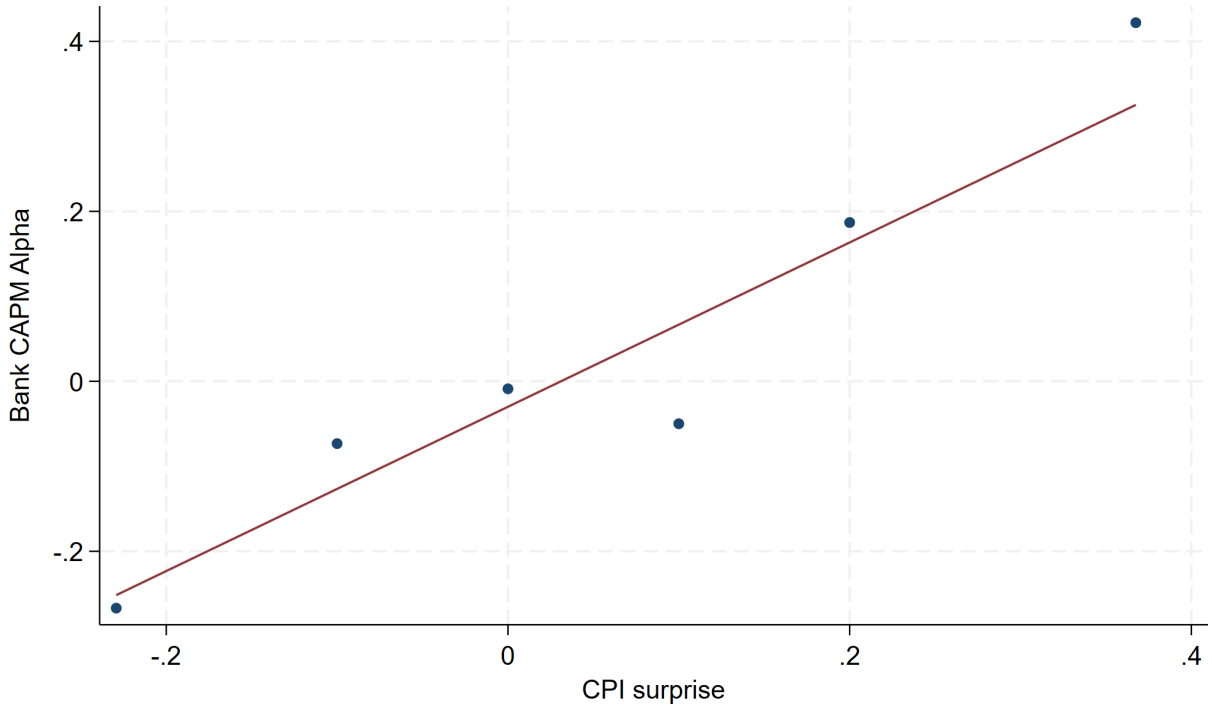
In this section, we first demonstrate a strong linear relationship between bank CAPM alphas and inflation surprises. Second, we present evidence that this relationship is primarily due to higher inflation causing expected future interest rates to rise, thereby boosting bank profitability from maturity and liquidity transformation. Third, we rule out potential alternative channels through which inflation surprises could cause bank stock return outperformance. Finally, we show that our results are robust to different measures of inflation and econometric specifications.

## Effect of consumer price surprises on bank stock prices

We find strong evidence that banks are positioned to benefit relatively from higher inflation relatively more than other firms. We begin our analysis with a simple visualization of how banks outperform the broader market on news of higher-than-expected inflation, and we then present regression results that quantify this relationship. To visually demonstrate the finding that banks outperform other firms in response to CPI surprises, figure 4 presents a "binned" scatterplot of bank CAPM alphas and CPI surprises.[12] A binned scatterplot is a convenient way of visualizing relationships when working with large datasets. The key result from figure 4 is the clear strong linear relationship between CPI surprises and bank CAPM alphas. This result demonstrates that higher-than-expected inflation is associated with bank stocks' risk-adjusted returns outperforming the broader market.

[12] To be precise, a binned scatterplot is a non-parametric method of plotting the conditional expectation function (which describes the average y-value for each x-value). To generate a binned scatterplot, we (i) group CPI surprises into equally sized bins (in this case, six bins for each period), (ii) compute the mean of the CPI surprises and bank stock price outperformances within each bin, and (iii) create a scatterplot of these data points.

*Figure 4: Performance of bank stock prices relative to the broader stock index in response to CPI surprises*




*This figure is a binned scatterplot of CPI surprises on average bank stock price outperformances, where we "bin" CPI surprises. A binned scatterplot is a convenient way of visualizing the relationship between CPI surprises and bank stock prices when working with large data sets. The figure shows that CPI surprises and bank stock price outperformance are positively correlated (there is a positively sloped line of best fit).*

In table 1, to identify more rigorously the relationship between CPI surprises and bank CAPM alphas, we regress bank CAPM alphas on CPI surprises. We present our estimate of equation 5 in column 1. This baseline coefficient estimate indicates that a one-standard deviation CPI surprise (that is, the realized CPI print was 15 basis point higher than the Bloomberg consensus estimate) causes bank risk-adjusted returns to outperform the broader stock market by 14.5 basis points.

