Energy Economics 133 (2024) 107474

Contents lists available at ScienceDirect

Energy Economics

journal homepage: www.elsevier.com/locate/eneeco

Managing inflation expectations and the efficiency of monetary policy responses to energy crises

Umer Shahzad [a], Bianca Orsi [b,*], Gagan Deep Sharma [c,d]

[a] School of Economics, Guangdong University of Finance & Economics, Guangzhou, 510320, PR China
[b] Department of Economics, Leeds University Business School, University of Leeds, LS2 9JT Leeds, United Kingdom
[c] University School of Management Studies, Guru Gobind Singh Indraprastha University, New Delhi, India
[d] Lebanese American University, Beirut, Lebanon

ARTICLE INFO

JEL classification:
E24
E31
E43
E52
D84

Keywords:
Energy shocks
Inflation expectations
Monetary policy
Explicit inflation targeting regime
Exchange rate

ABSTRACT

While ascertaining low and stable inflation expectations is a significant challenge across developed and emerging economies, energy shocks are central to this endeavor. Therefore, this study's prime objective is to investigate the role of energy shocks, monetary policy, and fiscal policy in managing inflation expectations in the context of the Federal Reserve's inflation targeting regime, adopted in 2012. We analyze monthly data on the United States from 1994 to 2022. Using the linear Autoregressive Distributed Lag (ARDL) and the Quantile ARDL (QARDL) estimators, we analyze and compare three different samples: full period, pre-inflation targeting regime (1994 to 2012), and post-inflation targeting regime (2012 to 2022). The conclusions suggest that inflation, energy shocks, and money supply have significant implications for inflation expectations in most quantiles during pre- and post-inflation targeting regimes. Policy implications for research and practice are also discussed.

1. Introduction

In the aftermath of the global financial crisis (GFC) in 2008, many economies have generally experienced low inflation. This decade of price stability, combined with an era of extremely low interest rates (or close to the "zero bound"), sparked research interests in inflation expectations, which was once again at the center of macroeconomic policy discussions. But the situation was reversed in February 2022, when fueled by the conflict between Russia and Ukraine, the oil price skyrocketed in response to the unstable geopolitical scenario. Governments throughout the world had to exert maximum effort to curb inflation. Yet, we still do not know the current energy crisis's impact on inflation expectations.

Economists have widely discussed the economic determinants of inflation for many decades. Consistent with the requirement for clear and predictable monetary policies (Rajan, 2015), both academics and practitioners have long debated the efficiency of the inflation targeting regime (ITR) in facilitating the transmission of policymakers' intentions to the market and the subsequent impact on inflation expectations (Nasir et al., 2020a, 2020b, 2020c). Since mid-2020, oil and gasoline prices have steadily risen, giving momentum to concerns about persistently high inflation expectations and the emergence of a wage-price spiral (Kilian and Zhou, 2022).

In response to the recent energy shock, the central bank of the United States, known as the Federal Reserve (Fed), has decided to use its main policy tool – interest rate – in its quest for controlling inflation. In traditional economic theory, monetary policy[1] plays a central role in controlling inflation expectations. Central banks often increase the interest rate to signal their commitment to the inflation target to avoid the risk of de-anchoring inflation expectations when inflation remains at high levels. The overall effect of inflation expectations may be ambiguous, as it mostly depends on the central bank's credibility.

While maintaining low and steady inflation has long been a monetary policy objective, it was not until January 2012 that the Fed officially adopted an explicit ITR. Implementing a clear target for inflation should help anchor inflation expectations and increase price stability through

* Corresponding author.
E-mail address: B.Orsi@leeds.ac.uk (B. Orsi).

[1] Although traditional economic theory emphasizes the critical role of monetary policy in controlling inflation, some economists (e.g., Weber and Wasner, 2023; Wildauer et al., 2023) advocate for fiscal policy, such as windfall profit taxes or price control mechanisms to prevent inflation.

https://doi.org/10.1016/j.eneco.2024.107474
Received 2 January 2023; Received in revised form 5 March 2024; Accepted 13 March 2024
Available online 19 March 2024

clearer communication of the central bank's policy goals. The academic and policy scholarship is responsible for assessing whether or not this monetary policy decision has successfully contained inflation expectations despite the energy shocks. Although monetary policy is most efficient in the control of demand-pull inflation, the economic and political hegemony of the United States gives it a greater policy space to tackle cost-push inflation caused by such energy shocks.

The "exorbitant privilege" of the US that arises from issuing the world's reserve currency creates a robust demand for the US dollar (or US dollar-denominated assets) even during economic distress, as observed during the global financial crisis of 2008. As a result of their privileged position in the international monetary system, contractionary monetary policies adopted by the Fed often result in a large inflow of capital toward the US – the "policy makers" – while most countries around the globe must deal with depreciation pressures on their exchange rates – the "policy takers" (Ocampo, 2001).

While substantial work has explored the factors that influence inflation, the discussion of inflation expectation is less explored. Inflation expectations are largely driven by past and current inflation; thus, the determinants of the latter overlap with those of the former (Armantier et al., 2016). This field generally discusses five main factors that influence inflation expectations – money supply, economic growth, fiscal stance, unemployment, and exchange rate, though empirical findings vary in different countries (e.g., Cerisola and Gelos, 2009; Coibion and Gorodnichenko, 2015; K. J. Forbes et al., 2017; Nasir, et al., 2020; Wong, 2015).

Another important factor in inflation expectations is the oil price, which substantially impacts energy costs and wages, raising inflation (Baba and Lee, 2022). The effect of energy shocks on the United States has recently been discussed in the academic literature on finance and economics (e.g., Kilian and Zhou, 2022; Oloko et al., 2021; Pham et al., 2020). However, there is currently a lack of studies that allow us to compare the effectiveness of the Federal Reserve's monetary policy responses to energy crises before and after the adoption of an explicit ITR.

Aiming to fill this knowledge gap, this piece attempts to analyze whether the efficiency of the Fed's monetary policy has improved after the adoption of an explicit ITR in January 2012, while taking into account the presence of inflationary energy shocks. To address this research question, the paper analyzes data from 1994 m1 to 2022 m10 and adopts a Quantile Autoregressive Distributed Lag (QARDL) estimator to assess the determinants of inflation in the US. In particular, our model contributes to this literature by including a variable that accounts for energy shocks, that is, the West Texas Intermediate (WTI) oil, which is generally used as a benchmark for crude oil prices. Our main findings suggest that past inflation, exchange rate, and energy shocks significantly contribute to inflation expectations in the United States. More specifically, the results indicate that in the post-inflation targeting regime period, both energy shocks and exchange rate have a minor impact on inflation in comparison with the full sample or the pre-inflation targeting regime period.

This paper is further organized as follows. After this introduction, Section 2 discusses the literature on the determinants of inflation expectations and the efficiency of inflation targeting regimes (ITR). Section 3 presents the methodology adopted and the data used in the econometric analysis. Section 4 analyzes the main results from our model, and Section 5 presents the paper's main conclusions and reports policies.

2. Review of the determinants of inflation expectations

The literature on inflation targeting, expectations, and energy shocks is scattered across many themes. We present a thematic map for a broad idea of the literature concerning inflation targeting, determinants of inflation expectations, and energy shocks (Fig. 1). The theme's centrality, shown along the vertical axis in Fig. 1, indicates its importance to

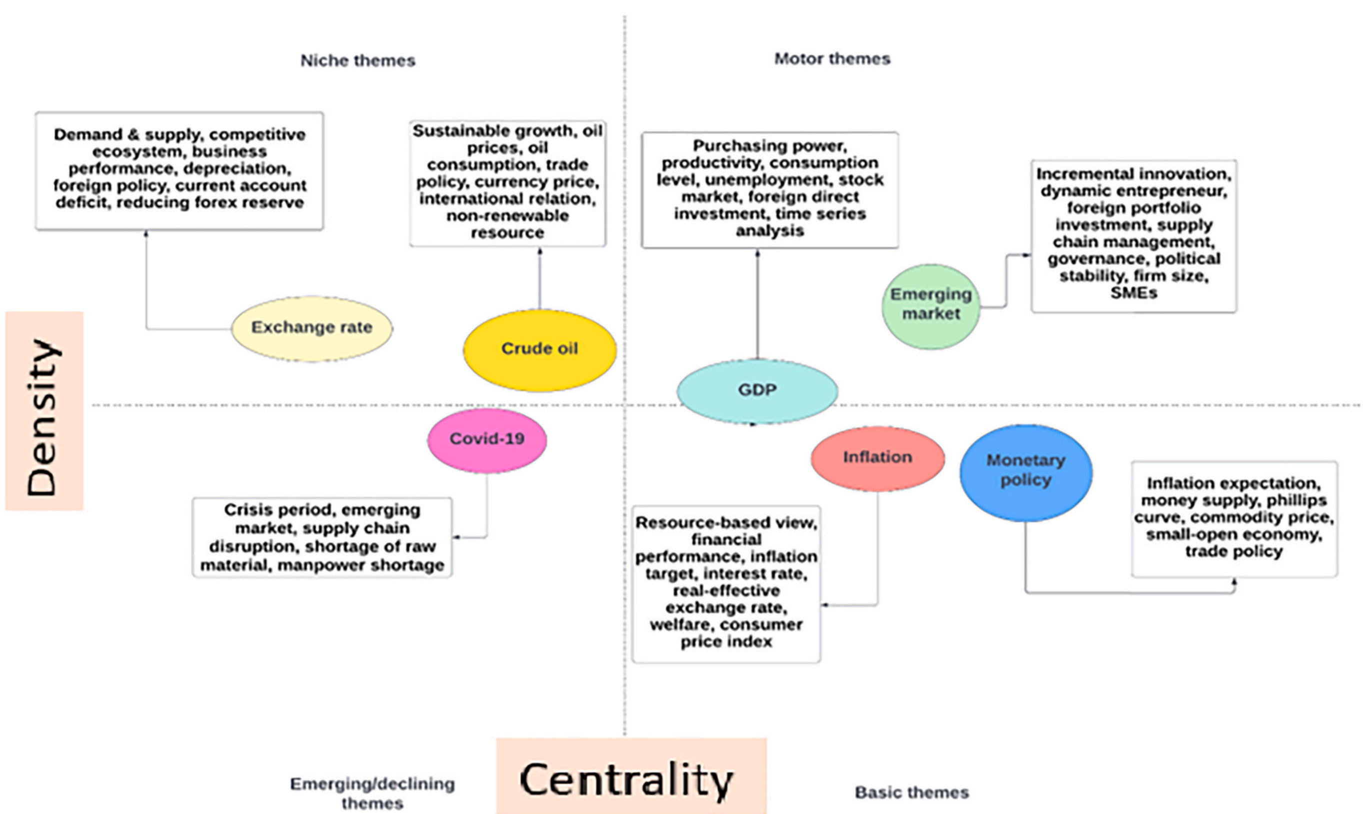

Fig. 1. Thematic Mapping of the Research Field.

the domain as a whole. In contrast, the density, plotted along the horizontal axis, reveals the depth of its internal connections. Fig. 1 classifies the themes covered by the extant literature into basic, emerging/declining, niche, and motor themes. Basic themes (lower-right quadrant) are vital to the research but are not fully developed yet; emerging/declining themes (lower-left quadrant) are weakly developed and marginal, representing either appearing or disappearing themes; niche themes (upper-left quadrant) are only marginally important for the field with well-developed internal ties but not many external ties; and motor themes (upper-right quadrant) are well established and are crucial for the research field structuring (Ameen et al., 2022; Mahendru et al., 2022).

Evidently, monetary policy and inflation are two topics that are crucial to the advancement of knowledge in this field. Immense research has been conducted around these themes, but there is further scope to explore other dimensions of monetary policy, particularly in the context of inflation targeting. In particular, the success of monetary policy in explicit inflation targeting needs to be studied for various countries and in different contexts. Currently, as pointed out in Fig. 1, research on the theme of COVID-19 seems to have passed its zenith and is declining. The themes of crude oil, which is intrinsically related to energy shocks, and exchange rate have well-established internal connections, yet have the scope of being developed further in the broader context of our research question. Finally, the themes of GDP and emerging markets are crucial to the structuring of this area.

With the unfolding pandemic, prices have increased again in recent years, initially in response to the mismatch between demand and supply and later fueled by the current energy crisis. In the early stages of the pandemic, economists often predicted a negative impact of COVID-19 on inflation expectations, driven primarily by a negative demand shock. However, these predictions were revisited, given the disruptions in global value chains (An et al., 2023) and, more recently, due to the political conflict between Russia and Ukraine. As inflation expectations are central to macroeconomic models (Woodford, 2003), understanding the drivers of agents' expectations about price is imperative to assess the efficiency of monetary policy in controlling inflation.

