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Inflation Persistence in Selected MENA Countries: What Has Changed Since the Advent of the Arab Spring?

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Abstract

This paper aims to empirically investigate the dynamic behaviour of inflation rates in four countries in the Middle East and North Africa (Algeria, Egypt, Morocco and Tunisia) based on the assumption that inflation has become more persistent in the aftermath of the Arab Spring. The study analyses whether the inflation dynamics in these countries have exhibited any differences after the Arab Spring period. To do so, we conduct an analysis based on the quantile autoregressive (QAR) unit root approach for before and after the Arab Spring. Our findings indicate that the inflation rates in the studied MENA countries exhibit high persistence in the period after the Arab Spring (2011–2023). As a result, shocks that hit inflation may not remain transitory and instead have a persistent inflationary effect. From a policy perspective, our findings suggest that monetary authorities in the selected MENA countries should not tolerate an increase in inflation, even if it is deemed transitory.

Keywords: Inflation persistence, unit root test, quantile unit root test, MENA countries

JEL Classification: E31, C22, P44

1. Introduction

The term Arab Spring refers to the massive anti-government protests that took place in the Middle East and North Africa (MENA) in late 2010 and early 2011. The Arab Spring has always been portrayed as political uprisings generally driven by demands for democratic reforms and political freedom. However, the motivations behind these protests were multifaceted and included not only political factors; economic issues were an equally important factor. Based on the Arab Barometer's 2012–2014 survey analysing the reasons for the Arab Spring in developing MENA countries, it was established that protesters in the Arab world primarily raised their voices to demand improvements in the economic situation (64% of respondents) and to express their dissatisfaction with corruption (64%) and lack of social and economic justice (57%).

What is noteworthy is that these protests occurred precisely in 2011, a date coinciding with a period of large peaks in global food prices. In fact, since 2006 most MENA countries have experienced an increase in their domestic food prices by more than 20% (WB, 2011). This is why many researchers have said that one of the major driving forces behind the Arab Spring was the high food prices (Krugman, 2011; Lagi *et al*., 2011; Soffiantini, 2020; Abu Hatab, 2016). In this context, top economist and Nobel laureate Paul Krugman (2011) pointed out that there was little doubt that sky-high food prices had been an important trigger for popular uprisings against corrupt and authoritarian regimes in the Middle East. Besides, Lagi *et al*. (2011) proposed a food price-crisis model which identifies a specific food price threshold (around the FAO price index of 210) above which protests become likely. Based on this model, Lagi *et al*. (2011) suggested that the Arab Spring events in North Africa and the Middle East were triggered by food prices. The authors argue that high and volatile food prices led to food riots and played a critical role in triggering the Arab Spring movements.

The statistics emphasize that many MENA countries experienced a surge in inflation rates following the Arab Spring. In Egypt, for instance inflation increased from 11.3% in 2010 to about 29.5% in 2017, and in Tunisia from 3.3% in 2010 to 7.3% in 2018. However, Algeria and Morocco, the two countries that were partially spared from the Arab Spring, the inflation rates witnessed fewer changes; they increased from 1% in 2010 to 1.8% in 2018 in Morocco and from 3.9% in 2010 to 4.3% in 2018 in Algeria.

After a pause during the COVID-19 pandemic, the inflation rates resumed their upward trend in the post-pandemic era across most MENA countries. In the MENA countries, the headline inflation reached 14.2% on average for 2022 and was expected to remain in double digits in 2023 (IMF, 2022). The catalyst of the Arab Spring, food prices, have also risen significantly in the post-pandemic period. Food price inflation reached 29% for most MENA economies in 2022, which is much higher than the headline inflation (WB, 2023).

In fact, high and persistent inflation pose significant threats to MENA economies (WB, 2023). For instance, tightening monetary policy by increasing interest rates to curb high infla-

tion carries the risk of impeding economic growth and putting upward pressure on unemployment. Moreover, according to the Lopez-Acevedo *et al.* (2022), for every one-percent increase in food prices, which accounts for about 50% of headline inflation in many countries in the MENA region, nearly half a million additional people could be pushed into poverty.

This issue of inflation persistence, defined as the speed with which inflation returns to its mean after a shock (Willis, 2003; Marques, 2004), has been extensively investigated in the literature. This is due to its importance to monetary policymakers and its central role in designing monetary policy (Fuhrer, 2009). Notably, when high inflation is persistent, the central bank would find it difficult to bring it back to its target level, suggesting a higher sacrifice ratio – the output costs of lowering inflation back to the target (Fuhrer, 2009). In other words, if inflation is persistent, reducing it to the target value would involve significant economic costs. Therefore, increased knowledge about the degree of inflation persistence is crucial for central banks to engineer effective disinflation policy.

In fact, empirical findings suggest that inflation persistence has changed substantially over the past twenty years (Stock and Watson, 2007; Cogley and Sargent, 2005; Watson, 2014). In the majority of industrial economies, there is evidence of a significant decline in inflation persistence since the 1980s (Mishkin, 2007; Cogley and Sbordone, 2008; Oliveira and Petrassi, 2014). However, in emerging markets and developing economies, inflation increased substantially during the 1970s and 1980s, whereas a decline began in the mid-1990s (Gaglianone *et al*., 2018). Meanwhile, many emerging economies have shown increasing persistence in inflation, with a few having experienced highly persistent inflationary pressures (Oliveira and Petrassi, 2014). While the inflation remained low after the 2008 financial crisis, it experienced a rebound following the recovery from the COVID-19 pandemic. According to the IMF (2022), inflation has risen faster and more persistently since 2021 than anticipated, culminating in its highest rate in advanced economies since 1982 in 2022.

Therefore, the aim of this paper is to examine the dynamic behaviour of the inflation rate for four MENA countries (Algeria, Egypt, Morocco and Tunisia). More specifically, we study the persistence of inflation in these countries in terms of whether shocks affecting the inflation rate are transitory or have a lasting impact especially after the Arab Spring.

During the Arab Spring period, most MENA countries strived to implement more social measures, primarily aimed at appeasing public discontent. These measures were based on the belief that economic and social problems were the main drivers of the region's pro-democracy movements. Several measures have been implemented, such as increasing workers' salaries, as well as significant increases in social care and pension allowances, increasing food subsidies, increasing employment in the public sector and government institutions and cutting taxes.