Table 1: *Performance of bank stock price relative to the broader stock index in response to CPI surprises*

| | (1) CAPM Alpha | (2) CAPM Alpha | (3) CAPM Alpha |
|---|---|---|---|
| CPI Surprise | 0.97*** | 0.31 | 0.45 |
| | (0.32) | (0.45) | (0.32) |
| ... X E(CPI) | | 0.21* | |
| | | (0.11) | |
| ... X High E(CPI) | | | 1.10* |
| | | | (0.60) |
| E(CPI) | | -0.014 | |
| | | (0.019) | |
| High E(CPI) | | | -0.092 |
| | | | (0.097) |
| Observations | 23719 | 23719 | 23719 |
| Adjusted $R^2$ | 0.017 | 0.021 | 0.022 |
| SE clusters | Date | Date | Date |

*This table estimates the effect of CPI surprises on bank stock price outperformance. The first column shows results for the effect of a 1 percent CPI surprise on bank CAPM alphas. The second and third columns expand this regression by examining whether the effect of a CPI surprise on bank CAPM alphas is larger during periods of high inflation by interacting the CPI surprise with the level of expected inflation—column 2—and with a dummy for high expected inflation (in the top 25% of the historical distribution) in column 3. The key inference from this table is that CPI surprises cause bank stock price outperformance and that this effect is larger during periods of high inflation. Further details on the variable construction and sources are in table A1 in the appendix. Standard errors are clustered for each CPI surprise and are in parentheses.*

*$^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$*

Moreover, we find the effect of CPI surprises on the relative outperformance of banks is significantly larger during periods of high inflation. In column 2, by including the interaction of the level of expected CPI inflation with the CPI surprise (the variable "CPI surprise x E(CPI)), we find that the estimated effect on bank CAPM alphas is 21 basis points larger if the expected inflation is 1 percent higher. Put differently, moving from the median expected value of CPI inflation to the 75$^{th}$ percentile increases the effect of an inflation surprise on bank stock prices by around 30 percent. The coefficient on the expected level of CPI inflation is not statistically significant, confirming that its effects are priced in prior to the release of new data.

In column 3, we interact a high inflation dummy variable (equal to one if the level of expected CPI is in the top quartile of the historical distribution) with the CPI surprise. Consistent with the evidence in column 2, we find that the effect of a CPI surprise is much larger during periods of

high inflation. The result that the coefficient for "CPI surprise" is not statistically significant in column 3 shows that during periods of low and moderate-inflation (not in the top quartile of inflation), bank risk-adjusted returns are not statistically different from zero.[13]

## Why do higher-than-expected CPI prints cause bank stock prices to relatively outperform the broader market?

The previous section established that positive inflation surprises cause the relative outperformance of bank stock prices. This section provides evidence that this relative outperformance stems from higher net interest income from higher inflation-induced interest rates. First, we show that, similar to bank CAPM alphas, medium-term interest rates are highly sensitive to CPI surprises—especially when inflation is high. By contrast, the effect of CPI surprises on inflation expectations does not depend on the level of inflation. This finding suggests that banks are benefiting from the effect of CPI surprises through changes in future interest rates rather than the direct effect on inflation. Second, we examine which banks benefit the most from inflation surprises. Consistent with the key channel for bank outperformance being higher interest income and deposit franchise values, we find that retail banks outperform investment banks and that banks with more deposit funding outperform other banks.

We start by testing whether a higher-than-expected CPI print is associated with significant rises in long-term U.S. Treasury yields. To estimate the effect of CPI surprises on interest rates, we estimate the following specification, analogous to equation (2):

$$\Delta_t US\ Treasury\ 5\ yield_t = \delta_0 + \boldsymbol{\delta_{UST}} CPIsurprise_t + \epsilon_t \quad (6)$$

where $\Delta_t US\ Treasury\ 5\ yield_t$ is the daily percentage point change in the yield of a five-year U.S. Treasury bond. Therefore, $\boldsymbol{\delta_{UST}}$ captures the effect of CPI surprises on the level of medium-term interest rates.

Consistent with rises in inflation causing rises in nominal interest rates, we find that a CPI surprise of 100 basis points is associated with the five-year U.S. Treasury bond yield rising by nearly 10 basis points (table 2, column 1). Moreover, this effect is significantly more pronounced during periods of high inflation (columns 2 and 3). For instance, during periods of high expected inflation (in the top 25 percent of the historical distribution), we find that the effect of a 100 basis point CPI surprise on the five-year US Treasury yield is 15 basis points larger than when expected inflation is low.

---

[13] Our result that banks do not outperform other firms on positive CPI surprises during periods of low and moderate inflation is consistent with the results in Dreschler et al. (2021). Dreschler et al. find that banks do not outperform other firms for tighter monetary policy surprises during the years 1994 to 2007, a period characterized by generally benign inflation,

*Table 2: Changes in 5-year UST yields in response to CPI surprises*

| | (1)<br>5-year UST yield | (2)<br>5-year UST yield | (3)<br>5-year UST yield |
|---|---|---|---|
| CPI Surprise | 0.099*** | -0.020 | 0.029 |
| | (0.035) | (0.071) | (0.056) |
| ... X E(CPI) | | 0.041** | |
| | | (0.019) | |
| ... X High E(CPI) | | | 0.15** |
| | | | (0.076) |
| E(CPI) | | -0.0049 | |
| | | (0.0033) | |
| High E(CPI) | | | -0.012 |
| | | | (0.013) |
| Observations | 229 | 229 | 229 |
| Adjusted $R^2$ | 0.043 | 0.081 | 0.062 |
| Standard Errors | Robust | Robust | Robust |

*This table estimates the effect of CPI surprises on medium-term interest yields. The first column shows the regression results for the effect of a 1 percent CPI surprise on 5-year U.S. Treasury (UST) yields. The second and third columns expand this regression by examining whether the effect of a CPI surprise on interest rate yields is larger during periods of high inflation by interacting the CPI surprise with the level of expected inflation—column 2—and with a dummy for high expected inflation (in the top 25% of the historical distribution) in column 3. Further details on the variable construction and sources are in table A1 in the appendix. Robust standard errors are in parentheses.*

*$^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$*

The rise in nominal interest rates following CPI surprises could be due to higher expected inflation or higher expected real rates. We determine which channel is at work by running the following regression, again a modified version of equation (2):

$$\Delta_t Inflation\ expectation_t = \delta_0 + \boldsymbol{\delta_{\pi^e}} CPIsurprise_t + \epsilon_t \quad (7)$$

where $\Delta_t Inflation\ expectation_t$ is the daily percentage point change in expected average inflation rate for the next five years that is implied by the difference between nominal and inflation-adjusted Treasury yields, and $\boldsymbol{\delta_{\pi^e}}$ estimates the effect of CPI surprises on inflation expectations.[14]

Contrary to the strong effect of CPI surprises on bond yields, we find a more muted response for the effect of CPI surprises on inflation expectations. Specifically, we find that CPI surprises cause medium-term inflation expectations to rise (table 3), but we do not observe a statistically larger effect when inflation is high (table 3, columns 2 and 3). Given that we find significantly larger effects of CPI surprises on bank stock outperformance when inflation is high, the results in table 3 suggest that the channel for bank outperformance from CPI surprises is not through the direct effect of higher inflation but rather through the effect of CPI surprises on other aspects of the economy.