The determinants of inflation dynamics have been widely discussed in the literature. Although one may theoretically distinguish between the determinants of inflation and inflation expectations, both tend to converge through the anchoring effect (Nasir, Balsalobre-Lorente, et al., 2020). As past and current information about inflation influences expectations, it is not surprising that the drivers of change in price level will also explain inflation expectations (Armantier et al., 2016). Although some studies report that the adoption of ITR helps to converge inflation to the target (e.g., Yigit, 2010), there is no consensus about the impact of inflation persistency (Corbo et al., 2001; Gali et al., 2005). Other studies have found that the correlation between inflation and expectations is only valid in the short run (Fuhrer, 2011).

Generally, this field discusses a few factors that influence inflation or the expectations for future inflation (Alekhina and Yoshino, 2019; Avci and Yucel, 2017). First, most economists often acknowledge the influence of **money supply** on inflation. In a monetarist view, as proposed by Friedman (1968, 1970), increases in the money supply would inevitably create inflationary pressures on the economy, in which the limited perspective argues that "inflation is always and everywhere a monetary phenomenon." However, some studies have found similar results (e.g., Lu et al., 2017), while few other studies have found little evidence of this relationship or found mixed results (Hung and Thompson, 2016; Su et al., 2016). This variable is particularly important in our study as it represents direct responses to monetary policy. As the Federal Reserve changes its policy tool (i.e., interest rates), it changes the liquidity in the economy and, therefore, the money supply. The literature has overlooked the influence of this variable on inflation expectations in the context of changes in the ITR.

The **fiscal policy stance** also plays an essential role in determining inflation expectations. As the government increases spending more than its revenues, it creates a budget deficit with the public authority, while there is an equal amount of monetary surplus in the economy, as argued in the influential work of Sargent and Wallace (1981). The excess in government spending through the expansion of the money supply would arguably positively impact inflation (Alpanda and Honig, 2010; Mikek, 2004; Minea and Tapsoba, 2014). Therefore, one should expect that adopting an ITR would force countries to promote fiscal discipline. However, empirical evidence suggests that when government spending increases *pari passu* with the economic growth rate, inflationary pressures weaken (Catao and Terrones, 2005; Fischer et al., 2002; Lin and Chu, 2013). While this condition may hold for countries with monetary sovereignty, such as the US, developing and emerging economies are the most vulnerable to pessimistic expectations regarding their ability to run a fiscal deficit (Cerisola and Gelos, 2009; Minella et al., 2003). Therefore, the empirical evidence of fiscal discipline as a necessary condition for monetary authorities to deliver price stability is mixed, depending on the country and context.

Another important variable that influences inflation expectations is the **exchange rate pass-through** (ERPT), which measures the responsiveness of international prices to exchange rate changes. Some studies have found evidence that the adoption of an inflation-targeting regime reduces the ERPT, as the credibility in the commitment of the monetary authority to deliver price stability keeps inflation expectations anchored even in the presence of depreciation (Eichengreen, 2002; Mishkin and Savastano, 2001; Schmidt-Hebbel et al., 2002). Some papers suggest that this result also holds for emerging economies such as Brazil (Minella et al., 2003). However, more recent studies indicate not only that inflationary pressures may persist even after the adoption of an ITR (K. Forbes, 2016; K. Forbes et al., 2018; K. J. Forbes et al., 2017; Nasir and Simpson, 2018) but also that the adoption of this regime could potentially increase the ERPT (Nasir and Vo, 2018).

Inflation is a phenomenon driven by two primary sources – cost-push, which is caused by an increase in prices of input (e.g., wages and raw material), and demand-pull, which is caused by a surge in demand that outpaces supply. Data on economic output and unemployment generally represent the persistent impact of demand-pull inflation, given that income plays a vital role in determining the consumption capacity of a household (Mehra and Herrington, 2008). Traditional studies such as the Phillips curve have reported a substantial trade-off between inflation and **unemployment** (e.g., Friedman, 1968, 1977).

The literature on the effects of **energy shocks** on inflation is under constant expansion. There is a broad consensus in this field that the global oil market mainly drives energy prices, as the world still extensively relies on this unsustainable energy source. Some economists have found a persistent effect of oil prices on inflation, the so-called "second-round effects" (Baba and Lee, 2022). This phenomenon describes the potential double impact of oil prices on inflation, which at first is directly affected by an increase in energy costs, which may be followed by a further increase as a wage-price spiral develops.

While oil demand shocks are often associated with a precautionary demand for energy, oil supply shocks are often triggered by abrupt changes in oil production, usually caused by political conflicts (Geiger and Scharler, 2019). Regardless of the type of shock, an upsurge in oil prices causes inflation expectations to increase (Coibion and Gorodnichenko, 2015; Nasir et al., 2020a; Nasir et al., 2020b; Wong, 2015). While many papers have analyzed the impact of energy shocks on inflation expectations in the US (e.g., Ball et al., 2022; Boufateh and Saadaoui, 2021; Kilian and Zhou, 2022), these papers have not addressed this issue in the context of a change in the inflation targeting regime in the US.

3. Data, modelling and estimation strategy

3.1. Data specification

As pointed out by the gaps in the literature review, in this study, we

Table 1
Data Information.

Indicator	Label	Measure	Source
Inflation expected	*IEXP*	Inflation Expectation (%)	University of Michigan (2022)
Inflation	*INF*	Consumer Price Index (CPI)	Federal Reserve (2022)
Economic Output	*GDP*	Real GDP per capita	Federal Reserve (2022)
Unemployment	*UNEMP*	Unemployment Rate	Federal Reserve (2022)
Money supply	*M3*	Money Supply (M3)	Federal Reserve (2022)
Oil Price shocks	*WTI*	Crude oil price per barrel (in US$)	Energy Information Administration (2022)
Fiscal policies	*FISCAL*	Deficit and Surplus Change	Federal Reserve (2022)
Exchange rate	*EXR*	Real Effective Exchange Rate change	Bank of International Settlements (2022)

have chosen the United States to investigate our primary hypothesis that adopting an inflation targeting regime (ITR) helps reduce inflation expectations, particularly in the context of energy crises. In addition, we also test the nexus between inflation expectations, fiscal policy, money supply, exchange rate, and energy shocks, which are the main determinants of inflation expectations in this literature. The focus of our study on the US is justified by the fact that their central bank, the Federal Reserve (Fed), has adopted an explicit ITR since January 2012, which allows us to compare the efficiency of their monetary policy before and after this change. In addition, due to the hegemonic power of the US and the key role of the US dollar in global trade and finance, we would also like to investigate how vulnerable US inflation is to energy shocks.

We collected monthly data on the determinants of inflation expectations from January 1994 to October 2022, which is the largest period for which we could find data.[2] To test the main hypothesis of our study, we propose three different analyses of the same data. First, we analyze a full-time period sample (from 1994 m1 to 2022 m10) to understand the overall determinants of inflation expectations in the US. Second, we split this sample into two parts, a pre-inflation targeting period (from 1994 m1 to 2011 m12) and a post-inflation targeting period (from 2012 m1 to 2022 m10). The key reason for pre- and post-inflation targeting period analysis is to examine the effects of inflation targeting policies of the US and the relevance of monetary policy, energy shocks, and fiscal policy. Table 1 shows the list of variables and their description. The variables are defined in detail as follows. For our empirical investigation, we employed both linear autoregressive distributed lag (ARDL) and quantile autoregressive distributed lag (QARDL) methods, which are further detailed in Section 3.3.

3.1.1. Inflation expectations

We use the monthly data of "Expected Changes in Inflation Rates" for the US accessed from the University of Michigan (2022). The inflation expectations are defined as the median of one year ahead of the expected inflation rate. Inflation expectations are part of the Fed's Survey of Consumer Expectations (SCE).

3.1.2. Inflation

We use the monthly data on inflation, which was obtained from the Federal Reserve Bank (2022). Inflation was measured by the Consumer Price Index (CPI).

3.1.3. Economic output

To estimate the role of economic output, we use the real GDP growth of the United States, also published by the Federal Reserve (2022).

3.1.4. Unemployment

To check the effects of unemployment on inflation expectations, we use the unemployment rate of the US from the Federal Reserve (2022).

3.1.5. Money supply

For money supply, we use the monetary aggregate (M3) indicator published by the Federal Reserve Bank (2022). M3 is defined as a collection of money supply that includes large-time deposits, institutional market funds, short-term repurchase agreements, and liquid funds. It is more closely associated with corporations and bigger financial institutions than with small businesses and individuals.

3.1.6. Energy shocks

For energy shocks, we use the oil price data as per West Texas Intermediate (WTI), published by the Energy Information Administration (2022). The energy shocks data was used as spot crude oil price in US$ per barrel.

3.1.7. Fiscal stance (surplus/deficit)

We also use fiscal policy as one of the key variables, which shows the current fiscal position of the US, as surplus or deficit. The fiscal stance is measured in US dollars, which consists of all government revenues minus all expenditures. This data is also published by the Federal Reserve Bank (2022).

3.1.8. Real exchange rate

Lastly, the exchange rate was used as a key policy variable. The exchange rate was measured by the real effective exchange rate (REER) fluctuations. The REER is an index, which shows the strength of a currency relative to the basket of other currencies. Exchange rate data was gathered from the Bank of International Settlements (2022).

3.2. The modelling

To formulate a robust policy measure, it is necessary to examine the impacts of policy indicators on inflation expectations across the entire spectrum of data. In doing so, the current study follows guidelines from recent literature (Nasir et al., 2020a, 2020b, 2020c; Kilian and Zhou, 2022) and studies the impact of the most relevant variables. This paper examines the long-run association between our key variables of interest: fiscal policy, money supply, energy shocks, exchange rate, and inflation expectations in the US. We design the following empirical model, which is represented in equation (i).

$$IEXP_t = f\left(INF_t, GDP_t, UNEMP_t, M3_t, WTI_t, FISCAL_t, EXR_t\right) \tag{i}$$

The traditional least square-based methods examine this impact at the median of variables and show some asymmetric relationships. This might defeat the policy-oriented objective of our study. However, even across the spectrum of data, the impacts of fiscal policy, energy shocks, and exchange rate on inflation expectations might not always be symmetric. Hence, the choice of empirical strategy should comply with the policy-level contribution of our study and show the impacts across the spectrum of data. In our preliminary analysis, time-varying integration was examined through the Wald test[3] to verify the effects of variables throughout the quantiles. It can further assist in evaluating short- and long-run relationships.

3.3. Linear autoregressive distributed lag (ARDL) and quantile ARDL (QARDL) methods

We employ the linear autoregressive distributed lag (ARDL) and

[2] Except for inflation, GDP, and money supply. Data on these three variables was only available up to August 2020. We further use ipolate methods and some annual reports for missing values.

[3] The Wald test findings are not reported in the study, but are available on request.

quantile ARDL (QARDL) methods to check the long-run association between key variables of interest. The ARDL method was employed for the full sample as well as the pre-inflation targeting and post-inflation targeting periods. The important reason to conduct a comprehensive analysis is that the US adopted an explicit inflation-targeting regime in 2012, which affected the economic indicators and, arguably, made an overall economic shift.

The linear ARDL model is estimated as follows.

$$IEXP_t = \partial_0 + \partial_1 INF_t + \partial_2 GDP_t + \partial_3\ UNEMP_t + \partial_4\ M3_t + \partial_5\ WTI_t + \partial_6\ FISCAL_{t,} + \partial_7 EXR_t + \varepsilon_t \quad \text{(ii)}$$

In equation (ii), ∂ represents the coefficient values of all explanatory variables at the time period (t), and ε_t refers to the error term.

We further employ the quantile ARDL estimator for the full-specification sample as well as pre-inflation targeting and post-inflation targeting periods. The QARDL was employed for the following reasons. First, this method considers the locational asymmetry as explained by Cho et al. (2015). As per locational asymmetry, the estimates may rely on the position of the dependent variable (i.e., inflation expectation) inside its conditional distribution. Second, the QARDL framework simultaneously considers the short- and long-term behavior across conditional quantile variations of the conditional distribution of inflation expectations (Godil et al., 2021). Third, Godil et al. (2021) argued that linear ARDL generally does not account for the effect of the variables that tend to move over time, which is addressed with the quantile regression, as it estimates changing integration data over different quantiles. Last, the quantile ARDL outperforms other linear and non-linear methods, such as ARDL and non-linear ARDL, in which non-linearity is explained by lowering the magnitude to zero.

In contrast to these methods, the QARDL is a data-driven approach. The quantile ARDL method allows for testing the long-run equilibrium impacts of our key variables of interest on inflation expectations at conditional quantiles. Given these reasons, the QARDL method is shown to be the most adequate estimator to explain the asymmetric link between variables.