Ultimately, the economic performance of many Arab countries deteriorated significantly in the aftermath of the Arab Spring. Many of these countries experienced high levels of inflation, diminished investment and a drastic reduction in average economic growth by more than half

(Lanchovichina, 2018). The government's ability to finance public services largely deteriorated as they raised spending on national security and social programmes over productive investments in public services and infrastructure (Lanchovichina, 2018). Certainly, increased spending in these countries has resulted in higher fiscal burden, consequently widening the budget deficit (WB, 2011). Accordingly, the expanded social policies are expected to have inflationary effects in the medium and long run; for that reason, this paper expresses the following hypothesis. Partly due to the expanded social policies following the Arab Spring uprisings, inflation has become more persistent in many MENA countries.

The main contributions of this paper to the existing literature can be summarized as follows. Firstly, this paper is an attempt to investigate inflation persistence in selected Middle East and North Africa (MENA) countries for both the periods before the Arab Spring (1988–2010) and after the Arab Spring (2011–2023). Specifically, we compare the dynamic behaviour of inflation in countries severely affected by the Arab Spring (Egypt and Tunisia) with those relatively spared from these events (Algeria and Morocco). Secondly, this work contributes to the existing literature by employing multiple unit root tests to determine whether inflation persistence in the studied countries has changed following the Arab Spring. This study employs traditional unit root tests to examine the behaviour of inflation persistence, in addition to the two-break unit root test proposed by Clemente *et al*. (1998) to identify potential structural breaks in inflation time series. It also adds to the current body of studies on the MENA region by applying two alternative methods: (1) a quantile autoregression (QAR) unit root test and (2) a recursive quantile autoregression estimation. The novel QAR unit root test allows us to identify the degree of inflation persistence across different quantiles and to separate periods of inflation that are non-stationary from those that are stationary. Thus, it helps identify an inflation threshold above which inflation becomes persistent. Notably, the closest paper to ours is Bolat *et al*. (2017), who used the quantile inference to investigate the dynamic behaviour of inflation in the MENA countries over the period 1971–2014. However, our paper distinguishes itself from Bolat *et al*. (2017) by accounting for the 2010 political events in the MENA region and comparing the persistence of inflation before and after the Arab Spring.

Our findings provide compelling evidence of increased inflation persistence in MENA countries following the Arab Spring. These findings carry significant implications for policymakers in the region.

The remainder of the paper is structured as follows. Section 2 discusses the definition, sources and measures of inflation persistence within the univariate context. Section 3 provides a brief literature review of empirical studies on inflation persistence. Section 4 describes the methodologies to estimate inflation persistence. Section 5 introduces the datasets for four MENA countries: Algeria, Egypt, Morocco and Tunisia. Section 6 discusses the empirical results. Finally, Section 7 concludes and draws implications.

2. Definition, Sources and Measurement of Inflation Persistence

According to Altissimo *et al*. (2006), inflation persistence refers to the speed with which inflation converges towards its long-run value following a shock. When this speed is low, inflation is considered more persistent, whereas if the speed is high, inflation is less persistent. High inflation persistence implies limited policy space to address rising prices and a higher sacrifice ratio needed to reduce inflation (Fuhrer, 2009; Marques, 2004). Angeloni *et al*. (2003) noted that large inflation persistence delays and reduces the effectiveness of monetary policy tools on real economic variables, thereby reducing the overall efficacy of monetary policy. Therefore, it is crucial for monetary authorities to monitor and understand the degree of inflation persistence.

The literature identifies three sources of inflation persistence (Altissimo *et al*., 2006). Firstly, extrinsic persistence is inherited from persistent fluctuations of the determinants of inflation. This source of persistence corresponds to the persistence in the driving forces of inflation, such as the output gap, production costs or supply shocks. This is often studied within the multivariate approach (see, for example, Altissimo *et al*., 2006; Cogley and Sbordone, 2008; Dua and Goel, 2021; Oloko *et al*., 2021; Geronikolaou *et al*., 2020; Wu and Wu, 2018; Canarella and Miller, 2016). Secondly, intrinsic persistence arises from the dependence of inflation on its own past. Intrinsic persistence is evaluated by relying only on time series data for inflation. This is usually measured using various univariate time series methods (see empirical studies such as Sheedy, 2010; Valera *et al*., 2017; Gaglianone *et al*., 2018; Valera *et al*., 2017; Wolters and Tillman, 2015; Antonakakis *et al*., 2016; Bilici and Çekin, 2020; Granville and Zeng, 2019). Thirdly, the last source of inflation persistence, often referred to as expectation-based persistence, arises from the formation of inflation expectations.

According to the existing literature, the most widely used univariate measures of inflation persistence include the sum of the autoregressive coefficients, the largest autoregressive root and the half-life indicator (Marques, 2004). Among these measures of inflation persistence suggested in the literature, the sum of autoregressive coefficients stands out as the best scalar measure of persistence (Andrews and Chen, 1994; Dua and Goel, 2021). A value of the sum of autoregressive coefficients equal or close to one indicates that the inflation process has a unit root, implying that past inflationary shocks have a more lasting impact on future inflation. On the other hand, if the sum is less than unity, the inflation process is considered stationary, meaning that a shock to inflation will have only a temporary effect. In this case, inflation will soon revert to its long-run equilibrium level. Therefore, the natural method to assess inflation persistence is to examine its stationarity (Roache, 2014). This involves verifying whether the inflation pattern tends to revert back to its long-run average or exhibits persistent behaviour over time.

Conventional univariate unit root tests, such as the augmented Dickey–Fuller (ADF), Phillips–Perron (PP), Dickey–Fuller generalised least squares (DF-GLS) and Kwiatkowski–Phillips–Schmidt–Shin (KPSS) tests, have long been used to estimate inflation persistence. In the context of these tests, the null hypothesis indicates that shocks are permanent and inflation is highly persistent. If the null hypothesis of a unit root is rejected, it suggests that inflation tends to revert to its equilibrium level and that shocks affecting inflation are transitory in nature.

However, more recently, quantile unit root tests have gained momentum as an alternative approach for estimating inflation persistence. In this vein, Valera *et al*. (2017) and Gaglianone *et al*. (2018) have suggested that the quantile autoregression (QAR) unit root test put forth by Koenker and Xiao (2004) is an effective technique for investigating inflation persistence due to its ability to account for possible asymmetric adjustments in time series. Moreover, Tsong and Lee (2011) indicated that Koenker and Xiao's (2004) quantile autoregression framework enjoys power gains over the conventional unit root methodologies when the process exhibits heavy-tailed (non-normal) distributions. In addition to this, the framework has the capacity to accommodate structural breaks more effectively, leading to more accurate assessments of inflation dynamics over different time periods.