[14] Specifically, we use the "5-year breakeven inflation rate" which measures the expected average inflation rate over the next five years and is derived from 5-Year Treasury constant maturity securities and 5-Year Treasury inflation-indexed constant maturity securities.

*Table 3: Changes in 5-year inflation expectations in response to CPI surprises*

| | (1) 5-year Inflation Expectations | (2) 5-year Inflation Expectations | (3) 5-year Inflation Expectations |
|---|---|---|---|
| CPI Surprise | 0.14*** | 0.11* | 0.12** |
| | (0.036) | (0.065) | (0.059) |
| ... X E(CPI) | | 0.011 | |
| | | (0.014) | |
| ... X High E(CPI) | | | 0.060 |
| | | | (0.073) |
| E(CPI) | | -0.0052** | |
| | | (0.0022) | |
| High E(CPI) | | | -0.021** |
| | | | (0.010) |
| Observations | 225 | 225 | 225 |
| Adjusted $R^2$ | 0.133 | 0.155 | 0.152 |
| Standard Errors | Robust | Robust | Robust |

*This table estimates the effect of CPI surprises on medium-term inflation expectations. The first column shows results for the effect of a 1 percent CPI surprise on 5-year inflation expectations. The second and third columns expand this regression by examining whether the effect of a CPI surprise on inflation expectations is larger during periods of high inflation by interacting the CPI surprise with the level of expected inflation—column 2—and with a dummy for high expected inflation (in the top 25 percent of the historical distribution) in column 3. Further details on the variable construction and sources are in table A1 in the appendix. Robust standard errors are in parentheses.*

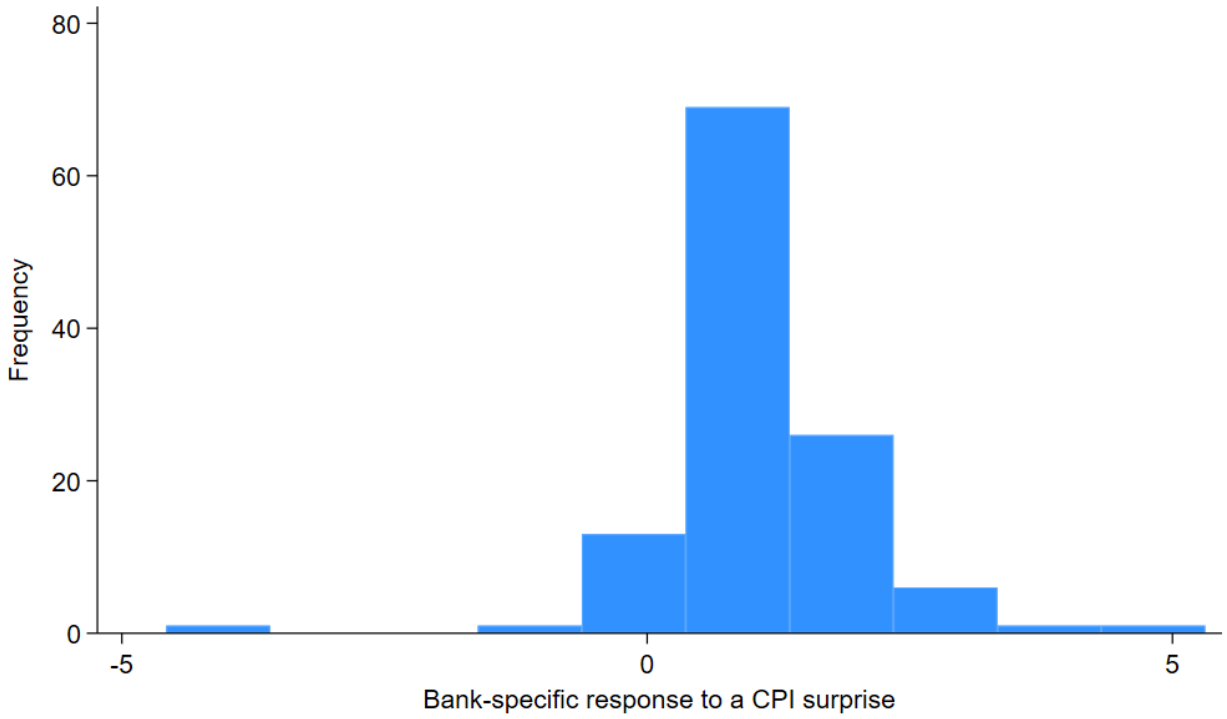
*$^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$*

To shed additional light the channels through which inflation affects bank value, we next examine heterogeneity in the responses of banks stock prices to inflation surprise. We begin by estimating equation (5) individually for each of the banks in our sample and plotting the distribution of bank-specific responses ($\delta_1$ in equation 5) in Figure 5. While the average bank outperforms on positive inflation surprises—some quite substantially—there are numerous banks that perform in line with the broader market (which reacts negatively) and three banks actually underperform.[15]

[15] While the negative values of left tail of the distribution does raise the possibility that the few banks that are relatively more adversely affected by inflation could pose systemic risks. We demonstrate below, in Table 5 and the accompanying discussion, that this is probably not the case.