The simple form of QARDL is presented as follows.

$$\mathrm{IEXP_t} = \mu + \sum_{i=1}^{n1} \sigma_{\mathrm{IEXP_i}} \mathrm{IEXP_{t-i}} + \sum_{i=0}^{n2} \sigma_{\mathrm{INF_i}} \mathrm{INF_{t-i}} + \sum_{i=0}^{n3} \sigma_{\mathrm{GDP_i}} \mathrm{GDP_{t-i}} + \sum_{i=0}^{n4} \sigma_{\mathrm{UNEMP_i}} \mathrm{UNEMP_{t-i}} + \sum_{i=0}^{n5} \sigma_{\mathrm{M3_i}} \mathrm{M3_{t-i}} + \sum_{i=0}^{n5} \sigma_{\mathrm{WTI_i}} \mathrm{WTI_{t-i}} + \sum_{i=0}^{n5} \sigma_{\mathrm{FISCAL_i}} \mathrm{FISCAL_{t-i}} + \sum_{i=0}^{n5} \sigma_{\mathrm{EXR}} \mathrm{EXR_{t-i}} + \varepsilon_t \quad \text{(iii)}$$

Where μ is the intercept and ε_t the error term, while the σ shows the coefficient values of relevant variables. Meanwhile, n series shows the lag order for the model, as suggested by the results of the Schwarz information criterion (SIC). Following the approach of Cho et al. (2015), we further simplify equation (iii) in a quantile ARDL format:

$$\mathrm{Q_{IEXP_t}} = \mu(\tau) + \sum_{i=1}^{n1} \sigma_{\mathrm{IEXP_i}}(\tau) \mathrm{IEXP_{t-i}} + \sum_{i=0}^{n2} \sigma_{\mathrm{INF_i}}(\tau) \mathrm{INF_{t-i}} + \sum_{i=0}^{n3} \sigma_{\mathrm{GDP_i}}(\tau) \mathrm{GDP_{t-i}} + \sum_{i=0}^{n4} \sigma_{\mathrm{UNEMP_i}}(\tau) \mathrm{UNEMP_{t-i}} + \sum_{i=0}^{n5} \sigma_{\mathrm{M3_i}}(\tau) \mathrm{M3_{t-i}} + \sum_{i=0}^{n5} \sigma_{\mathrm{WTI_i}}(\tau) \mathrm{WTI_{t-i}} + \sum_{i=0}^{n5} \sigma_{\mathrm{FISCAL_i}}(\tau) \mathrm{FISCAL_{t-i}} + \sum_{i=0}^{n5} \sigma_{\mathrm{EXR}}(\tau) \mathrm{EXR_{t-i}} + \varepsilon_t(\tau) \quad \text{(iv)}$$

In equation (iv), $\varepsilon_t(\tau)$ represent the error term, while the (τ) next to the variable coefficients denotes the level of the conditional quantile. The quantile ARDL is employed for three periods discussed in this paper, as explained in Section 3.1. We also employ different tests, such as the Ramsey stability test, to investigate the model fitness, stability, and normality. Further, we check the model stability by using the cumulative sum (CUSUM) and the cumulative sum of squares (CUSUMSQ) methods. These tests show the stability of the model and depend on recursive regression residuals by considering the short- and long-term empirics.

3.4. Unit root testing

To further extend our empirical analysis, we employ unit root tests. In general, unit root tests are used to examine whether the time series variable is stationary at level or first difference. The stationary properties of data present the concept of cointegration (Granger, 1981). For unit root testing, we employ the augmented Dickey-Fuller (ADF) test developed by Dickey and Fuller (1979), and Phillips-Perron (PP) test introduced by Phillips and Perron (1988) to investigate the cointegration properties of variables. It is important to mention here that the traditional unit root tests do not address the shocks and structural breaks in data, which might make the results biased. More specifically, the shocks and structural breaks of time series variables are momentary due to the variance and constant mean over time. Hence, we further employ the applied Zivot-Andrews one-stage structural break test developed by Zivot and Andrews (1992).

The null hypothesis of unit root tests states that the variable is non-stationary and, thus, there is a unit root problem, while the alternative hypothesis states that the variable is non-stationary. In equation (v), the null hypothesis can be described as follows:

$$H_0 : Z_t = Z_{t-1} + \delta_1 YTB_{1t} + \delta_2 YTB_{2t} + \varepsilon \quad \text{(v)}$$

The alternative hypothesis is presented as:

$$H_1 : Z_t = \partial + \delta_1 DZ_{1t} + \delta_2 YTB_{2t} + \varepsilon_t \quad \text{(vi)}$$

In equations (v) and (vi), YTB_t is considered as a pulse variable that takes the value of 1 if $t = YTB_1 + 1$, $(i = 1, 2)$ and 0 otherwise. In addition, YTB_1 and YTB_2 show the structural breaks in the data. Further, $DZ_{1t} = 1$, if $t > YTB_t$ and $(i = 1, 2), 0$ otherwise. Notably, the null hypothesis is rejected if the calculated t-statistic is higher than the absolute critical values of 1% or 5%.

4. Empirical results

4.1. Preliminary analysis

We start the preliminary investigation with the descriptive statistics of our variables. Table 2 shows the summary statistics of all variables employed, which includes the mean, standard deviation, minimum, and maximum of all variables employed, the 1st (p1) and 99th (p99) percentiles, skewness, and kurtosis. Overall, the residuals in the data were found to be normally distributed, symmetric, and not heavy-tailed.No outliers were observed in the descriptive analysis.

We then move toward unit root testing to check the stationarity properties of the data. To test the hypothesis of stationarity, we employed the ADF unit root test (Dickey and Fuller, 1979) and the PP unit root test (Phillips and Perron, 1988). In addition, we also employed the Zivot-Andrews unit root test (Zivot and Andrews, 1992) to check the structural breaks in data. Table 3 shows the empirics for ADF and PP unit root tests. It is observed in this table that all variables are stationary in the first difference, and there is no unit root problem. However, the variables present a mixed order of integration.

For instance, all variables are stationary at the first difference. The ADF and PP statistics are checked with trends and breakpoints. We have chosen the optimal number of lags for both tests and employed the Schwarz information criterion (SIC), which is also considered appropriate in the presence of any structural breaks (Asghar and Abid, 2007). Considering the perspective of structural breaks, the Zivot-Andrews unit root test (see Table 4) highlights that all variables are stationary at the level and first difference. However, the variables have structural breaks

Table 2
Summary Statistics.

Variable	Mean	Std Dev	Min	Max	p1	p99	Skew	Kurt
IEXP	3.010	0.665	0.400	5.400	1.700	5.300	1.345	6.703
INF	2.402	1.506	−2.097	9.060	−1.286	8.525	1.193	7.351
GDP	2.472	2.183	−8.351	12.461	−4.667	7.880	−0.911	8.949
UNEMP	5.718	1.794	3.500	14.700	3.500	10.200	1.418	5.265
M3	6.689	4.030	0.300	26.900	0.500	24.400	2.640	12.342
WTI	0.533	0.293	0.113	1.339	0.128	1.166	0.448	2.154
FISCAL	−1.450	6.312	−71.526	58.217	−21.707	11.827	−2.103	70.788
EXR	1.105	0.108	0.929	1.407	0.936	1.358	0.339	2.020

Note: Normality of Data: Null hypothesis: Residuals are normal.
Source: authors estimations.

Table 3
ADF and PP Unit Root Tests.

Variables	ADF test statistic		PP test statistic	
	Level	First Difference	Level	First Difference
IEXP	−4.404**	−19.252***	−4.407**	−19.487***
INF	−0.930	−11.831***	−2.044	−11.423***
GDP	−2.932	−6.640***	−4.162**	−6.302***
UNEMP	−3.103*	−18.023***	−2.988	−18.118**
M3	−1.960	−9.543***	−3.108*	−9.226***
WTI	−2.133	−12.823***	−2.765	−12.709***
FISCAL	−18.420***	−32.306***	−18.424***	−49.463***
EXR	−0.720	−12.764***	−1.226	−12.431***

Note: IEXP shows inflation expected; INF shows real-time inflation; GDP is GDP per capita; UNEMP is the unemployment rate; M3 is money supply; WTI is oil price shocks; FISCAL is the deficit or surplus; EXR is the exchange rate. Superscripts ***, **, *denote statistical significance at the 1 and 5% and 10% levels, respectively.
Source: authors' estimations.

Table 4
Zivot–Andrews Structural break test.

Variables	Level t-Statistic	Time break	1st difference t-Statistic	Time break
IEXP	−5.741***	2018 m4	−10.256**	2008 m8
INF	−4.071***	2008 m4	−12.473**	2008 m8
GDP	−5.425***	2007 m8	−8.449**	2009 m5
UNEMP	−4.325***	2008 m5	−11.170**	2009 m11
M3	−3.799***	2001 m1	−6.457**	2018 m4
WTI	−5.516***	2014 m1	−10.311**	2008 m7
FISCAL	−18.821**	2013 m1	−13.949**	2013 m4
EXR	−3.296***	2009 m3	−8.576**	2002 m3

Note: IEXP shows inflation expected; INF shows real-time inflation; GDP is GDP per capita; UNEMP is the unemployment rate; M3 is money supply; WTI is oil price shocks; FISCAL is the deficit or surplus; EXR is the exchange rate. Superscripts ***, **, *denote statistical significance at the 1%, 5% and 10% levels, respectively.

at different times. For instance, inflation expected (IEXP) shows a break in 2018 m4 and 2008 m8. Similarly, other variables also show the breakpoints at different periods. Table 4 shows the results of the Zivot-Andrews test, where the variables were found to be stationary at level and first difference.

4.2. Linear ARDL results

We now turn to the estimation of linear ARDL and QARDL of our preferred empirical model for inflation expectations in the US. Table 5 reports the linear ARDL empirics[4] for our preferred model specification. We analyzed the empirical model for three separate samples: full-time period (from 1994 to 2022), pre-inflation targeting period (from 1994 to 2012), and post-inflation targeting period (from 2012 to 2022). The comparative analysis between these three samples contributes to the literature on the determinants of inflation expectations in the United States, adopted by the Federal Reserve (Fed) in January 2012. The explicit ITR guides and explains the Fed's decisions about monetary policy instruments such as interest rates. Consequently, examining pre- and post-inflation targeting data provides a comprehensive knowledge of the determinants influencing inflation expectations, particularly the effect of energy shocks on these two distinct monetary policy scenarios – implicit and explicit ITR.

4.2.1. Short run findings

Overall, in the ARDL short-run findings, we observe that inflation significantly and positively impacts inflation expectations in pre-inflation targeting periods and is insignificant in the full-time. In the full panel of the first variable, the inflation (INF) coefficient is positive (0.1818) and statistically significant, indicating that there is a positive relationship between inflation (INF) and the inflation expectation. In the short run, a 1% increase in inflation is associated with an increase in the dependent variable by 0.1818 units. In the pre-inflation targeting period, inflation is positively related to the inflation expectation. However, the coefficient is smaller (0.1130) and still statistically significant, whereas inflation shows insignificance in the post-inflation targeting period.

Looking at GDP, we find that the coefficient is positive (0. 2924) and significant at the 5% level in the full panel. This indicates that there may be a positive relationship between GDP and the inflation expectation, but it is not strong enough to be considered statistically significant. In the post-inflation targeting period, GDP shows insignificance. Further, the coefficient is significant in the post-inflation targeting period (−0.0426) at the 10% level. Such findings show that a weak negative relationship exists between GDP and inflation expectations.

Moving ahead with unemployment (UNEMP), we find that unemployment significantly and positively affects inflation expectations. In the post-inflation targeting period, the unemployment coefficient is negative (−0.0919) and statistically significant, indicating a significant negative relationship between unemployment and inflation expectation. Meanwhile, money supply shows insignificant effects with inflation expectation in the full period sample.

Energy shocks significantly and positively impact inflation expectations in the full and pre-inflation targeting periods. Similarly, fiscal policy reported a significant positive relationship with inflation expectation in the full period sample. Meanwhile, the exchange rate reports an insignificant relationship.

4.2.2. Long-run findings

In the long-run findings, the full panel's inflation (INF) results show a significant positive relationship between inflation and inflation expectations in the full period and pre- and post-inflation targeting periods. Further, GDP shows significant positive impacts in the full period.

[4] Note: ARDL was tested as per the Akaike Information Criterion (AIC). For linear ARDL, we use up to three lags. For this reason, we also checked the impacts of lagged inflation expectations, which shows significant and positive impacts.

Table 5
Linear ARDL Empirics.