3. Literature Review

Over the past decades, many studies have investigated the dynamics of inflation persistence in both developed and emerging economies. Overall, two econometric approaches have been employed in the literature to analyse inflation persistence: multivariate and univariate frameworks.

The multivariate approach estimates inflation persistence by applying structural models. For example, Moriyama (2011) estimated inflation persistence and its determinants in Egypt and approximately 130 other countries, finding that inflation persistence in Egypt was relatively high compared to that of other countries. Cogley and Sbordone (2008) used the New Keynesian Phillips curve to estimate inflation persistence in the United States. They reported that inflation was highly persistent, with much of the persistence attributed to shifts in monetary policy. Using both univariate and multivariate approaches, Dossche and Everaert (2005) estimated inflation persistence in the Euro area and the United States, finding that shifts in the central bank's inflation objective induce a non-stationary component in the inflation rate. They also reported that persistence in the drivers of inflation is an important factor determining the observed inflation persistence.

The univariate approach uses the autoregressive regression specification to estimate inflation persistence. However, when it comes to applying quantile autoregression to estimate inflation persistence, only a handful of studies have been conducted, yielding mixed results.

A few studies have examined the issue of inflation persistence in developed economies using quantile inference. Tsong and Lee (2011) examined the dynamics of inflation persistence

in 12 OECD countries and found not only that inflation rates do not exhibit mean-reverting behaviour across quantiles, but that they also display asymmetries in their dynamic adjustment towards their long-run equilibrium in response to shocks. This finding contradicts the results of the counterpart conventional unit root tests, which identified a constant unit root process. Using the United States as the case study, Wolters and Tillmann (2015), employed a quantile-based unit root approach and found that while the inflation was not mean-reverting prior to the 1980s, the US inflation persistence has been lowered at every quantile since the end of the Volker disinflation.

With regard to emerging economies, a limited number of studies have evaluated inflation rate persistence using the newly developed quantile inference. For instance, Si and Li (2017) studied local persistence in inflation series for seven Eastern European countries (Czechia, Poland, Bulgaria, Latvia, Lithuania, Romania and Estonia) using the Fourier quantile unit root test newly developed by Bahmani-Oskooee *et al*. (2016). Their empirical findings, based on the quantile inference, suggest that the inflation rates in five out of seven Eastern European countries are globally mean-reverting – a finding that firmly contradicts the results of conventional unit root tests. Likewise, Valera *et al*. (2017) analysed the dynamics of inflation persistence for eight Asian countries over the period between 1987 and 2013. Their findings, based on quantile inference, indicate that Asian inflation rates generally exhibit mean reversion only in the lower quantiles, representing periods when inflation is declining. Gaglianone *et al*. (2018) studied inflation persistence in Brazil spanning the period 1995–2017 using the quantile autoregression (QAR) model. Their findings indicated that Brazil's inflation rates display non-stationary behaviour in 28% of the observations. Additionally, they discovered that shocks occurring during periods of high inflation take more time to dissipate compared to shocks that occur when inflation is lower. More recently, Nazlioglu *et al*. (2023) examined the persistence of interest and inflation rates in Turkey from January 2006 to July 2022. Their findings from conventional unit root tests supported the persistence of shocks to interest rates and inflation, while the quantile unit root test indicated asymmetric behaviour in the persistence. Lastly, Bolat *et al*. (2017) examined inflation persistence in the MENA countries with the quantile autoregression of Koenker and Xiao (2004) and the seasonal unit root test of Narayan and Popp (2011). The findings indicate that the inflation rates in the MENA countries are not mean-reverting, particularly in the higher quantiles.

Our study is closely related to the recent work of Gaglianone *et al*. (2018), who modelled Brazil's inflation rates in a quantile autoregression framework. Our key contribution is applying the quantile unit root testing developed by Koenker and Xiao (2004) to the question of inflation persistence in selected MENA countries. Our paper differs from that of Bolat *et al*. (2017) by incorporating the 2010 political events in the MENA region. Consequently, we divide the data sample into two sub-periods: before the Arab Spring and after the Arab Spring. Moreover, based on the QAR model, we separate the inflation time series into stationary and non-stationary observations, with the aim of identifying a threshold level at which the inflation rate exhibits stationary behaviour.

4. Econometric Methodology

In this section, we briefly describe the quantile autoregressive approach as proposed by Koenker and Xiao (2004). This approach is considered more robust compared to the ADF unit root test especially when shocks are heavy-tailed. An advantage of the QAR unit root test lies in its ability to consider the effects of both positive and negative shocks. Additionally, it demonstrates robust performance in the presence of asymmetric dynamics.

We adopt the methodology proposed by Koenker and Xiao (2004) and consider the following *p*-th order quantile autoregression (QAR(p)) model:

$$Q_{y_t}\left(\tau / y_{t-1}\right) = \alpha_0\left(\tau\right) + \alpha_1\left(\tau\right) y_{t-1} + ... + \alpha_P\left(\tau\right) y_{t-p} \tag{1}$$

where τ is the number of quantiles for the defined quantile level $\tau \in (0, 1)$, $\alpha_0(\tau)$ is the τ-th conditional quantile of y_t, which measures the size of the shock in each quantile, while $\alpha_1(\tau)$measures the speed of mean reversion of y_t in each quantile. The coefficient $\alpha_1(\tau)$ measures the speed of mean reversion in each quantile. Additionally, $\alpha_1(\tau)$ can be used to assess shock persistence for the variable using the half-life (HL) indicator. This is calculated as log (0.5) / log ($\hat{\alpha}_1(\tau)$) For quantiles where a unit root is present (indicating no mean reversion), the half-life is set to infinity (∞). This signifies that shocks have a permanent impact on the variable in those specific quantiles.

The solution to $\alpha_0(\tau)$, $\alpha_1(\tau)$, …, $\alpha_P(\tau)$ is obtained using quantile regression. The null hypothesis of a unit root conditional on the quantile level τ is then given by H_0: $\alpha_1(\tau) = 1$ for selected quantiles $\tau \in (0, 1)$.