Examining which bank characteristics are associated with better relative performance can help shed light on the drivers of that performance.

*Figure 5: Frequency distribution of Individual Bank Stocks' Responses to Inflation Surprises*




*This figure plots the frequency distribution of the coefficients on inflation surprises obtained when estimating equation (5) for each individual bank in the sample.*

First, we analyze differences in stock price changes between investment and retail banks. A priori, if changes in interest rates are generating bank outperformance, we would expect retail banks to outperform investment banks because retail banks' profits rely more on maturity transformation, whereas investment banks rely more on trading activities. Consistent with this prediction, we find that the investment banks' outperformance is smaller than that of retail banks on higher-than-expected inflation.[16] Specifically, in Table 4, column 1, the positive and statistically significant coefficient for the variable "CPI surprise x Retail bank" indicates that the outperformance of retail banks on CPI surprises is about 40 percent larger than that of investment banks.

We next explore whether the state dependence in banks' outperformance, with banks outperforming more when inflation is higher, holds for both retail and investment banks. Because

[16] To identify retail and investment banks in our sample, we rely on the GICs subindustry code. Specifically, we define investment banks as those labeled as "capital markets" (for example, Goldman Sachs) and retail banks as those that are labeled as "banks" (for example, Wells Fargo).

our statistical power is hampered by the limited number of investment banks in our sample, we separate our sample into retail banks (column 2) and investment banks (column 3) for this portion of the analysis. We find that retail banks statistically significantly outperform other firms more when inflation is higher whereas investment banks do not (the coefficients for the variable "CPI surprise x High E(CPI)" are statistically significant only for retail banks). To summarize, consistent with economic intuition, we find both that retail banks outperform investment banks for higher-than-expected inflation and that retail banks outperform other firms more when inflation is high.

*Table 4: Outperformance of bank stock prices: Retail versus investment banks*

| | (1) | (2) | (3) |
|---|---|---|---|
| | | CAPM Alpha | |
| CPI Surprise | 0.72** | 0.49 | 0.25 |
| | (0.33) | (0.32) | (0.36) |
| … x Retail bank | 0.29* | | |
| | (0.17) | | |
| … x High E(CPI) | | 1.13* | 0.98 |
| | | (0.61) | (0.68) |
| Retail bank | -0.020 | | |
| | (0.024) | | |
| High E(CPI) | | -0.095 | -0.074 |
| | | (0.097) | (0.13) |
| Observations | 23719 | 19719 | 4000 |
| Adjusted $R^2$ | 0.017 | 0.025 | 0.010 |
| SE clusters: | Date | Date | Date |
| Sample: | All banks | Retail banks | Investment banks |

*Standard errors are clustered for each CPI surprise and are in parentheses. This table regresses the effect of CPI surprises on bank CAPM alphas by bank type. Column 1 uses all banks, columns 2 restricts attention to retail banks, and column 3 restricts attention to only investment banks. Further details on the variable construction and sources are in table A1 in the appendix.*

*$^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$*

Our final exercise to verify that the outperformance of bank stock prices in response to higher-than-expected inflation is due to higher interest rates is to examine how different banks react to CPI surprises by combining bank characteristic data (using data for bank holding companies from the FRY9-C) with our stock price reaction and CPI surprise data. In table 5, in columns 1

through 8, we regress bank CAPM alphas on individual bank characteristics interacted with CPI surprises (as well as individual bank characteristics). Second, we regress bank CAPM alphas on the full set of bank characteristics interacted with CPI surprises for all time periods (column 9) and solely high-inflation periods (column 10).

We find that banks with shorter-dated liabilities (column 3) and banks with more debt securities (column 5) perform worse following positive CPI surprises. This evidence is consistent with banks' funding costs rising, and, as such, those banks that rely more on short-term funding have larger increases in costs. The latter result also likely reflects the fact that the value of banks' fixed-income securities fall as interest rates rise.

We also find that G-SIBs outperform other banks on positive CPI surprises (column 7), therefore suggesting that some banks may be benefiting from their large size or from too-big-to-fail concerns. For instance, these banks may benefit from large deposit inflows from smaller or regional banks, if concerns over potential valuation losses increase as interest rate rises (Chen et al. [2022] show empirical evidence for large uninsured deposit outflows following poor bank performance, especially for smaller banks). Importantly, this result suggests that the left tail of bank that are negatively affected by inflation surprises (visible in Figure 5) are unlikely to pose systemic risks to the wider banking system.

When we interact many bank characteristics with CPI surprises in a single regression, we see a distinct pattern (columns 9 and 10): Banks with more short-dated assets, fewer short-dated liabilities, and fewer debt securities outperform on higher-than-expected inflation. Moreover, when we restrict the sample to only periods of high inflation (column 10), the magnitude of the effects is larger but, not surprisingly, less precisely estimated. All told, our evidence is consistent with interest rates driving bank outperformance because we find that banks that are less exposed to interest rate risk benefit more from CPI surprises.

