Working Paper | 566 Outubro de 2023

FGV | SAO PAULO SCHOOL OF ECONOMICS

Inflation Surprises Across Developed and Emerging Economies

André Sanchez Pacheco

FGV | SAO PAULO SCHOOL OF ECONOMICS

Escola de Economia de São Paulo da Fundação Getulio Vargas FGV-EESP

www.eesp.fgv.br

TEXTO PARA DISCUSSÃO 566 • OUTUBRO DE 2023 • 1

Inflation Surprises Across Developed and Emerging Economies

André Sanchez Pacheco*

São Paulo School of Economics - FGV

October 4, 2023

Abstract

I construct a novel data-set containing monthly inflation surprises for a set of developed and emerging economies. These data are used in a panel setting to analyze the relationship between inflation surprises and changes in short- and long-term interest rates as well as exchange rates on CPI release days. I find that a 1% upward surprise in monthly inflation is associated with (1) a +7.4bps daily change in the two-year benchmark interest rate; (2) a +5.1bps daily change in the ten-year rate and (3) an appreciation in the domestic exchange rate relative to the U.S. Dollar. Such sensitivities are heterogeneous across country groups. Interest rates in emerging economies are more sensitive to inflation surprises than those in developed markets. In contrast, exchange rates in emerging markets appear to be less sensitive to such surprises relative to developed counterparts.

Keywords: Inflation surprises, yield curve, interest rates, exchange rates.

JEL: F30, F31, E31, E43.

*Center for Investment Processes Studies (FGVInvest). E-mail: andre.pacheco@fgv.br. I thank Ignacio Crespo and Bruno Delalibera for their valuable comments. I thank Felipe Tavares for his research assistance. All errors are my own.

1 Introduction

Inflation accelerated sharply following the Covid-19 pandemic across both developed and emerging economies. Central banks and market participants have failed to correctly anticipate such surge in inflation. Lagarde (2023) acknowledges that the European Central Bank and other central banks have underestimated inflation and its persistence.

Recent research has focused on understanding these inflation surprises relative to economic agents' expectations. Chahad et al (2022) document that the ECB staff projections' inflation errors were largely associated to higher-than-expected energy prices. Koch and Noureldin (2023) show that core inflation forecast errors by the IMF during this period were related to a stronger-than-expected increase in demand as well as a shift from services to goods at the onset of the pandemic. This inflation surprise episode posed a challenge for policymakers to address. Developed and emerging economies' central banks had to respond by tightening monetary policy to curb high inflation.

This episode also underscored the need for further research on inflation surprises across countries over time. Relatively little is known about the contemporaneous relationship between inflation surprises across countries. Nevertheless, currently there is no unified data-set on inflation surprises for a large group of countries and over multiple years.

This paper addresses this gap by creating the first data-set on inflation surprises for a set of developed and emerging economies. This data-set is presented on a monthly frequency from January 2005 to May 2023. It contains data on inflation surprises for country $*$ month pairs relative to the median expectation of market analysts.

One stylized fact that emerges from these data is that the share of countries experiencing monthly upward surprises in inflation increased from 34% in October 2020 to a maximum of 81.1% in January 2022. Such share has since then moved down to 32.2% by the end of the sample. These changes coincide with the post-Covid acceleration in global inflation and subsequent deceleration in 2023.

This novel data-set is then used to study the empirical relationship between key financial variables and inflation surprises. In particular, I focus on the link between the daily changes of interest and exchange rates and inflation surprises on days in which CPI is released. The analysis is conducted on a panel setting, allowing for different effects between emerging and developed country groups.

I find that a 1% upward surprise in inflation is associated with (1) a +7.4bps (0.074%) daily increase in benchmark two-year yield; (2) a +5.1bps daily increase in the benchmark ten-year yield and (3) a -0.26% daily change in the domestic exchange rate expressed in U.S. dollars per domestic currency unit. Therefore, the domestic currency strengthens on days in which inflation surprises on the upside.

The first two results suggest that market participants expect the central bank to react

to such surprise by increasing the policy rate. The finding that long-end yields move up by a smaller amount than front-end yields is consistent with the view that such increase in the policy rate is perceived to be temporary in order to curb inflationary pressures.

Importantly, the empirical results show that the coefficient estimates vary for a group of emerging economies relative to a group of developed countries. For a given inflation surprise, the daily change in the two-year and ten-year interest rates are greater for emerging economies relative to developed economies. In particular, I find that a 1% upward surprise in inflation is associated with a +5.0bps change in the two-year rate for developed economies and a +9.8bps change for emerging economies.

In terms of the ten-year rate, a similar upward surprise is associated with a +3.5bps change in the ten-year rate for developed economies and a +6.7bps change for emerging economies. Following a same magnitude upward inflation surprise, these results indicate that yield curve in emerging economies flattens by a greater amount relative to developed economies. Such result is also found by separate regressions using the slope of the yield curve as dependent variable.

In contrast, the domestic exchange rate relative to the U.S. dollar appears to be less sensitive to inflation surprises in emerging economies relative to developed countries. I find that a 1% upward surprise in inflation is associated with a -0.43% change in the domestic exchange rate expressed in U.S. dollars per units of the domestic currency for developed economies. A similar inflation surprise is associated with a -0.09% change in the exchange rate for emerging economies. Following a similar upward inflation surprise, these results suggest that the exchange rate of developed economies appreciate by more than that of their emerging counterparts.

Taken together, the results presented in this paper indicate that inflation surprises are associated with changes in important financial variables such as interest rates and exchange rates. These changes are heterogeneous across country groups as emerging economies present different sensitivities relative to developed counterparts. This is the first paper to document such heterogeneous sensitivities to inflation surprises across country groups in a panel setting.