Variables	Full panel (1994 to 2022)			Pre-Inflation targeting (1994–2012)			Post-Inflation targeting (2012–2012)		
	Coeff.	Std. Error	Prob	Coeff.	Std. Error	Prob	Coeff.	Std. Error	Prob
Short run estimates									
INF	0.0177	0.4953	0.721	0.1130**	0.0550	0.0410	−0.0389	0.0770	0.6140
GDP	0.2924**	0.1315	0.0270	−0.1363	0.0871	0.1190	−0.0426*	0.0259	0.1030
UNEMP	0.0857**	0.0283	0.0030	−0.0230	0.1487	0.8770	−0.0919**	0.0267	0.0010
M3	−0.0196	0.0291	0.5010	−0.0043	0.0395	0.9140	0.0550*	0.0315	0.0840
WTI	0.9510**	0.3816	0.0130	1.6770**	0.5446	0.0020	0.6487	0.4303	0.1340
FISCAL	−0.0069**	0.0032	0.0330	0.0009	0.0038	0.8040	−0.0019	0.0025	0.4540
EXR	−0.2913	1.1065	0.7930	1.0656	1.3874	0.4430	0.6248	1.4952	0.6770
ECT	−0.3330***	0.0505	0.0000	−0.4065***	0.0577	0.0000	−0.4260***	0.0673	0.0000
Long run estimates									
INF	0.1818***	0.0428	0.0000	0.1210*	0.0695	0.0830	0.2930***	0.0701	0.0000
GDP	0.0419	0.0336	0.2130	−0.0056	0.0421	0.8940	0.1325**	0.0379	0.0010
UNEMP	0.0069	0.0405	0.8630	−0.0702	0.0512	0.1720	0.2351***	0.0539	0.0000
M3	0.0527***	0.0160	0.0010	−0.0140	0.0340	0.6810	−0.0065	0.0145	0.6540
WTI	0.6899***	0.1912	0.0000	0.9711***	0.3112	0.0020	0.8116	0.6724	0.2300
FISCAL	0.0254**	0.0143	0.0760	−0.0075	0.0134	0.5790	0.0052	0.0087	0.5500
EXR	−1.4723**	0.6312	0.0200	−1.9810**	0.9950	0.0480	2.3064	1.4682	0.1190
Constant	1.1111**	0.3297	0.0010	1.9543***	0.5578	0.0010	−1.0038	0.9034	0.2690
F-test	7.0930	–	0.0000	6.2520	–	0.0000	6.6740	–	0.0000
t-test	−6.591	–	0.0000	−7.046	–	0.0000	−6.3360	–	0.0000
CUSUM test	Normal	–	–	Normal	–	–	Normal	–	–

Note: The dependent variable is inflation expected. Superscripts ***, **, *denote statistical significance at 1%, 5%, and 10%, respectively. Regression is applied on the assumption of no constant and no trend. The F bound test is more than lower and upper bound values of 1% in both cases. ECT shows the error correction term, as speed of adjustment. For the full panel, we employ the ARDL with three lags and report only the 1st lag (LD.) in this table. To keep it concise, the full results across all lags in the short run are reported in the appendix (Table A1).

Meanwhile, unemployment has reported insignificant effects in the full panel, but shows significant negative effects in the post-inflation targeting period and significant positive effects in pre-inflation targeting periods.

In addition, money supply indicated a positive association with inflation expectations in the full panel but had insignificant associations in pre- and post-inflation targeting periods.

"Energy shocks" is the most significant variable – the result of the full panel shows the coefficient is 0.6899, and it is statistically significant at 5%, indicating a strong positive relationship between oil prices and inflation. The result of the pre-inflation targeting coefficient is 0.9711, and it is statistically significant at the 1% level (p-value = 0.0020), indicating a very strong positive relationship between oil prices and inflation expectations. Although the post-inflation targeting coefficient is 0.8116, it is not statistically significant (p-value = 0.2300), suggesting no strong relationship between energy shocks and inflation expectations.

Fiscal policy reported significant positive effects in full panel period and insignificant signs in pre- and post-inflation targeting periods. Lastly, exchange rate (EXR) results of the full panel show that the coefficient is −1.4723, and it is statistically significant at the 5% level (p-value = 0.0210), indicating a negative relationship between exchange rates and inflation expectations in the full panel. For the pre-inflation targeting period, the coefficient is −1.9819, and it is statistically significant at the 5% level (p-value = 0.0480), indicating a negative relationship between exchange rates and inflation expectations. For the post-inflation targeting period, the coefficient is 2.3064, and it is insignificant.

Overall, in the ARDL short-run findings, we observe that inflation significantly and positively impacts inflation expectations in the full-time and pre-inflation targeting periods. GDP shows positive impacts in the full-time sample, while it has significant negative impacts on inflation expectations in the post-inflation targeting sample. Similarly, unemployment shows positive effects in the full-time period, and considerable negative effects in the post-inflation targeting period. The exchange rate and energy shocks present a significant and positive relationship with inflation expectations in the full sample, while energy shocks were also found to be significant for the pre-ITR sample.

In the long run, inflation, economic output, and unemployment positively impact inflation expectations, particularly in the post-ITR sample. In addition, we observe that money supply, energy shocks (WTI), and fiscal policies positively affect inflation expectations in the full sample. However, in both pre- and post-inflation targeting periods, these were non-significant. Lastly, the exchange rate negatively impacts inflation expectations for the full panel.

For diagnostic testing, we checked the F-tests and t-tests. The bound testing shows that critical values of F-statistics are higher than the upper bound level of 95% level of confidence, inferring strong evidence of cointegration in the model. Similarly, the t-test also shows the significance of the model. We further ran the CUSUM and CUSUM sum of squares normality (see in the appendix Fig. 5 and.

Fig. 6), showing the data's normality. This paper also analyzed the error correction term (ECT), which shows the error term as well as the speed of adjustment to recover from any shocks. In general, a significant and negative ECT denotes the model stability (Nasir et al., 2020a, 2020b, 2020c; Kilian and Zhou, 2022). In all our empirical models, the ECT value is significant and negative. This further shows a long-run relationship between variables under analysis; therefore, we employed the quantile ARDL method to explore further this persisting interaction among the variables in our model.

4.3. Quantile ARDL results: Full sample

We further employ the quantile ARDL method on our empirical model in extension to our empirical analysis. This analysis breaks down the coefficients for each variable at different quantiles (20th, 40th, 50th, 60th, and 80th percentiles). It explores how the relationships between these variables and inflation expectations vary across different levels of inflation expectations. **Table 6a** and Table 6b show the empirical estimates for the full sample from 1994 m1 to 2022 m10.

In short-run empirics (Table 6a), we note inflation is significant and positive across all quantiles, which is in line with our linear ARDL findings. Inflation represents significant positive relationships with inflation expectations at the 20th quantile, the coefficient is 0.0851, and

Table 6a
Quantile ARDL Empirics full panel (1994–2022) Short run Empirics.

Variables	Full panel (1994–2022)			
	Quantile	Coefficient	Std. Error	Prob.
	0.200	0.0851***	0.0170	0.0000
	0.400	0.0637**	0.0178	0.0004
INF	0.500	0.0683**	0.0188	0.0003
	0.600	0.0689***	0.0161	0.0000
	0.800	0.0931***	0.0162	0.0000
	0.200	0.0183*	0.0103	0.0770
	0.400	0.0107	0.0108	0.3255
GDP	0.500	0.0138	0.0114	0.2276
	0.600	0.0137	0.0098	0.1612
	0.800	0.0175**	0.0098	0.0766
	0.200	−0.0065	0.0133	0.6259
	0.400	−0.0036	0.0139	0.7935
UNEMP	0.500	0.0091	0.0147	0.5341
	0.600	0.0190	0.0126	0.1324
	0.800	0.0270**	0.0126	0.0339
	0.200	0.0019	0.0049	0.6933
	0.400	0.0130**	0.0052	0.0127
M3	0.500	0.0129**	0.0054	0.0194
	0.600	0.0107**	0.0047	0.0229
	0.800	0.0130**	0.0047	0.0060
	0.200	0.2575**	0.0707	0.0003
	0.400	0.1191*	0.0741	0.1093
WTI	0.500	0.1282*	0.0783	0.1024
	0.600	0.1531**	0.0669	0.0227
	0.800	0.2669**	0.0674	0.0000
	0.200	0.0042	0.0039	0.2878
	0.400	0.0023	0.0041	0.5761
FISCAL	0.500	0.0021	0.0044	0.6301
	0.600	0.0036	0.0037	0.3393
	0.800	0.0067*	0.0038	0.0779
	0.200	−0.1983	0.2075	0.3400
	0.400	−0.2786	0.2176	0.2014
EXR	0.500	−0.2027	0.2297	0.3782
	0.600	−0.0056	0.1964	0.9771
	0.800	−0.1387	0.1977	0.4836
	0.200	0.8097**	0.3027	0.0078
	0.400	0.7741**	0.3174	0.0152
Constant	0.500	0.6107*	0.3350	0.0692
	0.600	0.3977	0.2864	0.1659
	0.800	0.7467**	0.2884	0.0100
ECT (EXP-1)	0.200	0.6254***	0.0412	0.0000
	0.400	0.7264***	0.0432	0.0000
	0.500	0.7388***	0.0456	0.0000
	0.600	0.7372***	0.0390	0.0000
	0.800	0.6415***	0.0393	0.0000

Note: The dependent variable is inflation expected. Superscripts ***, **, *denote statistical significance at the 1%, 5% and 10% levels, respectively. Quantile 20th, 40th, 50th, 60th and 80th are checked. ECT shows the error correction term, as speed of adjustment.

Table 6b
Quantile ARDL Empirics full panel (1994–2022) Long run Empirics.

Variables	Full panel (1994–2022)			
	Quantile	Coefficient	Std. Error	Prob.
	0.200	0.2272***	0.0341	0.0000
	0.400	0.2331***	0.0570	0.0000
INF	0.500	0.2616***	0.0624	0.0000
	0.600	0.2621***	0.0596	0.0000
	0.800	0.2600***	0.0345	0.0000
	0.200	0.0490*	0.0273	0.0725
	0.400	0.0390	0.0456	0.3913
GDP	0.500	0.0530	0.0499	0.2879
	0.600	0.0523	0.0477	0.2724
	0.800	0.0489*	0.0276	0.0769
	0.200	−0.0173	0.0357	0.6275
	0.400	−0.0133	0.0596	0.8228
UNEMP	0.500	0.0351	0.0653	0.5908
	0.600	0.0723	0.0624	0.2468
	0.800	0.0753**	0.0361	0.0372
	0.200	0.0052	0.0134	0.6963
	0.400	0.0476**	0.0223	0.0332
M3	0.500	0.0494**	0.0245	0.0436
	0.600	0.0408*	0.0234	0.0809
	0.800	0.0364**	0.0135	0.0072
	0.200	0.6877***	0.1729	0.0000
	0.400	0.4353	0.2887	0.1315
WTI	0.500	0.4911	0.3161	0.1202
	0.600	0.5828**	0.3020	0.0536
	0.800	0.7448***	0.1750	0.0000
	0.200	0.0113	0.0090	0.2120
	0.400	0.0085	0.0151	0.5726
FISCAL	0.500	0.0081	0.0165	0.6236
	0.600	0.0137	0.0158	0.3864
	0.800	0.0187**	0.0091	0.0414
	0.200	−0.5296	0.5519	0.3372
	0.400	−1.0184	0.9212	0.2689
EXR	0.500	−0.7763**	1.0087	0.4415
	0.600	−0.0214	0.9639	0.9822
	0.800	−0.3869	0.5586	0.4885

Note: The dependent variable is inflation expected. Superscripts ***, **, *denote statistical significance at the 1%, 5% and 10% levels, respectively. Quantile 20th, 40th, 50th, 60th and 80th are checked.

it is highly statistically significant (p-value = 0.0000), indicating a strong positive relationship with inflation expectations at this quantile. Similar relationships hold for other quantiles (40th, 50th, 60th, and 80th), where the coefficients remain positive and statistically significant. The findings suggest the relationship is stronger at lower quantiles (e.g., 20th quantile) and becomes weaker as you move toward higher quantiles.

The relationship between GDP and inflation expectations varies across quantiles. GDP positively relates to inflation expectations at some quantiles (20th, 50th, and 80th), but the significance varies. Unemployment has a statistically significant negative relationship with inflation expectations, suggesting that lower unemployment is associated with higher inflation expectations. Also, in higher quantiles (50th, 60th, and 80th), the relationship is either not significant or positive. The results imply that unemployment may not have any long-term association with inflation expectations, which goes against the trade-off between inflation and unemployment as found in the traditional economic literature (Friedman, 1968, 1977). This minor link between unemployment and inflation may be explained by extensive capacity utilization, which is in line with some other studies (Bloch et al., 2004; Kriesler and Lavoie, 2007). The empirical finding is in line with Nasir et al. (2020a, 2020b, 2020c); they also reported non-significant effects of unemployment in the case of New Zealand.

Money supply (M3) indicated that the relationship between money supply and inflation expectations varies, but it is generally positive and statistically significant at several quantiles (40th, 50th, and 60th). The relationship is not statistically significant at the 20th and 80th quantiles. Energy shocks showed a significant and positive relationship with inflation expectations. Lastly, fiscal policy (FISCAL) and exchange rate (EXR) reported insignificant relationships with inflation expectations across most quantiles.