*Table 5: Relative outperformance of bank stock prices, by bank characteristic*

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
|---|---|---|---|---|---|---|---|---|---|---|
| | CAPM Alpha | | | | | | | | | |
| CPI Surprise | 0.51 | 0.85*** | 1.60*** | 0.97*** | 1.25*** | 1.01*** | 0.84*** | 0.72** | 0.35 | 0.64 |
| | (1.09) | (0.32) | (0.47) | (0.32) | (0.41) | (0.33) | (0.31) | (0.33) | (1.41) | (2.03) |
| ... x Deposits, fraction of liabilities | 0.61 | | | | | | | | 1.83 | 1.85 |
| | (1.33) | | | | | | | | (2.12) | (3.00) |
| ... x Earning assets, mature within year | | 0.34 | | | | | | | 0.61* | 0.97 |
| | | (0.35) | | | | | | | (0.35) | (0.60) |
| ... x Liabilities, mature within year | | | -2.90*** | | | | | | -3.33*** | -4.16*** |
| | | | (1.07) | | | | | | (1.00) | (1.55) |
| ... x Trading assets, share of assets | | | | 1.30 | | | | | -3.14 | -4.58 |
| | | | | (1.85) | | | | | (3.97) | (6.39) |
| ... x Securities, share of total assets | | | | | -1.21 | | | | -1.62* | -1.87 |
| | | | | | (0.83) | | | | (0.82) | (1.22) |
| ... x Net non-interest income, fraction of total assets | | | | | | -0.10 | | | -0.10 | 0.23 |
| | | | | | | (0.16) | | | (0.15) | (0.23) |
| ... x GSIB bank | | | | | | | 0.54* | | 1.32** | 1.58* |
| | | | | | | | (0.31) | | (0.52) | (0.91) |
| ... x Retail bank | | | | | | | | 0.29* | -0.16 | 0.036 |
| | | | | | | | | (0.17) | (0.33) | (0.51) |
| Observations | 15079 | 15079 | 15079 | 15079 | 15079 | 15079 | 23719 | 23719 | 15079 | 3644 |
| Adjusted $R^2$ | 0.027 | 0.026 | 0.034 | 0.026 | 0.026 | 0.026 | 0.018 | 0.017 | 0.040 | 0.084 |
| Sample | Full | Full | Full | Full | Full | Full | Full | Full | Full | High Inflation |
| Controls | Non-interacted variable included | | | | | | | | | |

*Standard errors are clustered for each CPI surprise and are in parentheses. For ease of exposition, the respective non-interacted bank characteristics are included in the regressions, but the coefficients are not reported. Further details on the variable construction and sources are in table A1 in the appendix. Columns 8 and 9 have more observations than the other columns because this regression includes non-U.S. G-SIBs. The final column shows results where we restrict the sample to only those CPI surprises during periods of high inflation.*

$^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$

## Other potential channels

This section examines alternative possible channels for why banks outperform the broader market on positive CPI surprises. We test whether the strength of the relationship between bank outperformance and CPI surprises varies with the state of the economy. In table 1, we showed that bank stocks outperform more on positive CPI surprises when inflation is high; here, we look for such nonlinearity with respect to other macro variables, with the results displayed in table 6. The results in columns 1 and 2 repeat the results from table 1 and are included for convenience.

We begin by interacting the CPI surprise variable with a dummy for the zero-lower-bound period (column 3), motivated by the finding in Ampudia and van den Heuvel (2019) that the relationship between monetary policy tightening and bank stock prices shifts when policy rates reach or fall below zero. We then analogously test whether the relationship changes when interest rates are high—specifically in the top quartile for five-year Treasury yields during our sample period (column 4). Next, we test whether the effect of inflation surprises on bank outperformance varies with the strength of economic growth (column 5). This regression allows us to discern whether the nonlinearity with respect to inflation is the result of banks outperforming more on positive inflation surprises when the economy is generally running hot. Relatedly, we test whether the strength of the relationship is different when the economy is in a recession (column 6). Finally, we interact the inflation surprise with the level of the VIX (column 7). It could be the case that bank stocks react more to inflation surprises when economic uncertainty is high, since there is a premium on additional information in such periods and high inflation tends to coincide with elevated uncertainty.

The key result from table 6 is that the only economic states where bank outperformance is significantly larger are those associated with high inflation (columns 1 and 2). Bank outperformance is not statistically significantly larger in economic states associated with low or high interest rates (columns 3 and 4), faster economic growth (columns 5 and 6), or uncertainty (column 7).

*Table 6: Outperformance of bank stock prices in different economic states*

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| | CAPM Alpha | | | | | | |
| CPI Surprise x E(CPI) | 0.21* | | | | | | |
| | (0.11) | | | | | | |
| CPI Surprise x High E(CPI) | | 1.10* | | | | | |
| | | (0.60) | | | | | |
| CPI Surprise x Zero-Lower-Bound | | | -0.26 | | | | |
| | | | (0.65) | | | | |
| CPI Surprise x High interest rate environment | | | | -0.35 | | | |
| | | | | (0.65) | | | |
| CPI Surprise X GDP growth | | | | | 0.049 | | |
| | | | | | (0.11) | | |
| CPI Surprise x Non-recession | | | | | | -0.10 | |
| | | | | | | (0.72) | |
| CPI surprise x VIX | | | | | | | 0.037 |
| | | | | | | | (0.032) |
| CPI Surprise | 0.31 | 0.45 | 1.09*** | 1.02*** | 0.77** | 1.04* | 0.10 |
| | (0.45) | (0.32) | (0.36) | (0.36) | (0.38) | (0.62) | (0.69) |
| Observations | 23719 | 23719 | 23719 | 23719 | 23376 | 23719 | 23719 |
| Adjusted $R^2$ | 0.021 | 0.022 | 0.017 | 0.018 | 0.016 | 0.017 | 0.020 |
| Controls | Non-interacted states | | | | | | |

*Standard errors are clustered for each CPI surprise and are in parentheses. In all the regressions, we also include a control for the economic state under consideration but do not report the coefficient for ease of exposition. For instance, in column 1, we include a control for the E(CPI). Further details on the variable construction and sources are in table A1 in the appendix.*

*$^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$*

## Robustness

In this section, we show the robustness of our results along three key dimensions: using alternative inflation definitions, excluding potential bank stock price change outliers, and a placebo regression using future CPI surprises.

First, we show that bank stock price outperformance is robust to alternative inflation definitions by examining core CPI surprises (that is, surprises to inflation excluding food and energy prices). The results in table 7 show that core inflation surprises are also associated with larger bank

CAPM alphas (column 1) and that these alphas are relatively larger when core inflation is higher (column 2). These coefficient estimates differ little from those in table 1.