The remainder of the paper is structured as follows. Section 2 discusses the recent literature around inflation surprises and their relationship with financial variables. Section 3 describes how the novel data-set is constructed. Section 4 presents stylized facts using this new data. Section 5 presents the empirical analysis and results that emerge from panel data regression. Section 6 concludes.

2 Related Literature

This paper makes two contributions to the existing body of literature that explores the impact of inflation surprises on financial variables. The first contribution is to analyze such impact on a panel data setting including developed and emerging economies. The second one is to estimate heterogeneous sensitivities of inflation surprises on financial variables across these two groups.

One of the first papers in such literature is Smirlock (1986). It documents a positive relationship between long-term rates and unexpected inflation using U.S. data. Beechey and Wright (2009) focus on the changes in both U.S. nominal and real interest rates. They find positive and statistically significant coefficients in the regressions using nominal 5-Year and 10-Year interest rates as dependent variables. However, the coefficient estimates when using real rates (TIPS) are not statistically significant.

In addition to the interest rate sensitivities, several studies have focused on the reaction of stock market indices to inflation surprises. Knif et al. (2008) show that the U.S. stock market reaction to an inflation shock depends on the prevailing economic conditions. More recently, Gil de Rubio Cruz et al. (2023) shed light on the specific sensitivities of certain stocks following an inflation surprise. They find that firms with low net leverage, large market capitalization, a low book-to-market ratio, and high beta are particularly negatively impacted following an inflation surprise.

In terms of exchange rate movements, Andersen et al (2003) and Clarida and Waldman (2008) provide evidence that upward inflation surprises are associated with exchange rate appreciation focused on a sample of developed economies' exchange rates. Among emerging economies, Farrell et al (2012) document that the South African Rand tends to appreciate following upward inflation surprises in the country. Their paper uses a narrow time window around the CPI release to identify the exchange rate reaction.

Faust et al (2007) analyze the response of joint interest rates and exchange rate movements to inflation surprises in the United States over a long time horizon. Their paper focuses on the Euro and Great British Pound in terms of exchange rates and short and long-term yields in the U.S., U.K. and Germany. They find that upward U.S. inflation surprises are associated with an increase in rates and an appreciation of the U.S. dollar.

This paper also focuses on the sensitivity of interest rates and exchange rates to inflation surprises. However, it uses panel data including developed and emerging economies. It also allows for the identification of heterogeneous sensitivities across these two country groups.

3 Data

I construct a new panel data-set on inflation surprises using data from Bloomberg. The data-set includes information on a group of nineteen developed and emerging countries. These countries include Brazil, Canada, Chile, the Czech Republic, France, Germany, Hungary, Indonesia, Italy, Mexico, Norway, South Africa, South Korea, Spain, Sweden, Switzerland, Thailand, the United Kingdom and the United States. The data-set is presented on a monthly frequency. It starts in January 2005 and ends in May 2023.

Inflation is published on a monthly frequency in these countries[1]. For each country i and monthly release t, I use data on the monthly change in the consumer price index (CPI) and the median analyst expectation for that release from the Bloomberg survey to compute the inflation surprise. The data-set also includes the release date of such CPI report. The inflation surprise for country i relative to release month t ($InflationSurp_{i,t}$) is defined as the difference between the actual monthly inflation ($\Delta\%CPI_{i,t} = 100 * (\frac{CPI_{i,t}}{CPI_{i,t-1}} - 1)$) and the analysts' median expectation ($Median_{i,t}$).

$$InflationSurp_{i,t} = \Delta\%CPI_{i,t} - Median_{i,t} \tag{1}$$

Some countries, notably those in the Euro Area, publish a flash estimate CPI release around the end of each month. The statistical offices of these countries release a final report later over the next month. In such cases, we consider the first release only as the flash estimates are often confirmed upon the release of the final report.

The data-set also includes financial variables to allow the analysis of their reaction to inflation surprises. In particular, I download daily data on the two-year benchmark interest rate, ten-year benchmark interest rate as well as on the exchange rate expressed as U.S. Dollars per domestic currency. Other variables used in section 5 include the VIX index, the U.S. Dollar DXY Index as well as the U.S. two-year and ten-year benchmark interest rates. Table 1 shows the Bloomberg tickers used for each variable in the dataset.

For a given month t, countries report its monthly CPI report in different release dates D. In order to study the relationship between inflation surprises and financial variables, I focus on the daily change in such variables on the release date D. Consider a country i that releases on day D the monthly CPI report for month t. I compute the daily change in the two-year benchmark yields as:

$$\Delta y^2_{i,t} = y^2_{i,D} - y^2_{i,D-1} \tag{2}$$

[1]Mexico publishes its consumer price index (CPI) release twice per month. In this paper, I consider the monthly CPI index which is published together with the CPI for the second half of each month.

Where $y^2_{i,D}$ represents the two-year benchmark yield for country i at the closing of the release date D relative to monthly CPI report t. $y^2_{i,D-1}$ represents the two-year benchmark yield for country i at the closing of the trading day $D-1$ just before prior to date D.

For an example, the South African monthly CPI release for March 2023 was released on 19 April 2023. The change in its two-year benchmark interest rate for that month is calculated as the difference between the two-year yield on that day (8.236%) minus the two-year yield on the previous trading day, 18 April 2023 (8.110%). As such, the difference $\Delta y^2_{i,t}$ for South Africa in March 2023 is equal to $8.236\% - 8.110\% = 0.126\%$ or 12.6 basis points.