Meanwhile, in the long run (Table 6b), inflation shows a consistently positive relationship with inflation expectations across different quantiles, indicating that inflation plays a critical role in explaining inflation expectations. In the long run, GDP reported positive significant effects at most of the quantiles, which is in line with short-run empirics. Unemployment (UNEMP) shows a negative and statistically significant association at the 20th quantile, indicating a strong negative relationship between unemployment and inflation expectations. As we move toward higher quantiles (40th to 80th), the relationship becomes less significant, with some quantiles showing no significant relationship. Money supply and energy shocks reported a significant positive relationship with inflation expectations in the US at most of the quantiles except for the last quantiles. Lastly, the exchange rate indicates a negative and statistically significant association up to the 50th quantile and insignificant at the 60th and 80th quantiles.

Notably, our primary factors of interest – GDP, money supply (M3), and energy shocks (WTI) – are significant and positive at most quantiles. This implies that money supply and energy shocks (i.e., increase in oil prices) positively affect inflation expectations. More recently, Kilian and Zhou (2022) also concluded similar findings for the case of the US. The study mentioned that since oil is traded in US dollars, it has short- and long-term effects on inflation expectations. In addition, the results mention that fiscal policy has a non-significant relationship with inflation expectations in the full sample. This exciting finding may, once again, be explained by the fact that expansionary fiscal policy does not necessarily lead to inflation, unless the economy is operating close to or beyond full capacity (Hart, 2009).

More interestingly, the results have suggested significant and negative impacts of the exchange rate (EXR) on inflation expectations. The findings indicate that exchange rate volatility might have been a key factor affecting inflation expectations over the past three decades. This means that exchange rate depreciation increases inflation expectations, as foreign goods would become more expensive to domestic consumers. This result is similar to Nasir et al. (2020a, 2020b, 2020c) and Kilian and Zhou (2022). However, our detailed analysis of money supply, exchange rate, and energy shocks allows us to draw further policy-related implications in the context of the United States.

Overall, in the empirical model, the error correction term (ECT) shows a significant relationship, which supports the model's validity. Fig. 2 shows the graphical representation of the quantile ARDL findings of the full-time span model discussed above. This figure also endorses the empirical findings and shows the impacts of studied variables in graphical form.

4.4. Quantile ARDL results: Pre- and post-inflation targeting analysis

As discussed earlier, the empirical estimations are done for three time periods (full sample, pre-inflation targeting, and post-inflation targeting). Table 7a and Table 7b show the quantile ARDL empirics for pre- and post-inflation targeting periods. In the post-ITR period, we observe that inflation, unemployment, and economic output (GDP) have significant and positive impacts on inflation expectations in most quantiles in the short run and long run. More specifically, in the pre-inflation targeting period, inflation (INF) coefficients are statistically significant at the 1% level, indicating that changes in inflation expectations have a significant short-run impact on inflation expectations across different quantiles. Meanwhile, GDP reported significant adverse effects at the initial quantile and insignificant effects at most quantiles in the short run and long run.

Money supply has significant positive relationships with inflation expectations at the initial quantile and is insignificant at most of the other quantiles. The central banks remain attentive to ensure long-run inflation expectations (market and survey-based). Meanwhile, central bank models, such as the FRB model for the US economy, focus on long-run inflation expectations (Adrian, 2023).

In general, the empirical findings are consistent and robust in both methods, in contrast with the narrative of Kilian and Zhou, (2022). Energy shocks significantly and positively impact inflation expectations at most quantiles, aligning with our primary findings. The fluctuations in energy prices affect transportation costs; consequently, it worsens inflation by raising the prices that customers have to pay for all goods and services. Similarly, money supply is a tool for de-anchoring and re-anchoring inflation expectations (European Central Bank, 2022).

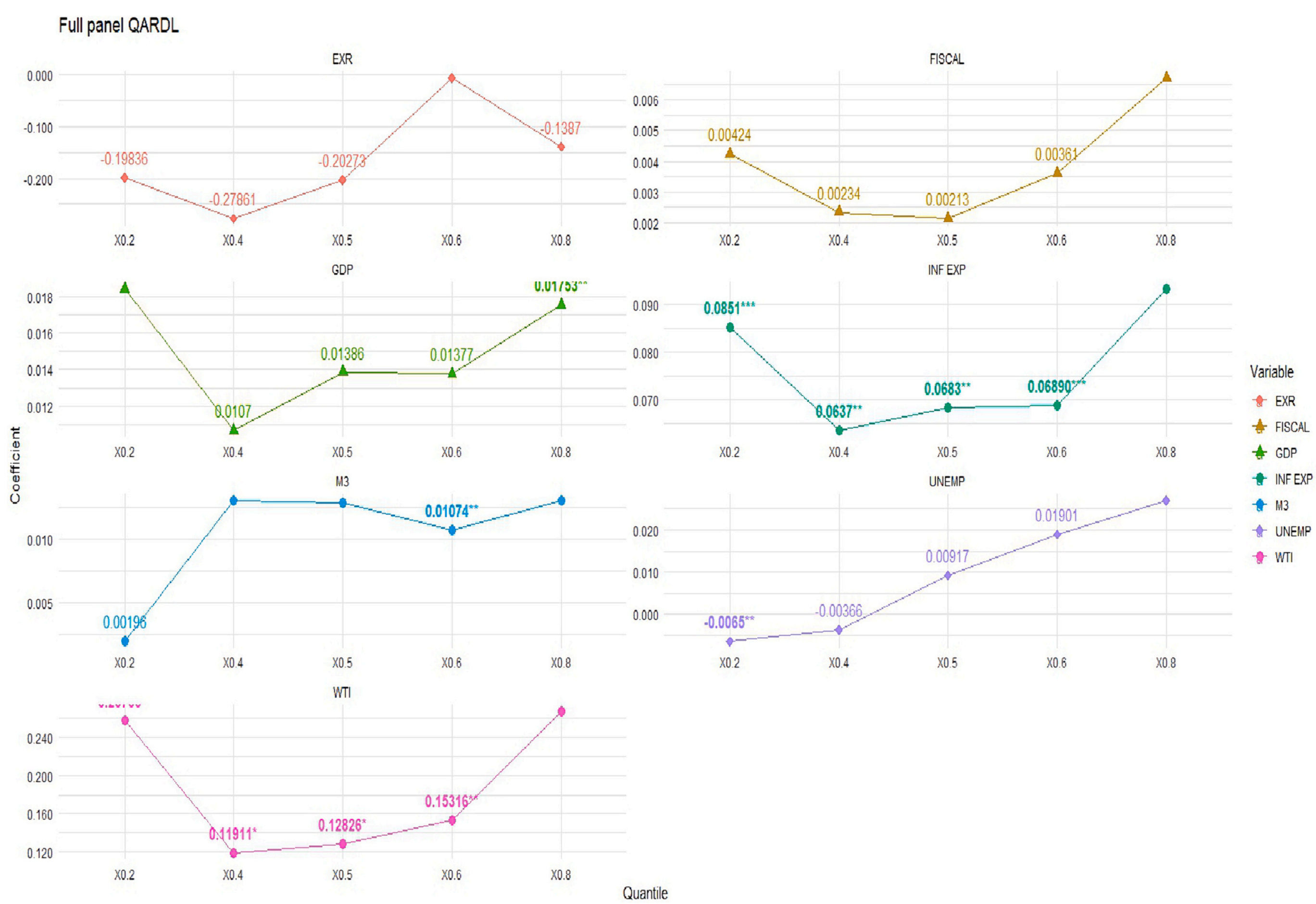

Fig. 2. Full Panel QARDL Graphical presentation.

Table 7a
Quantile ARDL Empirics pre 2012 (1994–2012) Short run Empirics.

Variables	Pre 2012 (1994–2012)			
	Quantile	Coefficient	Std. Error	Prob.
	0.200	0.0614**	0.0208	0.0035
	0.400	0.0828**	0.0276	0.0030
INF	0.500	0.0726**	0.0271	0.0081
	0.600	0.0949***	0.0253	0.0002
	0.800	0.1024**	0.0364	0.0055
	0.200	−0.0065	0.0128	0.6149
	0.400	0.0032	0.0171	0.8507
GDP	0.500	0.0024	0.0168	0.8829
	0.600	0.0004	0.0157	0.9978
	0.800	−0.0578**	0.0226	0.0112
	0.200	−0.0369**	0.0147	0.0128
	0.400	−0.0320*	0.0195	0.1020
UNEMP	0.500	−0.0225	0.0191	0.2413
	0.600	−0.0106	0.0179	0.5534
	0.800	−0.1158***	0.0257	0.0000
	0.200	0.0163*	0.0095	0.0881
	0.400	0.0132	0.0126	0.2962
M3	0.500	0.0159	0.0124	0.2013
	0.600	0.0333**	0.0115	0.0044
	0.800	−0.0014	0.0166	0.9307
	0.200	0.3403***	0.0954	0.0004
	0.400	0.3139**	0.1267	0.0141
WTI	0.500	0.2712**	0.1246	0.0308
	0.600	0.2774**	0.1163	0.0180
	0.800	0.7830***	0.1674	0.0000
	0.200	−0.0018	0.0034	0.6026
	0.400	0.0011	0.0046	0.8038
FISCAL	0.500	−0.0025	0.0045	0.5789
	0.600	−0.0039	0.0042	0.3496
	0.800	0.0018	0.0061	0.7674
	0.200	−1.6028***	0.2992	0.0000
	0.400	−1.4233***	0.3972	0.0004
EXR	0.500	−1.3343**	0.3907	0.0007
	0.600	−1.6727**	0.3645	0.0000
	0.800	−2.2340**	0.5246	0.0000
	0.200	3.3775***	0.4334	0.0000
	0.400	3.1041***	0.5753	0.0000
Constant	0.500	2.7698***	0.5659	0.0000
	0.600	3.0875***	0.5279	0.0000
	0.800	5.3746***	0.7599	0.0000
ECT (EXP-1)	0.200	0.5187***	0.0466	0.0000
	0.400	0.6386***	0.0618	0.0000
	0.500	0.7288***	0.0608	0.0000
	0.600	0.6306***	0.0567	0.0000
	0.800	0.4497***	0.0817	0.0000

Note: The dependent variable is inflation expectations. Superscripts ***, **, *denote statistical significance at the 1%, 5% and 10% levels, respectively. Quantile 20th, 40th, 50th, 60th and 80th are checked. ECT shows the error correction term, as speed of adjustment. We have reported the results of lag, and not the first difference.

Table 7b
Quantile ARDL Empirics pre 2012 (1994–2012) long run Empirics.

Variables	Pre 2012 (1994–2012)			
	Quantile	Coefficient	Std. Error	Prob.
	0.200	0.0907**	0.0359	0.0115
	0.400	0.1284**	0.0532	0.0159
INF	0.500	0.1318**	0.0660	0.0459
	0.600	0.1582**	0.0577	0.0061
	0.800	0.1174***	0.0308	0.0001
	0.200	−0.0096	0.0217	0.6586
	0.400	0.0049	0.0322	0.8766
GDP	0.500	0.0045	0.0399	0.9101
	0.600	0.0006	0.0349	0.9984
	0.800	−0.0663**	0.0186	0.0003
	0.200	−0.0546**	0.0264	0.0390
	0.400	−0.0496	0.0391	0.2050
UNEMP	0.500	−0.0409***	0.0486	0.3996
	0.600	−0.0177	0.0425	0.6769
	0.800	−0.1327***	0.0227	0.0000
	0.200	0.0240	0.0175	0.1708
	0.400	0.0204	0.0260	0.4319
M3	0.500	0.0288	0.0323	0.3713
	0.600	0.0555**	0.0282	0.0492
	0.800	−0.0016	0.0150	0.9123
	0.200	0.5031**	0.1609	0.0017
	0.400	0.4864**	0.2383	0.0412
WTI	0.500	0.4923*	0.2955	0.0957
	0.600	0.4623*	0.2585	0.0736
	0.800	0.8973***	0.1381	0.0000
	0.200	−0.0026	0.0069	0.6985
	0.400	0.0017	0.0103	0.8623
FISCAL	0.500	−0.0046	0.0127	0.7187
	0.600	−0.0066	0.0111	0.5518
	0.800	0.0020	0.0059	0.7276
	0.200	−2.3696**	0.5147	0.0000
	0.400	−2.2057**	0.7625	0.0038
EXR	0.500	−2.4220**	0.9456	0.0104
	0.600	−2.7874**	0.8269	0.0007
	0.800	−2.5601***	0.4418	0.0000

Note: The dependent variable is inflation expected. Superscripts ***, **, *denote statistical significance at the 1%, 5% and 10% levels, respectively. Quantile 20th, 40th, 50th, 60th and 80th are checked. We have reported the results of lag, and not the first difference.
Source: authors' estimations.