*Table 7: Performance of bank stock price relative to the broader stock index in response to core CPI surprises*

| | (1) CAPM Alpha | (2) CAPM Alpha |
|---|---|---|
| Core CPI Surprise | 1.01** | -0.51 |
| | (0.41) | (0.80) |
| ... x Core E(CPI) | | 0.60** |
| | | (0.23) |
| Core E(CPI) | | -0.019 |
| | | (0.027) |
| Observations | 23634 | 23634 |
| Adjusted $R^2$ | 0.012 | 0.019 |
| SE clusters: | Date | Date |

*This table estimates the effect of core CPI surprises on bank stock price outperformance. The first column shows results for the effect of a 1 percent CPI surprise on bank CAPM alphas. The second expands this regression by examining whether the effect of a CPI surprise on bank CAPM alphas is larger during periods of high inflation by interacting the core CPI surprise with the level of expected core inflation. Further details on the variable construction and sources are in table A1 in the appendix. Standard errors are clustered for each CPI surprise and are in parentheses.*

** p < 0.10, ** p < 0.05, *** p < 0.01*

Second, we show that our result that bank stock prices outperform on inflation surprises is robust to excluding outlier observations of the bank CAPM alphas. Specifically, we winsorize the CAPM alpha values at the 5 percent level. The results of this exercise suggest that the relationship between bank stock outperformance and CPI surprises is stronger when expected inflation is higher (column 2). The coefficient on the interaction between the CPI surprise and the dummy for high inflation periods is no longer significant—presumably because the winsorizing procedure removes observations with large changes in bank outperformance, which tend to occur when inflation is high.

*Table 8: Performance of bank stock price relative to the broader stock index in response to CPI surprises: Removing outliers*

| | (1) CAPM Alpha | (2) CAPM Alpha | (3) CAPM Alpha |
|---|---|---|---|
| CPI Surprise | 0.48*** | 0.050 | 0.19 |
| | (0.18) | (0.28) | (0.22) |
| … x Expected E(CPI) | | 0.13* | |
| | | (0.080) | |
| … x High E(CPI) | | | 0.60 |
| | | | (0.38) |
| E(CPI) | | -0.00037 | |
| | | (0.014) | |
| High E(CPI) | | | -0.012 |
| | | | (0.066) |
| Observations | 21505 | 21505 | 21505 |
| Adjusted $R^2$ | 0.015 | 0.021 | 0.020 |
| SE clusters: | Date | Date | Date |

*To ensure the result that banks outperform on positive CPI surprises is robust to outliers, we winsorize the CAPM alpha values at the 5 percent level. Standard errors are clustered for each CPI surprise and are in parentheses.*

** p < 0.10, ** p < 0.05, *** p < 0.01*

Third, we show there is no mechanical relationship between bank CAPM alphas and CPI surprises by conducting a placebo regression. Specifically, we regress bank CAPM on *future* CPI surprises, that is currently unrealized CPI surprises. Since we use unrealized inflation surprises, we should observe no statistical relationship between CPI surprises and bank CAPM alphas. Consistent with this prediction, table A4 in the appendix shows (i) no significantly statistical relationship between these two measures, (ii) the coefficient for the regressor "CPI surprise" (and all interactions of "CPI surprises") to be close to zero, and (iii), amount of variation (adjusted R-squared) in bank CAPM alphas explained by the variable "CPI surprise" is zero.

# 4. Conclusion

This paper analyzes the effect of unexpected inflation on expected bank value. To do so, we use a high-frequency event-study empirical design to estimate the effect of consumer price surprises on bank stock price excess returns. We find that banks outperform the broader market when inflation is higher than expected and that their outperformance is particularly pronounced when the level of inflation is high. To explain this relationship, we provide suggestive evidence that the key driver is the effect of higher inflation on future expected interest rates, which boost expectations for future bank profitability through larger net interest margins.

Our findings indicate that, at least in the U.S. context, elevated inflation does not threaten financial stability by disproportionately damaging the health of banks. At the same time, our results on the drivers of banks' outperformance in the face of higher-than-expected inflation suggest that this implication rests heavily on the central bank having credibly committed to fighting inflation. In a context in which, unlike the U.S., positive inflation surprises are not accompanied by higher long-term interest rates, the relationship between bank stock returns and inflation could well be different. Moreover, others have shown that the relationship between higher interest rates and bank value depends on institutional context (Drechsler et al. 2023) and the prior trajectory of monetary policy (Jiménez et al. 2023). A logical area for further research is therefore a cross-country comparison of the relationship between banks' stock returns and inflation, incorporating time periods and economies in which central bank credibility or independence is less well established, as is the case in several important emerging markets.

# References

Ampudia, Miguel and Skander Van den Heuvel "Monetary Policy and Bank Equity Values in a Time of Low and Negative Interest Rates" Journal of Monetary Economics 130 (2022): 49-64.

Athanasoglou, Panayiotis P., Sophocles N. Brissimis, and Matthaios D. Delis. "Bank-specific, industry-specific and macroeconomic determinants of bank profitability." Journal of International Financial Markets, Institutions and Money 18.2 (2008): 121-136.

Bhamra, Harjoat S., et al. "High Inflation: Low Default Risk and Low Equity Valuations." The Review of Financial Studies. (2022)

Bernard, Victor L. "Unanticipated Inflation and the Value of the Firm." Journal of Financial Economics 15.3 (1986): 285-321.

Boyd, John H., Jian Hu, and Ravi Jagannathan. "The stock market's reaction to unemployment news: Why bad news is usually good for stocks." The Journal of Finance 60.2 (2005): 649-672.

Campbell, John Y., and Robert J. Shiller. "Stock prices, earnings, and expected dividends." the Journal of Finance 43, no. 3 (1988): 661-676.

Chen, Qi, Itay Goldstein, Zeqiong Huang, and Rahul Vashishtha. "Bank transparency and deposit flows." Journal of Financial Economics 146, no. 2 (2022): 475-501.

Choudhary, M. Ali, and Anil K. Jain. "How public information affects asymmetrically informed lenders: Evidence from a credit registry reform." Journal of Development Economics 143 (2020): 102407.