For the same country $*$ month pair, I also compute the daily change in the ten-year benchmark interest rate ($\Delta y^{10}_{i,t}$) using a similar procedure. Such change is determined as:

$$\Delta y^{10}_{i,t} = y^{10}_{i,D} - y^{10}_{i,D-1} \tag{3}$$

Where $y^{10}_{i,D}$ represents the ten-year benchmark interest rate for country i at the closing of the release date D relative to monthly CPI report t. $y^{10}_{i,D-1}$ represents the ten-year benchmark interest rate for country i at the closing of the trading day $D-1$ just before prior to date D.

The percent daily change in the exchange rate for a given same country $*$ month pair is defined as:

$$\Delta FX_{i,t} = 100 * (\frac{FX_{i,D}}{FX_{i,D-1}} - 1) \tag{4}$$

Where $FX_{i,D}$ represents the exchange rate expressed in U.S. Dollars per units of country i currency at the closing of the release date D relative to monthly CPI report t. $FX_{i,D-1}$ represents the exchange rate for country i at the closing of the trading day $D-1$ just before prior to date D.

In addition to these domestic variables, the data-set also includes daily changes in the U.S. two-year and ten-year interest rates, the VIX index as well as the percent daily change in U.S. Dollar DXY Index. These variables take specific values for each country $*$ month pair depending on the specific release date D for each country. For a given month m, these variables will take different values for different countries i and j if the release date of country i differs from the release date of country j. These variables are used in the empirical analysis given the co-movements between domestic and global financial variables.

Lastly, the data-set also includes a dummy variable that groups countries into an emerging economies group and a developed economies groups. Countries marked as emerging economies are: Brazil, Chile, the Czech Republic, Hungary, Indonesia, Mex-

ico, South Africa, South Korea and Thailand. In contrast, countries marked as developed economies are: Canada, France, Germany, Italy, Norway, Spain, Sweden, Switzerland the United Kingdom and the United States. Dummy variable EM_i is equal to one if a country is in the first group and zero if a country is in the second group.

4 Stylized Facts

Global price shocks can produce co-movements in inflation across different countries. However, relatively little is known regarding the co-movements in inflation surprises. A key stylized fact from this novel data-set is that the share of countries experiencing same-direction inflation surprises in the same month varies across time.

For a given country i and month t, variable $UpSurprise_{i,t}$ is equal to 1 if the monthly inflation is greater than the median expectation from the Bloomberg survey for that release. This variable is equal to zero in case the monthly inflation release is smaller or equal to the median expectation.

$$UpSurprise_{i,t} = \begin{cases} 1, \text{ if } InflationSurp_{i,t} > 0 \\ 0, \text{ if } InflationSurp_{i,t} \leq 0 \end{cases} \tag{5}$$

For a given month t, the share of countries experiencing upward surprises in inflation $UpShare_t$ is defined as the sum of countries reporting upward surprises in inflation for that month divided by the total number of countries reporting inflation on that month N.

$$UpShare_t = \frac{\sum_{i=1}^{N} UpSurprise_{i,t}}{N} \tag{6}$$

Figure 1 shows the share of countries experiencing upward surprises in inflation per month. The line shows the three-month moving average of $UpShare_t$. This figure reveals that the three-month moving average of share of countries reporting upward surprises in inflation increased from 34% in October 2020 to its highest value at 81.1% in January 2022. From March 2022 until the end of the sample in May 2023, the three-month moving average of the share of countries reporting upward surprises in inflation fell to 32.2%.

This increase in the share of countries experiencing upward surprises in inflation coincides with the post-Covid acceleration in global inflation. This stylized fact shows that the positive inflation surprises after Covid were not limited to a specific number of countries but were widespread across developed and emerging economies.

Figure 2 shows the median standard deviation of inflation surprises in a rolling twenty-four months window. After reaching its lowest levels in 2019, the standard deviation of

inflation surprises has increased during the post-Covid period. Such finding indicates that analysts' forecast errors have on average increased post-2019.

This figure also shows that there is no clear trend in the median standard deviation. If analysts became better at forecasting over time, one would expect a downward trend to appear as forecast errors become smaller. The lack of such trend suggests that this is not case. The increase in the standard deviation post-Covid could potentially be associated with a set of macroeconomic conditions forecasting models were not able to capture as well as historically has been the case. The unprecedented shock to global supply chains combined with the strong monetary and fiscal stimulus delivered in developed and emerging economies may have generated conditions different than the sample these models have been estimated in.

Table 2 shows the pairwise correlation in inflation surprises over the sample period. The correlation coefficients in pairs including Chile (CLP) are estimated from February 2019 due to limited data availability. Over the sample horizon, some pairs such as Germany and Sweden present a positive correlation coefficient which is perhaps unsurprising given the geographic and economic proximity of the two countries.

5 Empirical Analysis

An inflation surprise means that the inflation data for a given month was different than what economic agents were expecting. Such new information should trigger an update in their beliefs. Such updates should then also translate into changes in asset prices. In this section, I analyze the empirical relationship between inflation surprises and changes in interest rates and exchange rates.

5.1 Interest Rates

5.1.1 Two-Year Benchmark Rate

Interest rate rules such as the Taylor (1993) rule indicate that central banks should react to an increase in inflation by increasing the policy rate. If economic agents believe an increase in inflation will be met with tighter monetary policy, upward inflation surprises should be associated with increases in short-term market rates. These rates reflect the market expectations of future evolution of the policy rate. Therefore, the expectation of tighter monetary policy in the future as a result of an upward inflation surprise should drive short-term rates higher.