Koenker and Xiao (2004) introduced a quantile autoregression (QAR) unit root test statistic, denoted as $t_n(\tau)$, which offers an alternative to the conventional augmented Dickey–Fuller (ADF) *t*-ratio test for detecting unit roots. The $t_n(\tau)$ statistic can be expressed mathematically as:

$$t_n\left(\tau\right) = \frac{f\left(\widehat{F^{-1}}(\tau)\right)}{\sqrt{\tau\left(1-\tau\right)}}\left(\dot{Y}_{-1} P_X Y_{-1}\right)^{\frac{1}{2}}\left(\hat{\alpha}_1\left(\tau\right)-1\right) \tag{2}$$

where $f\left(\widehat{F^{-1}}\left(\tau\right)\right)$ is a consistent estimator of $f(F^{-1}(\tau))$ and P_x is the projection matrix onto the space orthogonal to $X = (1, \Delta y_{t-1}, \ldots, \Delta y_{t-p+1})$.

Koenker and Xiao (2004) demonstrated that the limiting distribution of the $t_n(\tau)$statistic is non-standard. This implies that critical values used in the standard augmented Dickey–Fuller (ADF) test are not applicable here. Critical values for the $t_n(\tau)$ statistic can be found in Hansen (1995, p. 1155).

5. Datasets and Descriptive Statistics

Our empirical analysis uses monthly data on the inflation rates of four MENA countries, namely Algeria, Egypt, Morocco and Tunisia. The data were obtained from the International Monetary Fund's International Financial Statistics (IFS) over the period from June 1988 to December 2023.

These four Arab countries are of interest because they were at the forefront of the Arab Spring. The Arab Spring began in Tunisia in late 2010 and quickly spread to other Middle Eastern and North African countries. During the period from January to March 2011, major popular uprisings in Tunisia and Egypt led to the fall of the regimes, while Morocco and Algeria experienced public agitations (Ahmad, 2020). Several researchers have cited food price inflation between 2010 and 2011 as a major factor contributing to the popular discontent in Arab countries that led to the Arab Spring (*e.g.*, Soffiantini, 2020; Lanchovichina, 2018; Ahmad, 2020).

The descriptive statistics of the inflation rates for the four selected countries are shown in Table 1. The statistics encompass the mean, maximum, minimum, standard deviation, skewness, kurtosis and Jarque–Bera test values. It is observed that the inflation rates of Algeria and Egypt exhibit larger standard deviations, indicating a wider variation from their respective means. Furthermore, the kurtosis statistics for all the inflation rate series in all the countries, except Tunisia, exceed 3, indicating heavy-tailed distributions. Remarkably, the Jarque–Bera test is statistically significant for all the inflation rate series at the 1% level. This implies that the inflation rate series for the selected countries do not follow a normal distribution.

Table 1: Summary statistics for inflation rates (1988–2023)

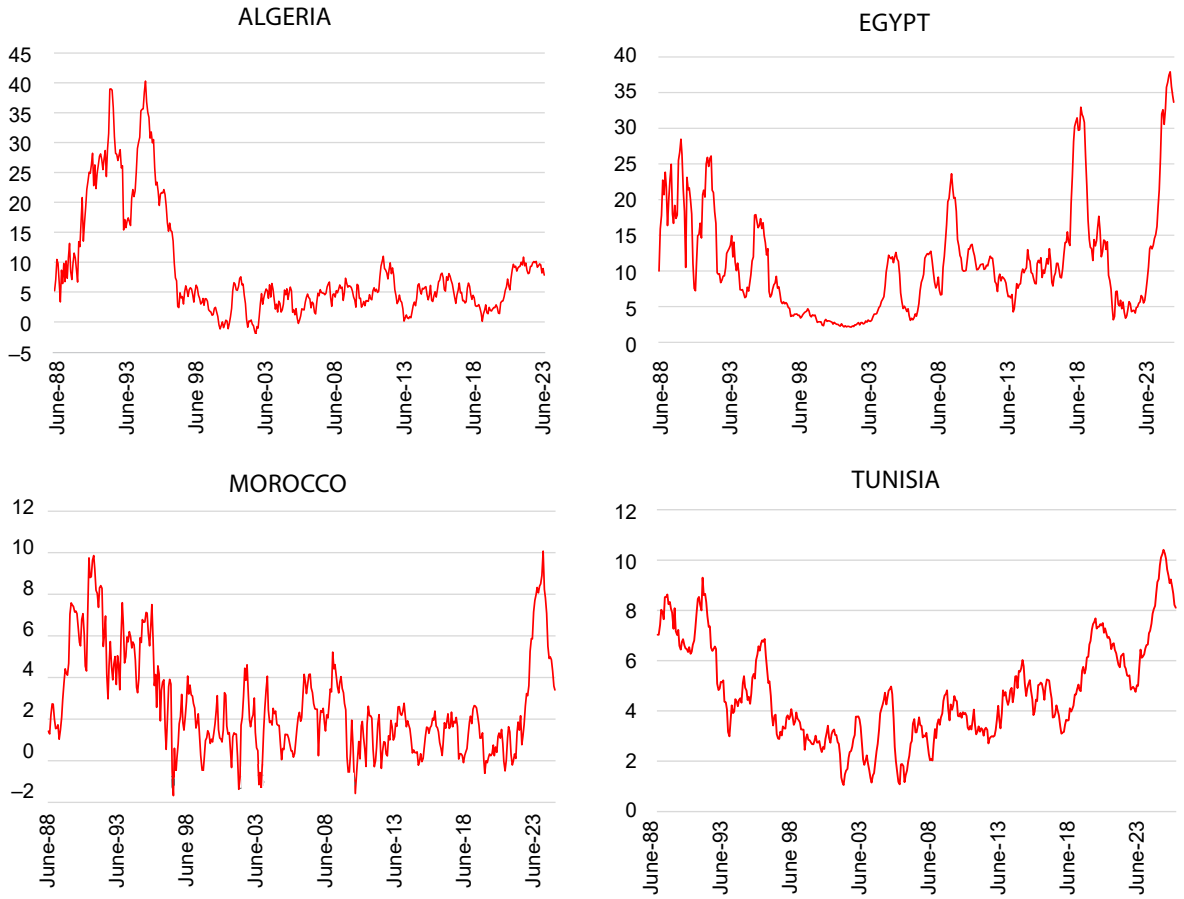
Country	Algeria	Egypt	Morocco	Tunisia
Mean	8.637473	11.15160	2.655303	4.741538
Median	5.346271	9.753260	1.950355	4.394745
Maximum	40.28073	37.91000	10.08000	10.41000
Minimum	–2.139678	2.134647	–1.667779	1.053271
Std. dev.	8.986526	7.631491	2.398907	1.998099
Skewness	1.672272	1.271194	0.966785	0.580429
Kurtosis	4.968702	4.411439	3.340563	2.739621
Jarque–Bera	267.9738	150.4445	68.58106	25.18209
Probability	0.000000	0.000000	0.000000	0.000003
Observations	427	427	427	427