De Jonghe, Olivier, and Özde Öztekin. "Bank capital management: International evidence." Journal of Financial Intermediation 24.2 (2015): 154-177.

Drechsler, Itmar, Alexi Savov and Philipp Schnab. "Banking on Deposits: Maturity Transformation Without Interest Rate Risk." Journal of Finance, 76.3 (2021): 1091-1143.

Drechsler, Itmar, Alexi Savov and Philipp Schnab. "Credit Crunches and the Great Stagflation." Working paper (2023).

Demirgüç-Kunt, Ash, and Harry Huizinga. "Determinants of commercial bank interest margins and profitability: some international evidence." The World Bank Economic Review 13.2 (1999): 379-408.

Fama, Eugene F. "Stock returns, real activity, inflation, and money." The American Economic Review 71.4 (1981): 545-565.

Feldstein, Martin. "Inflation and the stock market." Inflation, tax rules, and capital formation. University of Chicago Press, 1983. 186-198.

Gertler, Mark, and Peter Karadi. "Monetary policy surprises, credit costs, and economic activity." American Economic Journal: Macroeconomics 7.1 (2015): 44-76.

Geske, Robert, and Richard Roll. "The fiscal and monetary linkage between stock returns and inflation." The Journal of Finance 38.1 (1983): 1-33.

Hertzberg, Andrew, Jose Maria Liberti, and Daniel Paravisini. "Public information and coordination: evidence from a credit registry expansion." The Journal of Finance 66.2 (2011): 379-412.

Kaul, Gautam. "Stock returns and inflation: The role of the monetary sector." Journal of Financial Economics 18.2 (1987): 253-276.

Kaul, Gautam. "Monetary regimes and the relation between stock returns and inflationary expectations." Journal of Financial and Quantitative Analysis 25.3 (1990): 307-321.

Konchitchki, Yaniv, and Jin Xie. Undisclosed Material Inflation Risk. Working paper, University of California Berkeley, 2022.

Levi, Yaron, and Ivo Welch. "Best practice for cost-of-capital estimates." Journal of Financial and Quantitative Analysis 52.2 (2017): 427-463.

Lintner, John. "Inflation and security returns." The Journal of Finance 30.2 (1975): 259-280.

Modigliani, F., and R. Cohn. 1979. “Inflation, Rational Valuation and the Market.” Financial Analysts Journal, vol. 35, no. 2 (1979).

Nakamura, Emi, and Jón Steinsson. "High-frequency identification of monetary non-neutrality: the information effect." The Quarterly Journal of Economics 133.3 (2018): 1283-1330.

Neumark, David, and Steven A. Sharpe. "Market structure and the nature of price rigidity: evidence from the market for consumer deposits." The Quarterly Journal of Economics 107.2 (1992): 657-680.

Savor, Pavel, and Mungo Wilson. "How much do investors care about macroeconomic risk? Evidence from scheduled economic announcements." Journal of Financial and Quantitative Analysis 48.2 (2013): 343-375.

Wang, Yifei, Toni M. Whited, Yufeng Wu, and Kairong Xiao. "Bank market power and monetary policy transmission: Evidence from a structural estimation." The Journal of Finance 77, no. 4 (2022): 2093-2141.

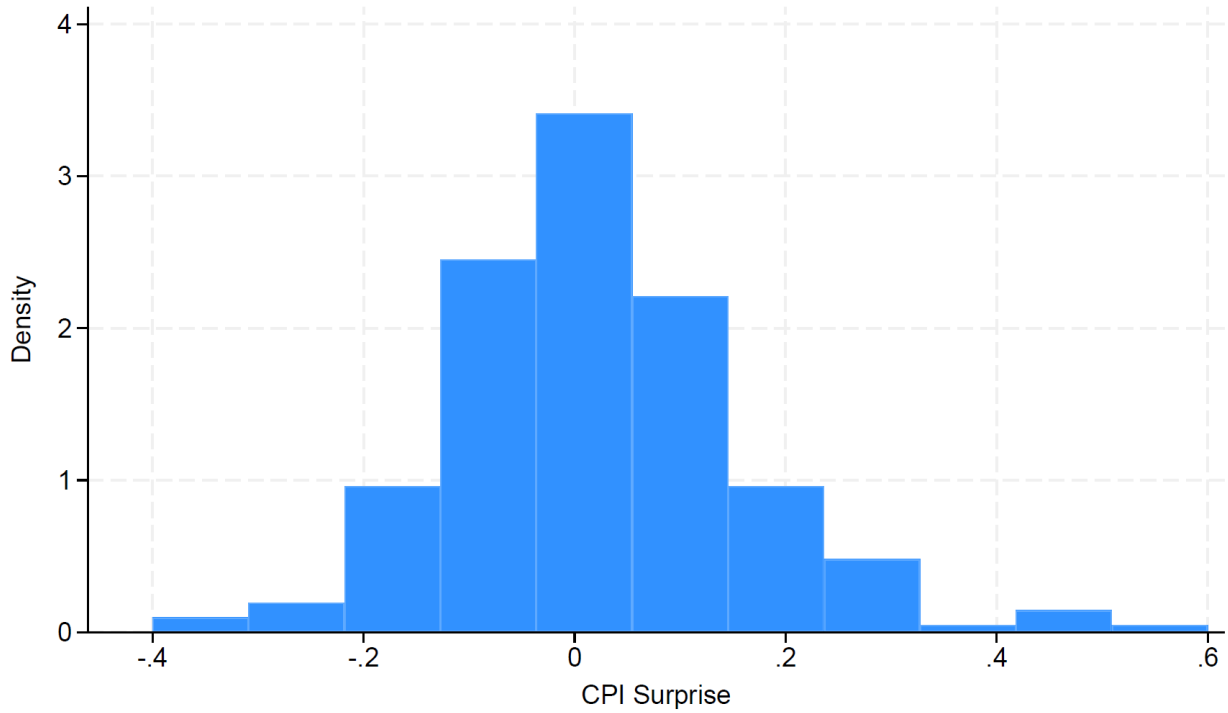
Welch, Ivo. Simpler better market betas. No. w26105. National Bureau of Economic Research, 2019.