I evaluate the empirical relationship between inflation surprises and changes in short-term market rates in a panel setting. Let $\Delta i^{\tau}_{i,t}$ represent the daily change in the $\tau = 2, 10$

year benchmark interest rate for country i on the day inflation for country i and month t was released as defined in Equations 2 and 3. These variables are separately used as dependent variables in the specification below:

$$\Delta i^{\tau}_{i,t} = \alpha_i + \beta_1 * InfSurp_{i,t} + \beta_2 * EM_i * InfSurp_{i,t} + X_{i,t}\Gamma + \epsilon_{i,t} \tag{7}$$

Where $InfSurp_{i,t}$ represent the inflation surprise country i experienced in release month t as defined in Equation 1. EM_i is a dummy variable that is equal to one if the country is classified as an emerging economy or zero otherwise. $X_{i,t}$ is a vector containing a series of control variables including the daily change in the VIX index and in the U.S. two or ten-year benchmark interest rate respectively. α_i captures country-specific fixed effects.

Equation 7 is estimated in a sample of eighteen developed and emerging economies described in section 3 over the period between January 2005 and May 2023. Data for the United States are dropped from the sample as the change in its benchmark interest rate is used as a control variable given the role of U.S. monetary policy influencing financial variables elsewhere as documented by Miranda-Agrippino and Rey (2020).

Table 3 shows the regression results for the daily change in the two-year benchmark interest rate. It shows that the coefficient estimate associated with inflation surprises is positive and statistically significant at the 1% level across specifications. This is consistent with the notion that market participants expect the central bank to react to an upward surprise inflation by increasing the policy rate. Results shown in column (5) suggest that a 1% surprise in monthly inflation is associated with a 7.4bps = 0.074% increase in the two-year benchmark rate.

The Taylor principle (1993) indicates that the policy rate should be raised by more than 1% = 100bps for a 1% increase in inflation. Albeit positive, the coefficient estimates associated with inflation surprises are statistically smaller than 100. This apparent violation of the Taylor principle could in fact indicate that economic agents do not revise their inflation expectations one-to-one whenever there is an inflation surprise. It is possible that they perceive such surprise as being driven by a shock that will revert in future periods rather than a permanent shock that produces a parallel shift to their inflation forecast. The current data and setting does not allow one to assess whether this apparent violation of the Taylor principle is indeed due to a smaller than one-to-one revision in inflation expectations following an inflation surprise or not.

Columns (2), (4) and (6) in Table 3 present the regression results when equation 7 is estimated with an emerging economies dummy. These estimates indicate that inflation surprises are associated with bigger changes in the two-year rate in emerging economies relative to developed economies. Column (6) indicates that a 1% inflation surprise is

associated with a $\hat{\beta}_1 = 5.0$bps change in the two-year rate for developed economies and a $\hat{\beta}_1 + \hat{\beta}_2 = 9.8$bps change for emerging economies. Such heterogeneity indicates that economic agents expect emerging economies' monetary policymakers to respond more forcefully to a given inflation surprise than their developed economies' counterparts.

Romelli (2022) shows that developed economies central banks present a greater degree of independence relative to emerging economies. This stylized fact would

Lastly, the coefficient estimates associated with changes in the two-year U.S. benchmark interest rate is positive and statistically significant.

5.1.2 Ten-Year Benchmark Rate

Table 4 shows the regression results for the daily change in the ten-year benchmark interest rate. The coefficient estimate associated with inflation surprises are also positive and statistically significant across specifications. Results shown in column (5) suggest that a 1% surprise in monthly inflation is associated with a 5.1bps = 0.051% increase in the ten-year benchmark rate.

The estimates displayed in columns (2), (4) and (6) show that there is also heterogeneity in the coefficient estimate associated with inflation surprises between emerging and developed economies. As in the two-year regressions, the change in the ten-year benchmark rate is larger for emerging economies than for developed economies for a given inflation surprise. Following a 1% inflation surprise, the coefficient estimates shown in column (6) indicate that the ten-year rate increases by $\hat{\beta}_1 = 3.5$bps in developed economies. In contrast, the ten-year rate increases by $\hat{\beta}_1 + \hat{\beta}_2 = 6.7$bps.

This table also reveals that the coefficient estimates associated with inflation surprises are smaller in the ten-year interest rate regressions than in the two-year regressions. This finding is consistent with the notion that the monetary authority is expected to respond to higher inflation by temporarily raising the interest rate. For example, consider that economic agents believe higher inflation will be immediately met with a x% higher policy rate over a two-year period and would move back to its initial value after that. In this case, the two-year rate would be x% higher as well. However, the ten-year rate - which is an average of ten one-year rates - would move by less than x% as the one-year rates from periods three to ten would be left unchanged.

5.2 Slope of the Yield Curve

To properly assess the relationship between changes in the slope of the yield curve and inflation surprises, I estimate the following regression on the same sample of developed

and emerging economies:

$$\Delta i_{i,t}^{10} - \Delta i_{i,t}^{2} = \alpha_i + \beta_1 * InfSurp_{i,t} + \beta_2 * EM_i * InfSurp_{i,t} + X_{i,t}\Gamma + \epsilon_{i,t} \quad (8)$$

Where $\Delta i_{i,t}^{10} - \Delta i_{i,t}^{2}$ represents the daily change in the slope of the yield curve for country i when inflation for month t is published. The slope of the yield curve is measured as the difference between the ten-year benchmark interest rate and the two-year benchmark rate. The control variables include the change in the VIX index as well as in the change in the slope of the U.S. benchmark curve on that day.

Table 5 shows the regression results for equation 8. The coefficient estimates associated with inflation surprises is negative across specifications. This result indicates that upward surprises in inflation are associated with a flattening in yield curves. Such finding is consistent with the view that short-term rates are more sensitive to inflation surprises than long-term rates, which is an indication that agents expect a temporary policy response.