The opposite is true for fiscal policy in all quantiles. The coefficients are not statistically significant, suggesting no significant short-run relationship between fiscal policy and inflation expectations across different quantiles. Lastly, exchange rate coefficients are statistically significant at the 1% level (p-values are very low), indicating a significant short-run relationship between exchange rates and inflation expectations across different quantiles. The exchange rate significantly and negatively impacted inflation expectations in the pre-2012 period. Notably, local currency depreciation can potentially affect inflation expectations by making imports cheaper. However, such a relationship is complex and depends on other economic factors. Exchange rates are just one element in the broader economic landscape that influences inflation expectations and actual inflation.

Table 8a and Table 8b report quantile autoregressive distributed lag (QARDL) analysis for the post-inflation targeting period in the US. In the short-run analysis, inflation and GDP are insignificant, whereas, in the long run, GDP has a significant positive relationship with inflation expectations. Meanwhile, unemployment has an essential negative relationship with inflation expectations in the short run and is insignificant in long-run empirics at most quantiles. Money supply reported a positive association with inflation expectations, and the strongest impact is at the 80th quantile in the short and long run. Energy crisis is observed as key factor in post 2012 analysis, as it highlighted positive impacts on inflation expectations. Meanwhile, fiscal policy reported insignificant coefficients in short- and long-run empirics. In contrast, the exchange rate coefficient is insignificant in the short- and long-run findings during post 2012 empirics. The empirical results are in line with primary outcomes and robust.

In summary, although money supply was a key policy variable causing the inflation expectations in the full sample, the same result does not hold when we analyze these two subsamples. However, it is worth mentioning that energy shocks significantly and positively impact inflation shocks in the pre- and post-inflation targeting periods. It is justified that the oil price has witnessed a significant surge during the studied period, which raised inflation and affected inflation expectations, especially after the 9/11 terrorist attack in the United States. Overall, the estimations verify the empirical findings in the full sample, inferring that energy shocks (i.e., oil price fluctuations) significantly contribute to inflation expectations.

The empirical finding aligns with the existing literature (e.g., Kilian and Zhou, 2022). Furthermore, the results found a non-significant relationship between fiscal policy and inflation expectation at most of the quantiles, implying that fiscal policy may not affect inflation

Table 8a
Quantile ARDL Empirics Post 2012 (2012−2022) Short run Empirics.

Variables	Post 2012 (2012–2022)			
	Quantile	Coefficient	Std. Error	Prob.
	0.200	0.0181	0.0300	0.5476
	0.400	0.0191	0.0367	0.6038
INF	0.500	−0.0001	0.0323	0.9998
	0.600	−0.0127	0.0294	0.6664
	0.800	0.0027	0.0270	0.9202
	0.200	0.0241*	0.0119	0.0463
	0.400	0.0190	0.0146	0.1970
GDP	0.500	0.0110	0.0128	0.3923
	0.600	0.0060	0.0117	0.6073
	0.800	0.0102	0.0107	0.3447
	0.200	−0.0264	0.0191	0.1707
	0.400	−0.0378	0.0234	0.1100
UNEMP	0.500	−0.0413**	0.0206	0.0478
	0.600	−0.0511**	0.0188	0.0077
	0.800	−0.0666***	0.0172	0.0002
	0.200	0.0212**	0.0060	0.0006
	0.400	0.0294**	0.0073	0.0001
M3	0.500	0.0278**	0.0064	0.0000
	0.600	0.0278***	0.0059	0.0000
	0.800	0.0397***	0.0054	0.0000
	0.200	−0.1286	0.2390	0.5916
	0.400	0.2799	0.2929	0.3416
WTI	0.500	0.4880*	0.2574	0.0609
	0.600	0.4476**	0.2349	0.0597
	0.800	0.3199	0.2156	0.1410
	0.200	0.0008	0.0021	0.6968
	0.400	−0.0001	0.0026	0.9556
FISCAL	0.500	0.0009	0.0023	0.6887
	0.600	0.0009	0.0021	0.6584
	0.800	0.0025	0.0019	0.1827
	0.200	−0.3268	0.5524	0.5554
	0.400	−0.1048	0.6770	0.8773
EXR	0.500	0.3610	0.5949	0.5453
	0.600	0.1862	0.5429	0.7323
	0.800	−0.3865	0.4983	0.4201
	0.200	0.4738	0.8088	0.5594
	0.400	0.3616	0.9913	0.7160
Constant	0.500	−0.2911	0.8710	0.7389
	0.600	−0.1146	0.7949	0.8856
	0.800	0.9665	0.7295	0.1883
ECT (EXP-1)	0.200	0.4104***	0.0823	0.0000
	0.400	0.4292***	0.1009	0.0000
	0.500	0.4939***	0.0886	0.0000
	0.600	0.5438***	0.0809	0.0000
	0.800	0.6090***	0.0742	0.0000

Note: The dependent variable is inflation expected. Superscripts ***, **, *denote statistical significance at the 1%, 5% and 10% levels, respectively. Quantile 20th, 40th, 50th, 60th and 80th are checked. ECT shows the error correction term, as speed of adjustment.

expectations. This is in contrast with the results of the full sample ARDL.

However, the exchange rate is significant and negative in the pre-ITR, while non-significant in the post-ITR. Overall, it implies that the exchange rate was a significant factor for inflation expectations until the explicit inflation targeting regime was introduced. After introducing this policy, the exchange rate effects may have become lower. Our finding is consistent with Nasir et al. (2020a, 2020b, 2020c), as they also concluded a similar outcome for the case of New Zealand in the post-ITR period. Overall, in the empirical results of both samples, we observe inflation, exchange rate, and energy shocks as strong factors influencing inflation expectations.

Fig. 3 and Fig. 4 highlight the graphical representation of quantile ARDL findings of pre-inflation targeting and post-inflation targeting. Overall, in the empirical model, ECT shows a significant relationship, which once again endorses the model's validity.

Table 8b
Quantile ARDL Empirics post 2012 (2012–2022) long run Empirics.

Variables	Post 2012 (2012–2022)			
	Quantile	Coefficient	Std. Error	Prob.
	0.200	0.2669	0.4342	0.5387
	0.400	0.1092	0.2625	0.6772
INF	0.500	−0.0004	0.3410	0.9999
	0.600	−0.1480	0.5406	0.7842
	0.800	0.0146	0.1568	0.9255
	0.200	0.3557*	0.2189	0.1041
	0.400	0.1086	0.1323	0.4117
GDP	0.500	0.0759	0.1719	0.6587
	0.600	0.0703	0.2725	0.7962
	0.800	0.0552	0.0790	0.4849
	0.200	−0.3893	0.3029	0.1988
	0.400	−0.2159	0.1832	0.2386
UNEMP	0.500	−0.2834	0.2379	0.2336
	0.600	−0.5942	0.3772	0.1152
	0.800	−0.3593**	0.1094	0.0010
	0.200	0.3128**	0.0874	0.0003
	0.400	0.1680**	0.0528	0.0014
M3	0.500	0.1909**	0.0686	0.0054
	0.600	0.3238**	0.1088	0.0029
	0.800	0.2143***	0.0315	0.0000
	0.200	−1.8967	4.1353	0.6464
	0.400	1.5982	2.5007	0.5227
WTI	0.500	3.3491	3.2480	0.3024
	0.600	5.1983	5.1493	0.3127
	0.800	1.7259	1.4941	0.2480
	0.200	0.0122	0.0527	0.8158
	0.400	−0.0008	0.0318	0.9791
FISCAL	0.500	0.0063	0.0414	0.8785
	0.600	0.0107	0.0656	0.8695
	0.800	0.0139	0.0190	0.4650
	0.200	−4.8189	8.9817	0.5915
	0.400	−0.5982	5.4312	0.9122
EXR	0.500	2.4777	7.0543	0.7254
	0.600	2.1624	11.1840	0.8466
	0.800	−2.0849	3.2452	0.5205

Note: The dependent variable is inflation expected. Superscripts ***, **, *denote statistical significance at the 1%, 5% and 10% levels, respectively. Quantile 20th, 40th, 50th, 60th and 80th are checked.

5. Conclusion and policy implications

Controlling inflation has been one of the primary goals of monetary policy, besides delivering financial stability and economic growth. In the late 1970s and early 1980s, OECD nations began to declare money or credit objectives and to make earnest attempts to achieve them. That time marked the start of the aggressive emphasis on inflation management (Reddell, 1999). The origin of unconventional monetary policies can be dated back to New Zealand, the first country to adopt an inflation-targeting regime in February 1990, with the introduction of the Reserve Bank of New Zealand Act 1989 (RBNZ Act).

Decades later, the 2008 global financial crisis shifted the focus of the discussion toward the ability of monetary policy to achieve its objectives in the face of a disrupted monetary transmission mechanism (Tsenova, 2015). In the aftermath of the GFC, the discussion on inflation control gathered speed, and the task of central banks to strike a balance between managing inflation and fostering growth grew increasingly challenging (Moessner and Takáts, 2020). The emergence of the explicit inflation targeting regime (ITR) in the United States in 2012 ushered in a new era for the global economy since the focus on inflation management could harm other policy objectives, such as economic growth, while being positive for inflation control.

The primary objective of this study is to examine the role of monetary policy, fiscal policy, and energy shocks for inflation expectations in the United States during the pre-and post-inflation targeting periods. This topic has become particularly relevant given the current geopolitical tension between Russia and Ukraine. The conflict between these countries has resulted in disruptions in the energy supply and worldwide

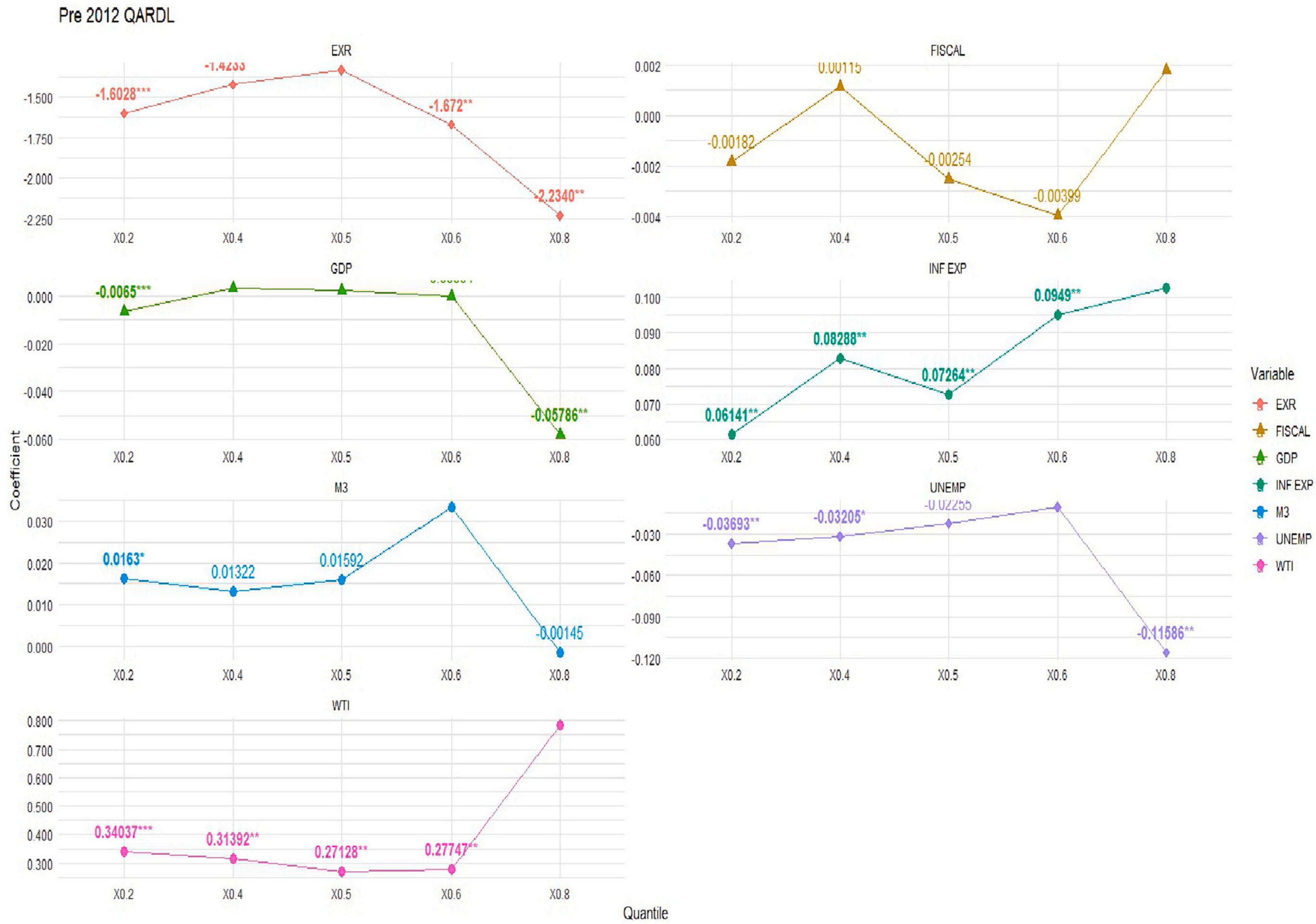

Fig. 3. Pre 2012 QARDL Graphical presentation.