# Appendix

*Table A1: Description of variables*

| Variable | Time Period | Description |
|---|---|---|
| CPI Surprise | Feb 2003 – Jan 2023 (Monthly) | The percent difference between the U.S. CPI Urban Consumers Data and the median of all survey estimates available for the indicator (Bloomberg Series: CPI YoY Index). |
| Bank CAPM alphas | Feb 2003 – Jan 2023 (Daily) | Calculated as discussed in Section 2 for the 100 banks listed in the S&P Total Market Index and the 21 non-US GSIBs that trade on the New York Stock exchange. |
| U.S. Treasury Yield | Feb 2003 – Jan 2023 (Daily) | Daily level change of the 5-year U.S. Treasury Yield. |
| Inflation Expectations | Feb 2003 – Jan 2023 (Daily) | Daily level change of the expected average inflation over the next 5 years (calculated using the FRED series T5YIE), which is derived from 5-Year Treasury constant maturity securities and 5-Year Treasury inflation-indexed constant maturity securities |
| GICS Industry | | The designated GICS subindustry of the banks in our sample. |
| VIX | Feb 2003 – Jan 2023 (Daily) | Percent change from close of previous trading day to open of the next business day for the Chicago Board Options Exchange's CBOE Volatility Index, a measure of the stock market's expectation of volatility based on S&P 500 index options (Bloomberg series: VIX Index). |
| Bank characteristics | 2003Q1 – 2023Q1 (Quarterly) | Measures of bank profitability, funding structure, bank model for bank holding companies (using FRY9C). |

*Figure A1: Histogram of CPI surprises*




*This histogram plots the distribution of CPI surprise between February 2003 and January 2023.*

*Table A2: Summary statistics for macroeconomic variables on CPI release dates*

| | Obs. | Median | Mean | Min | Max | Std. Dev. |
|---|---|---|---|---|---|---|
| CPI Surprise | 229 | 0.00 | 0.01 | -0.4 | 0.6 | 0.15 |
| Core CPI surprise | 228 | 0.00 | 0.00 | -0.3 | 0.7 | 0.12 |
| E(CPI) | 229 | 2.10 | 2.47 | -1.9 | 8.8 | 1.91 |
| Close-to-close change in 5-year UST yield | 229 | 0.00 | -0.01 | -0.4 | 0.2 | 0.07 |
| Close-to-close change in 5-year Inflation Expectations | 225 | 0.00 | -0.00 | -0.2 | 0.3 | 0.06 |
| Observations | 229 | | | | | |

*Summary statistics for macroeconomic variables on CPI release dates*

*Table A3: Summary statistics for bank-specific variables*

| | Obs. | Median | Mean | Min | Max | Std. Dev. |
|---|---|---|---|---|---|---|
| CAPM Alpha | 23,719 | -0.00 | -0.01 | -24.3 | 22.0 | 1.13 |
| **U.S. bank holding company statistics** | | | | | | |
| Share of earning assets that mature within a year | 15,871 | 0.44 | 0.44 | 0.0 | 1.0 | 0.17 |
| Share of liabilities that mature within a year | 15,871 | 0.14 | 0.19 | 0.0 | 0.9 | 0.16 |
| Deposits as a fraction of total liabilities | 15,871 | 0.86 | 0.82 | 0.0 | 1.0 | 0.14 |
| Trading assets as a fraction of total assets | 15,871 | 0.00 | 0.02 | 0.0 | 0.4 | 0.06 |
| Securities as a fraction of total assets | 15,871 | 0.18 | 0.20 | 0.0 | 0.8 | 0.11 |
| Net non-interest income as a fraction of total assets | 15,871 | 0.06 | 0.08 | -4.8 | 18.8 | 0.31 |
| Net interest margin | 15,871 | 0.02 | 0.02 | -0.0 | 0.2 | 0.01 |
| Total assets (natural logarithm) | 15,871 | 16.72 | 17.06 | 12.4 | 22.1 | 1.74 |

*Data for bank variables is collected from FRY9-C and therefore only available for the U.S. bank holding companies.*

*Table A4: Placebo regression: Performance of bank stock price relative to the broader stock index in response to CPI surprises* (5 business days earlier)

| | (1) CAPM Alpha | (2) CAPM Alpha | (3) CAPM Alpha |
|---|---|---|---|
| CPI Surprise | 0.16 | 0.24 | 0.32 |
| | (0.31) | (0.63) | (0.46) |
| ... x E(CPI) | | 0.0058 | |
| | | (0.16) | |
| ... x High E(CPI) | | | -0.11 |
| | | | (0.65) |
| E(CPI) | | -0.044* | |
| | | (0.026) | |
| High E(CPI) | | | -0.15 |
| | | | (0.12) |
| Observations | 23596 | 23596 | 23596 |
| Adjusted $R^2$ | 0.000 | 0.005 | 0.003 |
| SE clusters: | Date | Date | Date |

*This table estimates the effect of CPI surprises on bank stock price outperformance using* ***future—that is currently unobserved****—CPI surprises. Specifically, we test whether the CPI surprise five business days later has any correlation with bank outperformance today—for example, assume there was a 10-basis point CPI surprise on August 9, 2024, we regress a 10-basis point CPI surprise on the bank CAPM alpha for August 2, 2024. Reassuringly for our econometric methodology, we find the coefficient on "CPI surprises" (and all interactions of "CPI surprises") to be close to zero and not statistically significant across all the regressions. Moreover, the amount of variation (adjusted R-squared) in bank CAPM alphas explained by the variable "CPI surprise" is zero (column 1).*

*$^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$*