The estimates shown in columns (2), (4) and (6) of Table 5 indicate that the slope of the yield curve in emerging economies is more sensitive to inflation surprises than in developed economies. The results displayed in column (6) indicate that an 1% upward inflation surprise is associated with a $\hat{\beta}_1 = -1.5$bps change in the slope of the yield curve in developed economies. A similar surprise is associated with a $\hat{\beta}_1 + \hat{\beta}_2 = -1.5 - 1.6 = -3.1$bps.

Estimates shown in columns (3)-(6) reveal that changes in the slope of local yield curves is positively correlated with changes in the slope of the U.S. yield curve. This result underscores the importance of the slope of the U.S. yield curve to other countries' respective curves.

Overall, the flattening of the yield curves associated with upward inflation surprises are consistent with earlier research as in Faust et al (2007). These findings are consistent with the notion that economic agents expect the monetary authority to temporarily tighten monetary conditions in response to an unexpected increase in inflation.

5.3 Exchange Rates

Changes in interest rate differentials can produce changes in exchange rates. The previous subsections present evidence that upward surprises in inflation are associated with increases in domestic interest rates. Following an upward inflation surprise, it is possible that such increase widens the interest rate differential which could support an exchange rate appreciation.

Focusing on a set of developed economies, Clarida and Waldman (2008) show that upward inflation surprises are associated with an appreciation in the domestic nominal

exchange rate. They also present a theoretical framework that sheds light on the channels through which this happens. Among emerging economies, Farrell et al (2012) show that the South African Rand tends to appreciate versus the U.S. dollar immediately after an upward surprise in South Africa's inflation.

In this subsection, I investigate the empirical relationship between inflation surprises and changes in the domestic exchange rate. I proceed with the same panel data containing developed and emerging economies described in the in the previous subsection. This means that data for the United States are also removed from the sample as the exchange rates are all measured in terms of U.S. dollars.

$$\Delta FX_{i,t} = \alpha_i + \beta_1 * InfSurp_{i,t} + \beta_2 * EM_i * InfSurp_{i,t} + X_{i,t}\Gamma + \epsilon_{i,t} \tag{9}$$

Where $\Delta FX_{i,t}$ is the percent daily change in the U.S. dollar exchange rate expressed in terms of the domestic currency of country i on release date t. The control variables include the change in the VIX index as well as in the percent daily change in the DXY Dollar Index.

Table 6 shows the regression results for equation 9. The coefficient estimate associated with inflation surprises is negative and statistically significant across specifications. This result indicates that upward surprises in inflation are associated with appreciation of the domestic exchange rate relative to the U.S. Dollar. The estimates displayed in column (5) suggest that a 1% surprise in monthly inflation is associated with a -0.26% daily change in the domestic exchange rate. Such finding is consistent with Clarida and Waldman (2008) and Farrell et al (2012) which also show that the domestic exchange rate tends to appreciate following upward inflation surprises.

Estimates shown in columns (2), (4) and (6) reveal that such relationship is stronger for developed economies relative to emerging economies. The results shown in column (6) indicate that a +1% inflation surprise in a developed economy is associated with a $\hat{\beta}_1 = -0.43\%$ daily change in the USD-domestic currency exchange rate. Meanwhile, a +1% inflation surprise in an emerging economy is associated with a $\hat{\beta}_1 + \hat{\beta}_2 = -0.43\% + 0.34\% = -0.09\%$ change in the exchange rate. The smaller change in the exchange rate in emerging economies contrasts with the larger increase in the interest rate differential suggested in subsection 5.1.

6 Conclusion

This paper presents a novel data-set on monthly inflation surprises for a group of nineteen developed and emerging economies. Such data is used to analyze the association between

inflation surprises and important financial variables. The empirical analysis consists of estimating a set of panel regressions of the daily change in financial variables on CPI release dates as a function of inflation surprises on those dates and control variables.

I find a positive and statistically significant relationship between upward inflation surprises and increases in both short-term and long-term interest rates. In particular, I estimate that a +1% upward inflation surprise is associated with a +7.4bps increase in the two-year benchmark rate. However, such coefficient estimate is heterogeneous across country groups. The expected change in the two-year rate in emerging economies following a +1% surprise is estimated at +9.8bps. In contrast, the expected change in such rate in developed economies following a similar surprise is estimated at +5.1bps.

The coefficient estimates associated with inflation surprises are higher in the regressions using the two-year benchmark rate relative to the ten-year benchmark rate. These results indicate that economic agents expect the central bank to react to an upward inflation surprise by temporarily tightening monetary conditions. When analyzing the change in ten-year benchmark rates, a stronger response is also estimated for emerging economies relative to developed economies.

Consistent with these results, I find that upward inflation surprises are associated with decreases of the slope of the yield curve measured as the difference between the ten-year and two-year rates. Such finding also supports the notion that economic agents expect a temporary monetary policy tightening following an upward inflation surprise.

Lastly, I analyze the empirical relationship between changes in the domestic exchange rate on CPI release days. I find that upward inflation surprises are associated with appreciation of the domestic exchange rate relative to the U.S. Dollar. Such relationship is stronger among developed economies than among emerging economies.

These findings highlight that inflation surprises are associated with changes in important financial variables such as interest rates and exchange rates. These changes are heterogeneous across country groups as emerging economies present different sensitivities relative to developed counterparts.

References

[1] Andersen, T. G., Bollerslev, T., Diebold, F. X., & Vega, C. (2003). Micro Effects of Macro Announcements: Real-Time Price Discovery in Foreign Exchange. American Economic Review, 93(1), 38-62.