Source: Authors' own calculations

The plot of inflation rates for the selected MENA countries can be seen in Figure 1. The figure reveals that in the late 1980s and early 1990s, inflation surged significantly (double-digit episodes) in Algeria and Egypt. The results of the descriptive analysis reported in Table 1 make it evident that the highest inflation rates were recorded in these two countries, with Algeria experiencing the highest maximum rate at 40.2%, followed by Egypt at 37.9%. Additionally, Egypt encountered elevated levels of inflation during the period from 2007 to 2009, while inflation in Egypt appeared higher than in other countries from 2015 to 2019. This economic challenge posed various difficulties for these countries during those times. As of 2021, inflation was once again on the rise in Algeria, Egypt, Morocco and Tunisia. Remarkably, recent inflation in Egypt hit the highest level compared to other countries. The escalation of inflation in these countries has raised particular concern about the persistence of underlying inflationary pressures in the aftermath of the Arab Spring and its potential effects on their economic stability.

Therefore, the summary statistics in Table 1 as well as the plot in Figure 1 shed light on the nature of inflation dynamics in these countries and sustain the importance of applying the quantile unit test approach to analyse inflation persistence in this context.

Figure 1: Inflation rate in Algeria, Egypt, Morocco and Tunisia from June 1988 to December 2023



Source: Authors' own elaboration

6. Empirical Results and Discussion

This section measures intrinsic inflation persistence, a reduced form of persistence, using a univariate approach. This method is preferred over multivariate models due to its simplicity, which reduces the risk of specification errors (Dossche and Everaert, 2005). A common test for intrinsic inflation persistence is the unit root test. Numerous studies have employed unit root and quantile unit root tests to measure inflation persistence, including Ball and Cecchetti (1990), Dossche and Everaert (2005), Tsong and Lee (2011), Wolters and Tillmann (2015), Bahmani-Oskooee *et al*. (2016) and Gaglianone *et al*. (2018).

Accordingly, this section contains three subsections. In the first subsection, we apply both traditional unit root tests and unit root tests with structural breaks to analyse inflation persistence among selected MENA countries spanning the timeframe from 1988 to 2023. The next subsection reports the outcomes of both the quantile autoregression model and the quantile unit root test to analyse and compare the dynamics of inflation persistence between the period before the Arab Spring (June 1988 – December 2010) and after the Arab Spring (January 2011 – December 2023). In the last subsection, we estimate the quantile autoregression QAR(1) model using a recursive estimation scheme to examine the dynamics of inflation persistence for the identical periods.

6.1 Univariate unit root tests

As a first step, we begin our empirical analysis by investigating the global stationarity of the inflation rate series. For this purpose, we conduct two conventional unit root tests: the ADF test and the PP test. However, the ADF and PP tests have been widely criticised due to a failure to allow for the possibility of a structural break. The presence of structural breaks significantly reduces the power of standard unit root tests to reject the null hypothesis of a unit root (Perron, 1989). For this reason, we also consider the Clemente–Montanes–Reyes (1998) structural break unit root test. The Clemente–Montanes–Reyes (1998) test allows for two endogenous structural breaks and tests the null hypothesis of a unit root with structural break(s) against the alternative of stationarity with break(s). This test includes two forms of structural break models: an additive outlier (AO) model, which captures a sudden change in the time series, and an innovative outlier (IO) model, which allows for a gradual shift in the mean of the time series (Baum, 2005). As seen with the ADF test results (Table 2), the null hypothesis of a unit root for all the countries cannot be rejected, suggesting non-stationarity in the inflation rate series. The PP test results (Table 2) show that the inflation rate series for all the countries, except Morocco, are non-stationary. Therefore, the ADF test results indicate that the inflation rates in Algeria, Egypt, Morocco and Tunisia do not exhibit mean-reverting properties. However, the PP test suggests that the inflation rates in Morocco are globally mean-reverting. Based on these unit root test results, a clear conclusion cannot be reached regarding the issue of non-stationarity (persistence) of inflation rates in the selected MENA countries.

Table 2: Results of univariate unit root tests for inflation rates

Country	ADF		Phillips–Perron	
	Intercept	Trend and intercept	Intercept	Trend and intercept
Algeria	–1.836	–2.232	–2.050	–2.566
Egypt	–1.84	–1.912	–2.442	–2.508
Morocco	–2.177	–2.303	–3.770***	–4.183***
Tunisia	–1.239	–1.525	–2.248	–2.343

Note: ***, ** and * denote significance at the 1%, 5% and 10% level, respectively.
Source: Authors' own calculations