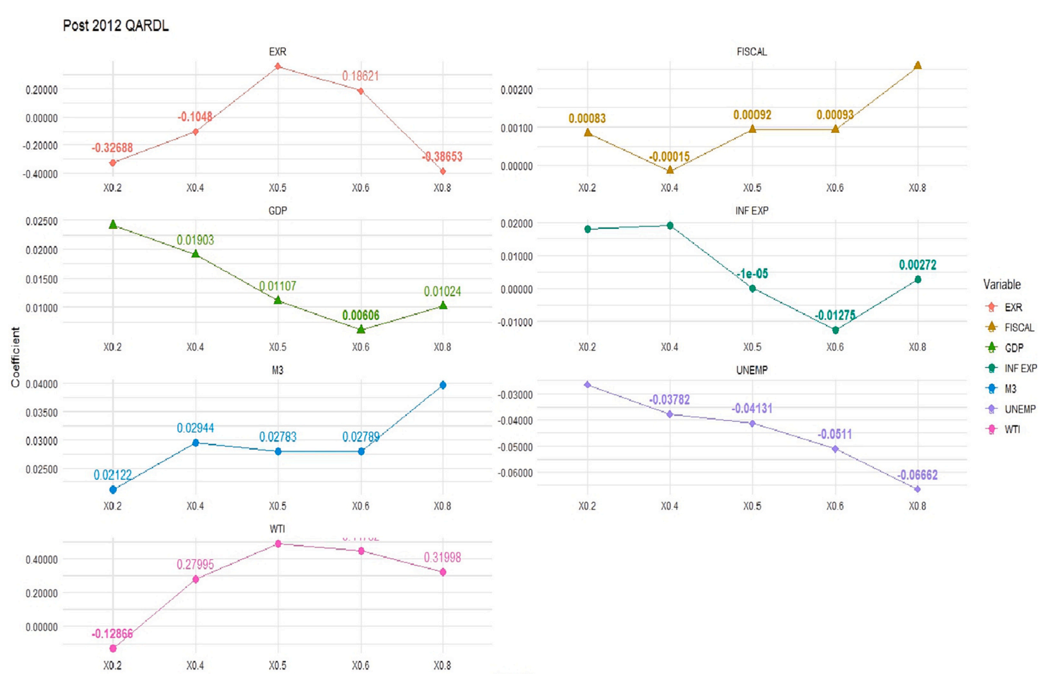

Fig. 4. Post 2012 QARDL Graphical presentation.

impacts on energy costs and inflation.

Adopting an ITR also challenges the scholarship of economics and finance in evaluating the impact of such a regime and guiding the monetary policymakers as to whether ITR is a beneficial policy in pursuing inflation control. Academic scholarship has made several attempts in this direction, but there are hardly any conclusive results. Besides, the studies have focused on other countries, such as the United Kingdom (Nasir et al., 2020b), New Zealand (Nasir et al., 2020a), Japan (De Andrade and Divino, 2005), Kazakhstan (Algozhina, 2022), and economies in Latin America (Carrasco and Ferreiro, 2014). However, Canarella and Miller (2016) compare the inflation experience of the countries adopting ITR with the US. The present study is novel as it focuses on adopting explicit ITR in the US and draws some exciting findings, giving us theoretical and policy-level contributions.

Notably, the current study allows us to conclude that monetary policy, energy shocks, and exchange rates are key policy factors for inflation expectations. The increased usage of monetary policy to keep inflation expectations under control is being witnessed worldwide. In line with Houcine et al. (2020), the linear ARDL results suggest that the monetary policy, which did not have any significant impact on the inflation expectations during the pre-ITR regime, also had insignificant effects and started making a positive (short-run) impact during the post-ITR regime. However, since we did not find a development of monetary policy on inflation expectations in the long run, the drastic cost of persistent unemployment (as cautioned by Jean Louis and Balli (2013)), may be evaded.

Energy shocks remain a prominent determinant of macroeconomic outcomes worldwide (Bhar and Mallik, 2010). The linear ARDL results suggest this impact is dying down in the post-ITR period. However, the more robust technique of QARDL indicates the reverse, where the effect of oil price shocks on inflation expectations is visible through pre- and post-ITR periods. The diminishing influence over the long run, as shown by the ARDL results, verifies the conclusions of Kilian and Zhou (2022), who argue that the fears of growing long-term inflation due to oil price shocks are exaggerated. This comes as a critical guidance for monetary policymakers who have relied on this fear to advocate for tight economic policies in recent times.

The results about the effect of exchange rate shocks in determining inflation targets provide an additional significant contribution to the existing research. Throughout the full period (1994 m1-2022 m10), the ARDL technique confirms this short- and long-term relationship. Surprisingly, the influence changes from being insignificant in the short term to harmful in the long term. Similar evidence is seen in the pre-ITR period. However, the influence becomes non-significant post-ITR. This shift may be deciphered via the price of the US dollar since 2012, which has been continuously appreciating; as a result, its influence on inflation predictions is, at best, modest, unlike the case with other economies whose currencies are not as strong as the US dollar (Adil et al., 2022).

The nations adopting an inflation target regime (ITR) must evaluate this policy in light of the inflation-growth nexus. Economic crises, such as the GFC in 2008, the pandemic, the recent energy crisis, and the imminent environmental crisis, threaten to throw a significant portion of the world's population into unemployment, and expansion of monetary policy may be seen as one of the most important coping mechanisms (Yunus, 1999). The economists' quest for growth fuels the debate over whether explicit inflation targeting should be implemented. The long-term objective of reducing the reliance on fossil fuels is imperative for sustainable development and may reduce the chances of future energy crises.

The current research explores the drivers of inflation expectations in the United States before and after implementing the explicit ITR. The influence of monetary policy on inflation targeting is short-term but not long-term, posing little harm to economic growth or employment (as of now). While this is a sign of relief, monetary policymakers must tread cautiously, as countries with weaker currencies relative to the US dollar may face dire consequences due to the impact of exchange rate shocks, which can quickly have a global ripple effect due to the magnitude of capital flows during these times.

A caveat of the present study is that we have not considered interest rate, communication policy, and geopolitical risk as variables in the empirical model. Future studies might include these factors as, in modern times, these are becoming more relevant for inflation expectations and the overall structural economy. Similarly, the empirical model can be extended with these factors and studied prior to the implementation of an ITR and post the implementation of an ITR (inflation targeting regime).

Ethics approval and consent to participate

Not applicable.

Consent to publish

Not applicable.

Funding

No funding was received for this work.

CRediT authorship contribution statement

Umer Shahzad: Writing – original draft, Software, Methodology, Formal analysis. **Bianca Orsi:** Writing – review & editing, Writing – original draft, Supervision, Investigation, Formal analysis, Conceptualization. **Gagan Deep Sharma:** Writing – review & editing, Writing – original draft, Investigation, Formal analysis, Conceptualization.

Declaration of competing interest

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

Data availability

The datasets used during the current study are available from the corresponding on reasonable request.

Appendix A. Appendix

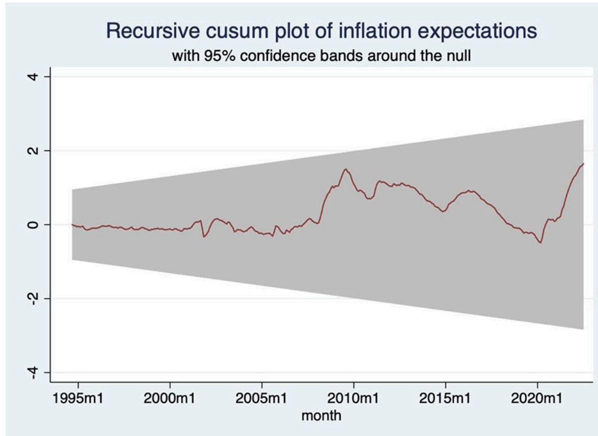

Fig. 5. CUSUM test Full panel.

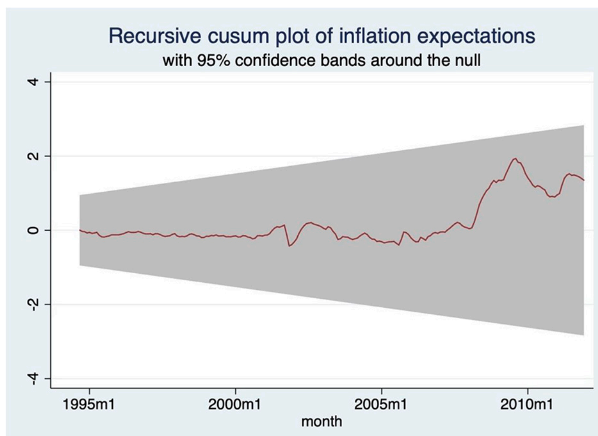

Fig. 6. CUSUM test Pre 2012.

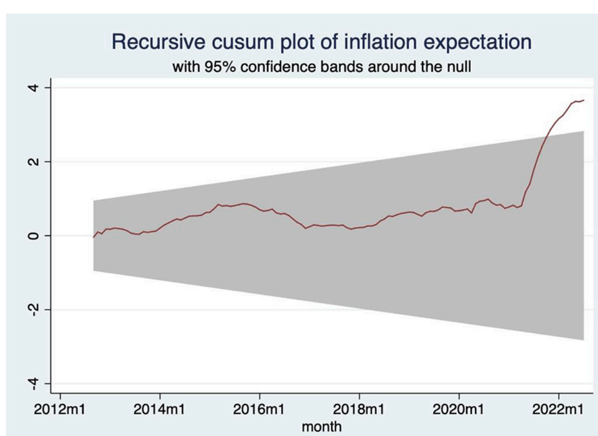

Fig. 7. CUSUM test Post 2012.

Appendix B. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.eneco.2024.107474.

References

Adil, M.H., Ghosh, T., Nurudeen, I., Hatekar, N., 2022. Dynamic interaction among macroeconomic fundamentals: evidence from India using the SVAR framework. J. Stud. Econ. Economet. 46 (1), 43–63. https://doi.org/10.1080/03796205.2022.2077232.

Adrian, T., 2023, May 15. The Role of Inflation Expectations in Monetary Policy. Retrieved from https://www.imf.org/en/News/Articles/2023/05/15/sp-role-inflation-expectations-monetary-policy-tobias-adrian.

Alekhina, V., Yoshino, N., 2019. Homogeneity of world oil prices to the Russian Federation's economy and monetary policy. Eur. Econ. Rev. 9 (4), 531–555. https://doi.org/10.1007/s40822-018-0115-3.

Algozhina, A., 2022. Monetary policy rule, exchange rate regime, and fiscal policy cyclicality in a developing oil economy. Energy Econ. 112 https://doi.org/10.1016/j.eneco.2022.106126.

Alpanda, S., Honig, A., 2010. Political monetary cycles and a de facto ranking of central bank independence. J. Int. Money Financ. 29 (6), 1003–1023.

Ameen, N., Sharma, G.D., Tarba, S., Rao, A., Chopra, R., 2022. Toward advancing theory on creativity in marketing and artificial intelligence. Psychol. Mark. (September 2021) https://doi.org/10.1002/mar.21699.

An, Z., Sheng, X.S., Zheng, X., 2023. What's the role of perceived oil price shocks in inflation expectations? Retrieved from.

Armantier, O., Topa, G., van der Klaauw, W., Zafar, B., 2016. How Do People Revise their Inflation Expectations? Liberty Economics.

Asghar, Z., Abid, I., 2007. Performance of Lag Length Selection Criteria in Three Different Situations. University Library OfMunich, Germany., MPRA Paper(40042).

Avci, S.B., Yucel, E., 2017. Effectiveness of monetary policy: evidence from Turkey. Eur. Econ. Rev. 7 (2), 179–213. https://doi.org/10.1007/s40822-017-0068-y.

Baba, C., Lee, J., 2022. Second-Round Effects of Oil Price Shocks–Implications for Europe's Inflation Outlook.

Ball, L.M., Leigh, D., Mishra, P., 2022. Understanding US Inflation During the COVID Era. Retrieved from.

Bank of International Settlements, 2022. US dollar exchange rates. Retrieved from https://www.bis.org/.