[2] Beechey, M., & Wright, J. (2009). The high-frequency impact of news on long-term yields and forward rates: Is it real? Journal of Monetary Economics, 56(4), 535-544.

[3] Chahad, M., Hofmann-Drahonsky, A.-C., Meunier, B., Page, A., & Tirpák, M. (2022). What explains recent errors in the inflation projections of Eurosystem and ECB staff? ECB Economic Bulletin, Issue 3/2022.

[4] Clarida, R. H., & Waldman, D. (2008). Is Bad News about Inflation Good News for the Exchange Rate? And, If So, Can That Tell Us Anything about the Conduct of Monetary Policy? In Asset Prices and Monetary Policy (pp. 371-396).

[5] Farrell, G., Hassan, S., & Viegi, N. (2012). The High-Frequency Response of the Rand-Dollar Rate to Inflation Surprises. South African Reserve Bank Working Paper, 12/03.

[6] Faust, J., Rogers, J. H., Wang, S.-Y. B., & Wright, J. H. (2007). The high-frequency response of exchange rates and interest rates to macroeconomic announcements. Journal of Monetary Economics, 54(4), 1051-1068.

[7] Gil de Rubio Cruz, A., Osambela, E., Palazzo, B., Palomino, F., & Suarez, G. (2023). Inflation Surprises and Equity Returns. Working Paper.

[8] Lagarde, C. (2023). Communication and monetary policy. Speech at the Distinguished Speakers Seminar, 04 September 2023.

[9] Miranda-Agrippino, S., & Rey, H. (2020). U.S. Monetary Policy and the Global Financial Cycle. The Review of Economic Studies, 87(6), 2754–2776.

[10] Romelli, D. (2022). The political economy of reforms in Central Bank design: evidence from a new dataset. Economic Policy, 37(112), 641-688.

[11] Koch, C., & Noureldin, D. (2023). How We Missed the Inflation Surge: An Anatomy of Post-2020 Inflation Forecast Errors. IMF Working Paper WP/23/102.

[12] Knif, J., Kolari, J., & Pynnönen, S. (2008). Stock market reaction to good and bad inflation news. Journal of Financial Research, 31(2), 141-166.

[13] Smirlock, M. (1986). Inflation Announcements and Financial Market Reaction: Evidence From the Long-Term Bond Market. The Review of Economics and Statistics, 68(2), 329-333.

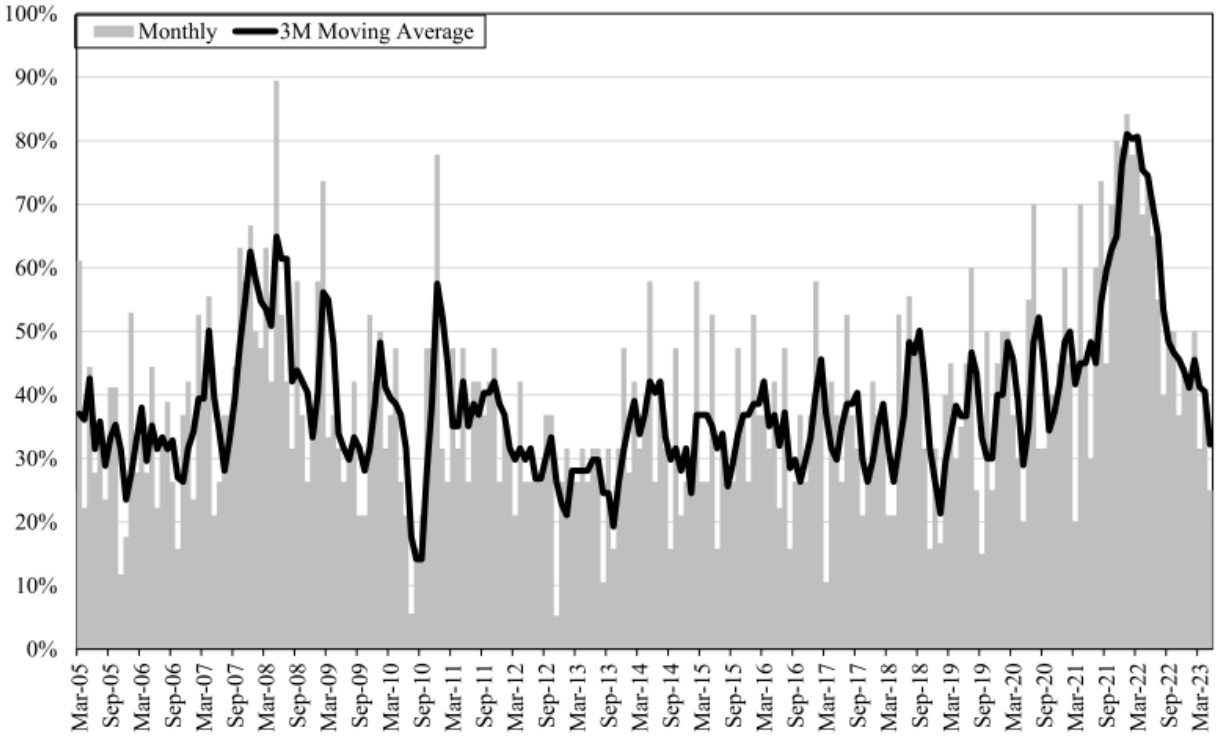
[14] Taylor, J. B. (1993). Discretion versus policy rules in practice. Carnegie-Rochester Conference Series on Public Policy, 93, 195-214.