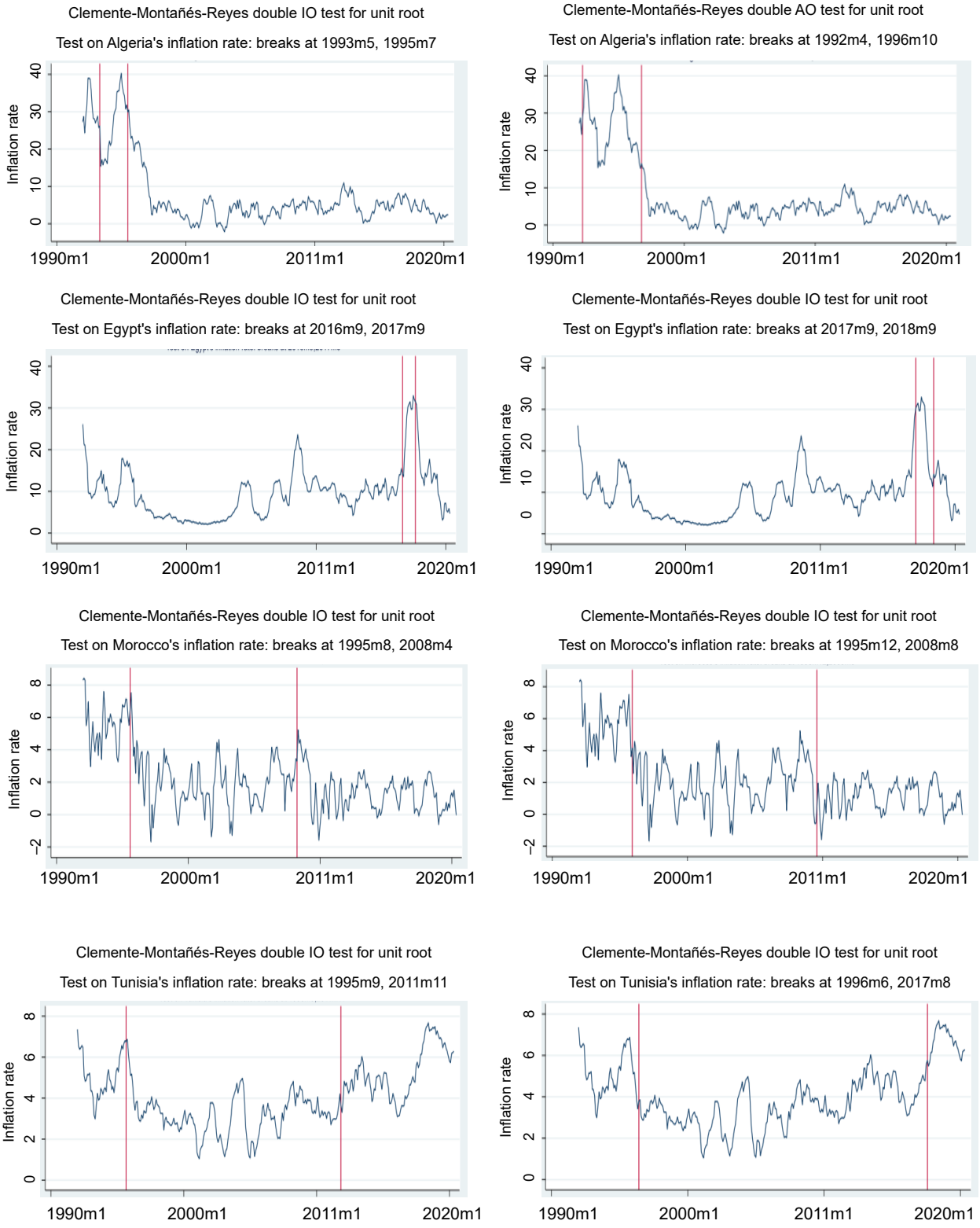
Table 3: Clemente–Montanes–Reyes unit root test with two structural breaks

Country	Innovative outlier model			Additive outlier model		
	t-statistic	TB1	TB2	*t*-statistic	TB1	TB2
Algeria	–5.449	May 1993	July 1995	–4.929	April 1992	October 1996
Egypt	–3.938	September 2016	September 2017	–3.162	February 2017	June 2018
Morocco	–5.153	August 1995	April 2008	–4.717	December 1995	August 2009
Tunisia	–4.999	September 1995	November 2011	–4.154	June 1996	August 2017

Notes: TB1 and TB2 are the dates of the structural breaks. 5% critical value: –5.490.
Source: Authors' own calculations

After allowing for the possibility of two structural breaks under both the null and alternative hypothesis, Table 3 and Figure 2 show that the Clemente–Montanes–Reyes (1998) suggests the presence of a unit root with two breaks in either the AO or the IO model, implying that the inflation series of Algeria, Egypt, Morocco and Tunisia are non-stationary. We note that the break dates by the Clemente–Montanes–Reyes (1998) unit root test correspond to the timing of major political and economic events that these countries have experienced.

Figure 2: Clemente–Montanes–Reyes AO and IO for unit root test



Source: Authors' own elaboration

For example, the first break date for Algeria falls within the period 1992–1993, coinciding with Algeria's standby agreement concluded with the IMF in February 1992. The second break of Algeria falls within the period 1995–1996, coinciding with the country's adoption of an economic adjustment and structural reform plan negotiated with the International Monetary Fund. Notably, both identified break dates for Algeria took place during the Algerian troubles of the 1990s. As for Egypt, the AO and IO models picked 2016, 2017 and 2018 as the optimal break dates for its inflation rate time series. The breaks detected by the tests roughly correspond to the timing of Egypt's 2016 currency crisis and its aftermath, following the devaluation of the country's pound. In Morocco, the first break in 1995 coincided with the adoption of a structural adjustment programme and the consolidation of the central bank's position to stabilize the overall price level. The other breaks occurred in April 2008 and August 2009, mainly driven by sharply rising food prices. Both IO and AO models suggest the period 1995–1996 as the optimal first break points for Tunisia's inflation rate time series. This break point likely reflects the deflationist monetary policy that Tunisia adopted to maintain the inflation rate at around 3% after 1994. It can also be seen that the second break, in November 2011, coincides with the period immediately after the Arab Spring uprising. Significantly, the uprising in Tunisia came just as the food prices hit a record high in late 2010 and early 2011.

6.2 Quantile autoregression (QAR) model

To further investigate the inflation rate dynamics in the aforementioned countries and to mitigate the inconclusive and ambiguous results of the standard unit root tests, we consider now the quantile autoregression QAR(1) and the quantile-based unit root test of Koenker and Xiao (2004). The estimated coefficients of the QAR(1) model: $\hat{\alpha}_0(\tau)$ and $\hat{\alpha}_1(\tau)$ over quantiles (0.1, 0.9) are reported in Table 4. To gain more insight, the estimated coefficients of the QAR(1) along with their corresponding 95% confidence bands are also graphically reported in Figure 3. For comparison purposes, we also estimated the coefficients $\hat{\alpha}_0$ and $\hat{\alpha}_1$ by applying ordinary least squares (OLS). We then plotted $\hat{\alpha}_0$ and $\hat{\alpha}_1$ in Figure 3, in which the solid line indicates the estimated coefficients and the dashed lines are 95% confidence intervals.