Bhar, R., Mallik, G., 2010. Inflation, inflation uncertainty, and output growth in the USA. Phys. A: Stat. Mech. Appl. 389 (23), 5503–5510. https://doi.org/10.1016/j.physa.2010.06.063.

Bloch, H., Dockery, A.M., Sapsford, D., 2004. Commodity prices, wages, and US inflation in the twentieth century. J. Post Keynesian Econ. 26 (3), 523–545.

Boufateh, T., Saadaoui, Z., 2021. The time-varying responses of financial intermediation and inflation to oil supply and demand shocks in the US: evidence from Bayesian TVP-SVAR-SV approach. Energy Econ. 102, 105535.

Canarella, G., Miller, S.M., 2016. Inflation persistence and structural breaks: the experience of inflation targeting countries and the USA. J. Econ. Stud. 43 (6), 980–1005. https://doi.org/10.1108/JES-10-2015-0190.

Carrasco, C.A., Ferreiro, J., 2014. Latin American inflation differentials with USA inflation: does inflation targeting make a difference? J. Econ. Policy Reform 17 (1), 13–32. https://doi.org/10.1080/17487870.2013.787794.

Catao, L.A., Terrones, M.E., 2005. Fiscal deficits and inflation. J. Monet. Econ. 52 (3), 529–554.

Cerisola, M., Gelos, G., 2009. What drives inflation expectations in Brazil? An empirical analysis. Appl. Econ. 41 (10), 1215–1227.

Cho, J.S., Kim, T.H., Shin, Y., 2015. Quantile cointegration in the autoregressive distributed-lag modeling framework. J. Econ. 188, 281–300. https://doi.org/10.1016/j.jeconom.2015.05.003.

Coibion, O., Gorodnichenko, Y., 2015. Information rigidity and the expectations formation process: a simple framework and new facts. Am. Econ. Rev. 105 (8), 2644–2678.

Corbo, V., Landerretche, O., Schmidt-Hebbel, K., 2001. Assessing inflation targeting after a decade of world experience. Int. J. Financ. Econ. 6 (4), 343–368.

De Andrade, J.P., Divino, J.A., 2005. Monetary policy of the Bank of Japan - inflation target versus exchange rate target. Jpn. World Econ. 17 (2), 189–208. https://doi.org/10.1016/j.japwor.2003.12.009.

Dickey, D.A., Fuller, W.A., 1979. Distribution of the estimators for autoregressive time series with a unit root. J. Am. Stat. Assoc. 74 (366), 427. https://doi.org/10.2307/2286348.

Eichengreen, B., 2002. Can emerging markets float. In: Should they Inflation Target.

Energy Information Administration, 2022, November 10. Energy Indicators Data. Retrieved from 3. https://www.eia.gov/dnav/pet/pet_pri_spt_s1_d.htm?fbclid=IwAR0zS-w2murD3PftB44LWMPgYROnJYjeRohItmDBfikndVjyOZ5jH_ANUmk.

European Central Bank, 2022, October 11. The Transmission of Monetary Policy. Retrieved from https://www.ecb.europa.eu/press/key/date/2022/html/ecb.sp221011~5062b44330.en.html.

Federal Reserve Bank, 2022. Federal Reserve Bank. Retrieved November 2022, from Federal Reserve Economic Data: Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/INTDSRUSM193N, December 24, 2022.

Fischer, S., Sahay, R., Végh, C.A., 2002. Modern hyper-and high inflations. J. Econ. Lit. 40 (3), 837–880.

Forbes, K., 2016. Much ado about something important: how do exchange rate movements affect inflation? Manch. Sch. 84 (S1), 15–41.

Forbes, K.J., Hjortsoe, I., Nenova, T., 2017. Shocks Versus Structure: Explaining Differences in Exchange Rate Pass-through across Countries and Time.

Forbes, K., Hjortsoe, I., Nenova, T., 2018. The shocks matter: improving our estimates of exchange rate pass-through. J. Int. Econ. 114, 255–275.

Friedman, M., 1968. The role of monetary policy. Am. Econ. Rev. 58 (March), 269–295. https://doi.org/10.1126/science.151.3712.867-a.

Friedman, M., 1970. The counter-revolution in monetary theory: first Wincott memorial lecture, delivered at the Senate House, University of London, 16 September, 1970 (Vol. 33): Transatlantic Arts.

Friedman, M., 1977. Nobel lecture: inflation and unemployment. J. Polit. Econ. 85 (3), 451–472.

Fuhrer, J.C., 2011. The Role of Expectations in US Inflation Dynamics. http://hdl.handle.net/10419/55653http://www.bostonfed.org/economic/wp/index.htm.

Gali, J., Gertler, M., Lopez-Salido, J.D., 2005. Robustness of the estimates of the hybrid new Keynesian Phillips curve. J. Monet. Econ. 52 (6), 1107–1118.

Geiger, M., Scharler, J., 2019. How do consumers assess the macroeconomic effects of oil price fluctuations? Evidence from US survey data. J. Macroecon. 62, 103134.

Godil, D.I., Sharif, A., Ali, M.I., Ozturk, I., Usman, R., 2021. The role of financial development, R&D expenditure, globalization and institutional quality in energy consumption in India: new evidence from the QARDL approach. J. Environ. Manag. 285, 112208 https://doi.org/10.1016/j.jenvman.2021.112208.

Granger, C., 1981. Some properties of time series data and their use in econometric model specification. J. Econ. 16 (1), 121–130.

Hart, N., 2009. Discretionary Fiscal Policy and Budget Deficits: An 'Orthodox ' Critique of Current Policy Debate. SAGE Publications Sage UK, London, England.

Houcine, B., Abdelkader, A., Lachi, O., 2020. The impact of unconventional monetary policy tools on inflation rates in the USA. Asian Econ. Financ. Rev. 10 (6), 628–643. https://doi.org/10.18488/journal.aefr.2020.106.628.643.

Hung, H.F., Thompson, D., 2016. Money supply, class power, and inflation: monetarism reassessed. Am. Sociol. Rev. 81 (3), 447–466. https://doi.org/10.1177/0003122416639609.

Jean Louis, R., Balli, F., 2013. Low-inflation-targeting monetary policy and differential unemployment rate: is monetary policy to be blamed for the financial crisis? - evidence from major OECD countries. Econ. Model. 30 (1), 546–564. https://doi.org/10.1016/j.econmod.2012.09.042.

Kilian, L., Zhou, X., 2022. The impact of rising oil prices on US inflation and inflation expectations in 2020–23. Energy Econ. 113, 106228.

Kriesler, P., Lavoie, M., 2007. The new consensus on monetary policy and its post-Keynesian critique. Rev. Politic. Econ. 19 (3), 387–404.

Lin, H.-Y., Chu, H.-P., 2013. Are fiscal deficits inflationary? J. Int. Money Financ. 32, 214–233.

Lu, X., Guo, K., Dong, Z., Wang, X., 2017. Financial development and relationship evolvement among money supply, economic growth and inflation: a comparative study from the US and China. Appl. Econ. 49 (10), 1032–1045. https://doi.org/10.1080/00036846.2016.1210776.

Mahendru, M., Sharma, G.D., Pereira, V., Gupta, M., Mundi, H.S., 2022. Is it all about money, honey? Analyzing and mapping financial well-being research and identifying future research agenda. J. Bus. Res. 150 (October 2021), 417–436. https://doi.org/10.1016/j.jbusres.2022.06.034.

Mehra, Y.P., Herrington, C., 2008. On the sources of movements in inflation expectations: a few insights from a VAR model. FRB Richmond Econ. Quart. 94 (2), 121–146.

Mikek, P., 2004. Inflation targeting and switch of fiscal regime in New Zealand. Appl. Econ. 36 (2), 165–172. https://doi.org/10.1080/0003684042000174056.

Minea, A., Tapsoba, R., 2014. Does inflation targeting improve fiscal discipline? J. Int. Money Financ. 40, 185–203.

Minella, A., De Freitas, P.S., Goldfajn, I., Muinhos, M.K., 2003. Inflation targeting in Brazil: constructing credibility under exchange rate volatility. J. Int. Money Financ. 22 (7), 1015–1040.

Mishkin, F.S., Savastano, M.A., 2001. Monetary policy strategies for Latin America. J. Dev. Econ. 66 (2), 415–444.

Moessner, R., Takáts, E., 2020. How well-Anchored are Long-Term Inflation Expectations? www.bis.org.

Nasir, M.A., Simpson, J., 2018. Brexit associated sharp depreciation and implications for UK's inflation and balance of payments. J. Econ. Stud. 45 (2), 231–246.

Nasir, M.A., Vo, X.V., 2018. A Quarter Century of Inflation Targeting & Exchange Rate Pass-Through: Evidence from the First Three Movers. Available at SSRN 3130082.

Nasir, M.A., Balsalobre-Lorente, D., Huynh, T.L.D., 2020a. Anchoring inflation expectations in the face of oil shocks & in the proximity of ZLB: a tale of two targeters. Energy Econ. 86, 104662.

Nasir, M.A., Huynh, T.L.D., Vo, X.V., 2020b. Exchange rate pass-through & management of inflation expectations in a small open inflation-targeting economy. Int. Rev. Econ. Financ. 69, 178–188.

Nasir, M.A., Huynh, T.L.D., Yarovaya, L., 2020c. Inflation targeting & implications of oil shocks for inflation expectations in oil-importing and exporting economies: evidence from three Nordic kingdoms. Int. Rev. Financ. Anal. 72 https://doi.org/10.1016/j.irfa.2020.101558.

Ocampo, J.A., 2001. International Asymmetries and The Design of the International Financial System. CEPAL Serie Temas de Coyuntura, 15.

Oloko, T.F., Ogbonna, A.E., Adedeji, A.A., Lakhani, N., 2021. Oil price shocks and inflation rate persistence: a fractional cointegration VAR approach. Econ. Anal. Policy 70, 259–275.

Pham, T.A.T., Nguyen, T.T., Nasir, M.A., Huynh, T.L.D., 2020. Exchange rate pass-through: a comparative analysis of inflation targeting & non-targeting ASEAN-5 countries. Q. Rev. Econ. Finance. 87, 158–167. February 2023.

Phillips, P.C.B., Perron, P., 1988. Testing for a unit root in time series regression. Biometrika 75 (2), 335–346. https://doi.org/10.1093/biomet/75.2.335.

Rajan, R., 2015. Sustainable growth in the financial sector: 2015 C.K. Prahalad Lecture. https://www.rbi.org.in/Scripts/BS_SpeechesView.aspx?Id=976.

Reddell, M., 1999. Origins and early development of the inflation target. Reserve Bank New Zealand Bullet. 62 (3), 63–71.

Sargent, T.J., Wallace, M., 1981. Some unpleasant monetarist arithmetic. Federal Reserve Bank Minneapolis Quart. Rev. 5 (3), 1–17.
Schmidt-Hebbel, K., Werner, A., Hausmann, R., Chang, R., 2002. Inflation targeting in Brazil, Chile, and Mexico: performance, credibility, and the exchange rate [with comments]. Economia 2 (2), 31–89.
Su, C.W., Fan, J.J., Chang, H.L., Li, X.L., 2016. Is there causal relationship between money supply growth and inflation in China? Evidence from quantity theory of money. Rev. Dev. Econ. 20 (3), 702–719. https://doi.org/10.1111/rode.12194.
Tsenova, T., 2015. Are long-term inflation expectations well-anchored? Evidence from the euro area and the United States. Bull. Econ. Res. 67 (1), 65–82. https://doi.org/10.1111/j.1467-8586.2012.00474.x.
University of Michigan, 2022. University of Michigan: Inflation Expectation [MICH] retrieved from FRED, Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/MICH, November 24, 2022.
Weber, I.M., Wasner, E., 2023. Sellers' inflation, profits and conflict: why can large firms hike prices in an emergency? Rev. Keynes. Econ. 11 (2), 183–213.
Wildauer, R., Kohler, K., Aboobaker, A., Guschanski, A., 2023. Energy price shocks, conflict inflation, and income distribution in a three-sector model. Energy Econ. 106982.
Wong, B., 2015. Do inflation expectations propagate the inflationary impact of real oil price shocks?: evidence from the Michigan survey. J. Money Credit Bank. 47 (8), 1673–1689.
Woodford, M., 2003. Interest and Prices: Foundations of a Theory of Monetary Policy. Princeton University Press, Woodstock.
Yigit, T.M., 2010. Inflation targeting: An indirect approach to assess the direct impact. J. Int. Money Financ. 29 (7), 1357–1368.
Yunus, M., 1999. Banker to the Poor: Microlending and the Battle against World Poverty. Public Affairs.
Zivot, E., Andrews, D.W.K., 1992. Further evidence on the great crash, the oil-Price shock, and the unit-root hypothesis. J. Bus. Econ. Stat. 10 (3), 251–270.