Table 1: Country Codes and Benchmark Rates

Country	Code	Two-Year Benchmark Rate	Ten-Year Benchmark Rate
Brazil	BRL	BZAD2Y Index	BZAD10Y Index
Canada	CAD	GTCAD2YR Corp	GTCAD10YR Corp
Chile	CLP	CHSWP2 BGN Curncy	CHSWP10 BGN Curncy
Czech Republic	CZK	CKSW2 Curncy	CKSW10 Curncy
France	FRA	GTFRF2Y Govt	GTFRF10Y Govt
Germany	GER	GTDEM2Y Govt	GTDEM10Y Govt
Hungary	HUF	HFSW2 Curncy	HFSW10 Curncy
Indonesia	IDR	GTIDR2YR Corp	GTIDR10YR Corp
Italy	ITA	GTITL2Y Govt	GTITL10Y Govt
Mexico	MXN	MPSW2B BGN Curncy	MPSW10J BGN Curncy
Norway	NOK	NKSW2 BGN Curncy	NKSW10 BGN Curncy
South Africa	ZAR	SASW2 Curncy	SASW10 Curncy
South Korea	KRW	KWSWO2 BGN Curncy	KWSWO10 BGN Curncy
Spain	SPA	GTESP2Y Govt	GTESP10Y Govt
Sweden	SEK	SKSW2 BGN Curncy	SKSW10 BGN Curncy
Switzerland	CHF	GSWISS02 Index	GSWISS10 Index
Thailand	THB	GTTHB2YR Corp	GTTHB10YR Corp
United Kingdom	GBP	GTGBP2YR Corp	GTGBP10YR Corp
United States	USD	USGG2YR Index	USGG10YR Index

Note: This table shows Bloomberg tickers used to download data on the Two-Year and Ten-Year benchmark rates per country.

Figure 1: Share of countries experiencing upward surprises in inflation



Note: This figure shows the share of countries that have reported a positive inflation surprise in a given month. Inflation surprises are calculated as the difference between the monthly inflation print for a given country minus the median value from the Bloomberg survey for that release. A country has an upward surprise in inflation in a given month if such difference is greater than zero for that month. The grey bars report the share of countries experiencing upward inflation surprises relative to the total number of countries. The black line shows the three-month moving average of that share. Monthly data starts in January 2005 except for Chile whose data starts in February 2019.

Figure 2: Median Rolling Standard Deviation of Inflation Surprise - 24-Month Window

Note: This figure shows the median standard deviation of inflation surprises computed on a 24 months rolling window. Inflation surprises are calculated as the difference between the monthly inflation print for a given country minus the median value from the Bloomberg survey for that release.

Table 2: Monthly Inflation Surprise Correlation Matrix

	BRL	CAD	CHF	CZK	FRA	GBP	GER	HUF	IDR	ITA	KRW	MXN	NOK	SEK	SPA	THB	ZAR	CLP
BRL	1.00																	
CAD	0.01	1.00																
CHF	0.09	0.11	1.00															
CZK	-0.09	0.19	0.18	1.00														
FRA	-0.03	0.05	0.14	0.06	1.00													
GBP	-0.04	0.11	0.02	-0.03	0.09	1.00												
GER	0.15	0.08	0.13	0.10	0.14	0.12	1.00											
HUF	0.03	0.11	0.18	0.16	0.20	0.03	0.20	1.00										
IDR	0.01	0.00	-0.01	0.03	0.02	-0.04	-0.05	-0.02	1.00									
ITA	0.09	-0.04	0.21	-0.28	0.26	0.17	0.17	0.21	-0.18	1.00								
KRW	-0.04	0.15	0.20	0.10	0.09	0.15	0.13	0.06	0.11	-0.01	1.00							
MXN	-0.02	0.08	0.04	0.03	0.12	0.02	0.07	0.10	0.07	0.03	0.12	1.00						
NOK	0.03	-0.01	0.14	0.03	0.00	0.07	0.09	0.19	-0.05	0.08	0.05	0.03	1.00					
SEK	0.11	0.05	0.13	0.13	0.00	0.17	0.27	-0.11	-0.07	0.07	0.07	-0.01	0.04	1.00				
SPA	0.11	0.13	0.10	0.18	0.03	0.14	0.21	-0.02	0.09	-0.03	0.19	0.11	-0.15	0.17	1.00			
THB	0.00	0.16	0.25	0.13	0.05	0.07	0.15	0.14	0.20	0.11	0.20	0.06	-0.03	0.13	0.17	1.00		
ZAR	0.14	0.24	0.09	0.04	0.05	0.11	0.05	0.13	0.04	0.06	0.17	-0.02	0.00	0.13	0.04	0.20	1.00	
CLP	0.07	0.39	0.12	0.39	0.11	-0.12	0.27	0.08	0.16	-0.21	0.09	0.23	-0.11	0.00	0.40	0.09	0.17	1.00

Note: This table shows the pairwise correlation in monthly inflation surprises across different countries in the data-set. Inflation surprises are calculated as the difference between the monthly inflation print for a given country minus the median value from the Bloomberg survey for that release. Monthly data starts in January 2005 except for Chile whose data starts in February 2019.