In a first step, we analyse the dynamic behaviour of the inflation rate in different quantiles by examining the estimated values of the intercept $\hat{\alpha}_0(\tau)$. The intercept captures the size of the observed shock that affects inflation at each quantile. It can be observed that only for Egypt in the period before the Arab Spring, the estimated $\hat{\alpha}_0(\tau)$ shows a monotonically increasing trend across all the quantiles. Additionally, we note that the sizes of the shocks are relatively similar across all the countries, except Egypt. In the case of Egypt, the largest shocks were estimated after the Arab Spring, with the estimated intercepts ranging from −0.65 to 1.11. However, for Algeria, the most significant shocks were identified before the Arab Spring, with the intercept values ranging from −1.22 to 1.87.

Now, our attention turns to the autoregressive coefficients $\hat{\alpha}_1(\tau)$ and their associated unit root

tests across different quantiles. This analysis aims to discern the extent of mean-reverting behaviour within the inflation rate series in each quantile. It is evident that the estimated values of $\hat{\alpha}_1(\tau)$ are consistently positive across all the countries, with a striking proximity to unity (both above and below) in the middle and upper quantiles. This suggests a notable lack of mean-reverting behaviour in the inflation rate series for these countries, both before and after the Arab Spring. Furthermore, the coefficients derived from the ordinary least squares (OLS) estimation (Figure 3) reveal that inflation in Egypt, Morocco and Tunisia has become more persistence after the Arab Spring. Specifically, the estimated values of $\hat{\alpha}_1$ have risen from 0.95, 0.91 and 0.97 respectively before the Arab Spring to 0.99, 0.96 and 0.98 following the Arab Spring events.

To perform the quantile unit root based on Koenker and Xiao (2004), we test the null hypothesis H_0: $\alpha_1(\tau) = 1$ in the quantiles for $\tau = (0.1, 0.2, 0.3, \ldots, 0.9)$ against the alternative hypothesis H_1: $\alpha_1(\tau) < 1$by using the t-statistic test $t_n(\tau)$ proposed by Koenker and Xiao (2004). Table 4 reports the quantile unit root results. It encompasses estimates of the autoregressive coefficients $\hat{\alpha}_1(\tau)$, the $t_n(\tau)$ statistics for the unit root test and the half-lives (HL) in different quantiles. The critical values of the calculated $t_n(\tau)$ statistics were obtained from Hansen (1995, p. 1155).

For Algeria and Egypt, the QAR unit root results (Table 4) indicate that the unit root null is rejected in the lower quantiles. Conversely, across other quantiles, the QAR test consistently supports the presence of a unit root behaviour both before and after the Arab Spring. For Morocco, the decision about the presence of a unit root is strongly rejected across nearly all the quantiles before the Arab Spring, whereas after the Arab Spring, stationarity is not accepted only for the extreme low quantile (0.1). For Tunisia, stationarity of the inflation rate is observed across nearly all the quantiles in the period before the Arab Spring, except the middle and extreme high quantiles. However, in the period after the Arab Spring, stationarity is not confirmed in the low and middle quantiles (0.1, 0.2, 0.5, 0.6 and 0.7).

These findings suggest that the inflation rate series in Algeria, Egypt, Morocco and Tunisia exhibit stationary behaviour in the lower quantiles, while remaining non-stationary in the middle and higher quantiles. Therefore, it can be inferred that the inflation rates are mean-reverting during periods of lower inflation, while demonstrating a persistence pattern during phases of higher inflation and shocks with permanent duration. Notably, the evidence points towards an increase in inflation persistence in these MENA countries after the Arab Spring.

Table 4 also contains the half-life of inflation shocks, which is measured as log (0.5) / log ($\hat{\alpha}_1(\tau)$) and defined as the number of periods required for the inflation rate to return to its long-run equilibrium after a shock. As indicated in Table 4 for the higher quantiles (60^{th} to 90^{th}) across Algeria and Egypt, the inflation rates do not exhibit a tendency to revert to their long-run equilibrium for the periods before and after the Arab Spring. This is due to their infinite half-lives resulting from the detection of a unit root. However, when considering the mean-reverting quantiles (0.1–0.4), we observe increasing half-lives for Algeria before the Arab Spring. Noticeably, in the lower quantiles (10^{th} to 40^{th}), Egypt's inflation following the Arab Spring exhibits longer half-lives com-

pared to the period before the Arab Spring. We also observe that Morocco has infinite half-lives after the Arab Spring over almost all the quantiles. Tunisia exhibited significantly longer half-lives compared to other countries. Notably, the half-life exceeded 38 months in the 60th quantile before the Arab Spring. This value reached 25 months in the 40th quantile after the Arab Spring. These results indicate an asymmetric behaviour of the inflation rates in the four selected MENA countries. Specifically, the inflation rates show a tendency to return to their means in the lower quantiles, while the higher quantiles contain a unit root, leading to increased persistence.

Table 4: Quantile unit root results for selected MENA countries

Koenker–Xiao test for *Algeria*											
Before Arab Spring, 1988–2010						After Arab Spring, 2011–2023					
τ	$\hat{a}_0(\tau)$	$\hat{a}_1(\tau)$	$t_n(\tau)$	H_0: $a_1(\tau) = 1$	H-L	τ	$\hat{a}_0(\tau)$	$\hat{a}_1(\tau)$	$t_n(\tau)$	H_0: $a_1(\tau) = 1$	H-L
0.10	−1.223	0.895	−8.08	Reject	6.25	0.10	−0.673	0.886	−5.16	Reject	5.72
0.20	−0.888	0.935	−4.21	Reject	10.33	0.20	−0.280	0.895	−5.52	Reject	6.24
0.30	−0.538	0.958	−2.97	Reject	16.15	0.30	−0.049	0.909	−4.59	Reject	7.64
0.40	−0.256	0.975	−1.95	Do not reject	∞	0.40	0.022	0.946	−2.61	Do not reject	∞
0.50	−0.093	1.002	0.18	Do not reject	∞	0.50	0.328	0.948	−2.61	Do not reject	∞
0.60	0.323	1.006	0.43	Do not reject	∞	0.60	0.503	0.963	−1.72	Do not reject	∞
0.70	0.847	1.007	0.61	Do not reject	∞	0.70	0.918	0.939	−2.93	Reject	11.01
0.80	1.074	1.019	1.23	Do not reject	∞	0.80	1.108	0.965	−1.77	Do not reject	∞
0.90	1.870	1.059	2.68	Do not reject	∞	0.90	1.541	0.957	−1.55	Do not reject	∞