Table 3: Regression Results of the change in the local Two-Year rates on CPI release days

	(1)	(2)	(3)	(4)	(5)	(6)
Inflation Surp.	7.469***	4.971***	7.383***	4.983***	7.377***	4.966***
	(0.543)	(0.754)	(0.540)	(0.750)	(0.540)	(0.750)
InfSurp. $*$ EM		4.979***		4.786***		4.807***
		(1.046)		(1.041)		(1.041)
Δ US^{2y}			15.106***	14.781***	15.663***	15.398***
			(2.408)	(2.379)	(2.473)	(2.467)
Δ VIX					0.060	0.066
					(0.071)	(0.070)
Country F.E.	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.05	0.06	0.06	0.07	0.06	0.07
Obs.	3736	3736	3736	3736	3736	3736

Note: $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$

Note: This table shows the regression results of the change in the local two-Year interest rate on days in which the local CPI is released. This variable is expressed in basis points (10 Bps = 0.10%). The independent variables are the inflation surprise on the day of the release, its interaction with a dummy variable on whether the country is categorized as an emerging economy, the change in the U.S. two-Year interest rate on the release day and the change in the VIX index on the release day. As such, an x coefficient estimate associated with inflation surprise indicates that a 1% surprise in monthly inflation is associated with an x basis points change in local rates (0.0x%). The panel includes monthly data for a group of 18 developed and emerging economies from January 2005 until May 2023. Data for the United States is removed from the sample as its two-year interest rate is used as a control variable.

Table 4: Regression Results of the change in the local Ten-Year rates on CPI release days

	(1)	(2)	(3)	(4)	(5)	(6)
Inflation Surp.	5.240***	3.505***	5.079***	3.479***	5.066***	3.448***
	(0.510)	(0.709)	(0.501)	(0.696)	(0.501)	(0.696)
InfSurp. $*$ EM		3.463***		3.196***		3.230***
		(0.984)		(0.967)		(0.967)
Δ US^{10y}			21.880***	21.727***	22.882***	22.771***
			(1.911)	(1.909)	(2.011)	(2.008)
Δ VIX					0.107	0.111*
					(0.067)	(0.067)
Country F.E.	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.03	0.03	0.07	0.07	0.07	0.07
Obs.	3680	3680	3680	3680	3680	3680

Note: $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$

Note: This table shows the regression results of the change in the local ten-Year interest rate on days in which the local CPI is released. This variable is expressed in basis points (10 Bps = 0.10%). The independent variables are the inflation surprise on the day of the release, its interaction with a dummy variable on whether the country is categorized as an emerging economy, the change in the U.S. ten-Year interest rate on the release day and the change in the VIX index on the release day. As such, an x coefficient estimate associated with inflation surprise indicates that a 1% surprise in monthly inflation is associated with an x basis points change in local rates (0.0x%). The panel includes monthly data for a group of 18 developed and emerging economies from January 2005 until May 2023. Data for the United States is removed from the sample as its ten-year interest rate is used as a control variable.

Table 5: Regression Results of change in the slope of the Yield Curve on CPI release days

	(1)	(2)	(3)	(4)	(5)	(6)
Inflation Surp.	-2.269***	-1.463**	-2.301***	-1.501***	-2.303***	-1.509***
	(0.413)	(0.575)	(0.411)	(0.572)	(0.411)	(0.572)
InfSurp. $*$ EM		-1.608**		-1.596**		-1.584**
		(0.799)		(0.794)		(0.794)
Δ US^{2y10y}			15.789***	15.777***	15.972***	15.943***
			(2.323)	(2.322)	(2.345)	(2.344)
Δ VIX					0.030	0.027
					(0.052)	(0.052)
Country F.E.	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.01	0.01	0.02	0.02	0.02	0.02
Obs.	3680	3680	3680	3680	3680	3680

Note: $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$

Note: This table shows the regression results of the change in the slope of the yield curve on days in which the local CPI is released. This variable calculated as the change in the difference between the local Ten-Year and Two-Year rates. It is expressed in basis points (10 Bps = 0.10%). The independent variables are the inflation surprise on the day of the release, its interaction with a dummy variable on whether the country is categorized as an emerging economy, the change in the slope of the U.S. yield curve on the release day and the change in the VIX index on the release day. As such, an x coefficient estimate associated with inflation surprise indicates that a 1% surprise in monthly inflation is associated with an x basis points change in the slope of the yield curve (0.0x%). The panel includes monthly data for a group of 18 developed and emerging economies from January 2005 until May 2023. Data for the United States is removed from the sample as its two-year interest rate is used as a control variable.

Table 6: Regression Results of change in the exchange rate on CPI release days

	(1)	(2)	(3)	(4)	(5)	(6)
Inflation Surp.	-0.247***	-0.458***	-0.254***	-0.404***	-0.258***	-0.428***
	(0.059)	(0.082)	(0.050)	(0.069)	(0.048)	(0.067)
InfSurp. $*$ EM		0.421***		0.298***		0.338***
		(0.113)		(0.096)		(0.093)
Δ USD DXY			0.855***	0.853***	0.823***	0.820***
			(0.023)	(0.023)	(0.022)	(0.022)
Δ VIX					0.083	0.083
					(0.006)	(0.006)
Country F.E.	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.01	0.01	0.29	0.29	0.32	0.33
Obs.	3736	3736	3736	3736	3736	3736

Note: $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$

Note: This table shows the regression results of the change in exchange rate on days in which the local CPI is released. This variable is calculated as the percent change in the local currency exchange rate per dollar. A positive percent change represents an exchange rate depreciation. The independent variables are the inflation surprise on the day of the release, its interaction with a dummy variable on whether the country is categorized as an emerging economy, the percent change in the U.S. DXY Dollar Spot Index on the release day and the change in the VIX index on the release day. As such, an x coefficient estimate associated with inflation surprise indicates that a 1% surprise in monthly inflation is associated with a X% change in the domestic exchange rate. The panel includes monthly data for a group of 18 developed and emerging economies from January 2005 until May 2023. Data for the United States is removed from the sample as its two-year interest rate is used as a control variable.