Koenker–Xiao test for *Egypt*											
Before Arab Spring, 1988–2010						After Arab Spring, 2011–2023					
τ	$\hat{a}_0(\tau)$	$\hat{a}_1(\tau)$	$t_n(\tau)$	H_0: $a_1(\tau) = 1$	H-L	τ	$\hat{a}_0(\tau)$	$\hat{a}_1(\tau)$	$t_n(\tau)$	H_0: $a_1(\tau) = 1$	H-L
0.10	0.309	0.789	−12.73	Reject	2.92	0.10	−0.656	0.924	−3.91	Reject	8.76
0.20	0.162	0.874	−11.11	Reject	5.14	0.20	−0.454	0.949	−4.16	Reject	13.24
0.30	0.228	0.903	−11.22	Reject	6.79	0.30	−0.115	0.950	−4.37	Reject	13.51
0.40	0.264	0.939	−5.76	Reject	11.01	0.40	0.034	0.976	−1.94	Do not reject	∞
0.50	0.171	0.984	−1.90	Do not reject	∞	0.50	0.227	0.990	−0.79	Do not reject	∞
0.60	0.162	1.005	0.73	Do not reject	∞	0.60	0.727	0.979	−1.76	Do not reject	∞
0.70	0.218	1.029	3.42	Do not reject	∞	0.70	0.930	0.993	−0.57	Do not reject	∞
0.80	0.137	1.069	6.29	Do not reject	∞	0.80	1.111	1.017	1.15	Do not reject	∞
0.90	−0.041	1.151	6.90	Do not reject	∞	0.90	1.048	1.071	3.23	Do not reject	∞

Table 4: Continuation

Koenker–Xiao test for *Morocco*											
Before Arab Spring, 1988–2010						After Arab Spring, 2011–2023					
τ	$\hat{\alpha}_0(\tau)$	$\hat{\alpha}_1(\tau)$	$t_n(\tau)$	H_0: $\alpha_1(\tau) = 1$	H-L	τ	$\hat{\alpha}_0(\tau)$	$\hat{\alpha}_1(\tau)$	$t_n(\tau)$	H_0: $\alpha_1(\tau) = 1$	H-L
0.10	−0.874	0.885	−2.94	Reject	5.67	0.10	−0.464	0.863	−2.71	Reject	4.70
0.20	−0.528	0.887	−3.63	Reject	5.78	0.20	−0.336	0.947	−1.29	Do not reject	∞
0.30	−0.225	0.888	−5.50	Reject	5.83	0.30	−0.110	0.918	−2.53	Do not reject	∞
0.40	−0.049	0.907	−5.10	Reject	7.10	0.40	−0.002	0.950	−1.61	Do not reject	∞
0.50	0.198	0.905	−4.55	Reject	6.94	0.50	0.138	0.946	−1.75	Do not reject	∞
0.60	0.450	0.914	−3.95	Reject	7.70	0.60	0.185	0.989	−0.31	Do not reject	∞
0.70	0.638	0.906	−4.17	Reject	7.02	0.70	0.359	0.995	−0.16	Do not reject	∞
0.80	0.994	0.918	−3.07	Reject	8.10	0.80	0.505	0.988	−0.41	Do not reject	∞
0.90	1.423	0.931	−1.92	Do not reject	∞	0.90	0.721	0.980	−2.60	Do not reject	∞

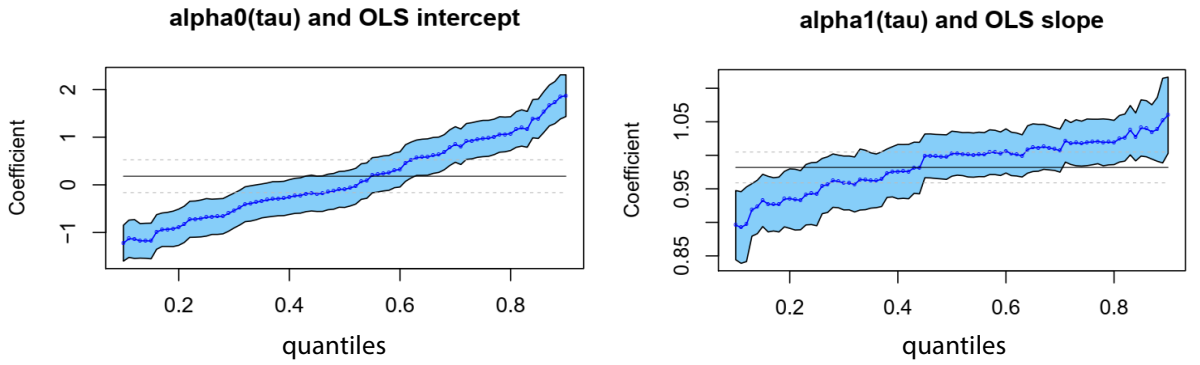
Koenker–Xiao test for *Tunisia*											
Before Arab Spring, 1988–2010						After Arab Spring, 2011–2023					
τ	$\hat{\alpha}_0(\tau)$	$\hat{\alpha}_1(\tau)$	$t_n(\tau)$	H_0: $\alpha_1(\tau) = 1$	H-L	τ	$\hat{\alpha}_0(\tau)$	$\hat{\alpha}_1(\tau)$	$t_n(\tau)$	H_0: $\alpha_1(\tau) = 1$	H-L
0.10	−0.479	0.916	−7.44	Reject	7.90	0.10	−0.147	1.013	1.47	Do not reject	∞
0.20	−0.180	0.956	−4.98	Reject	15.40	0.20	−0.114	0.988	−1.43	Do not reject	∞
0.30	0.094	0.962	−4.49	Reject	17.89	0.30	−0.022	0.963	−5.60	Reject	18.38
0.40	0.112	0.969	−4.71	Reject	22.01	0.40	0.072	0.973	−4.90	Reject	25.32
0.50	0.050	0.985	−2.26	Do not reject	∞	0.50	0.077	1.000	4.42	Do not reject	∞
0.60	0.172	0.982	−3.46	Reject	38.16	0.60	0.162	0.988	−2.60	Do not reject	∞
0.70	0.216	0.976	−3.86	Reject	28.53	0.70	0.254	0.992	−1.38	Do not reject	∞
0.80	0.434	0.973	−3.09	Reject	25.32	0.80	0.376	0.970	−3.09	Reject	22.75
0.90	0.702	0.995	−0.40	Do not reject	∞	0.90	0.461	0.958	−4.79	Reject	16.15

Notes: The results are related to 5% significance. H-L: half-lives.

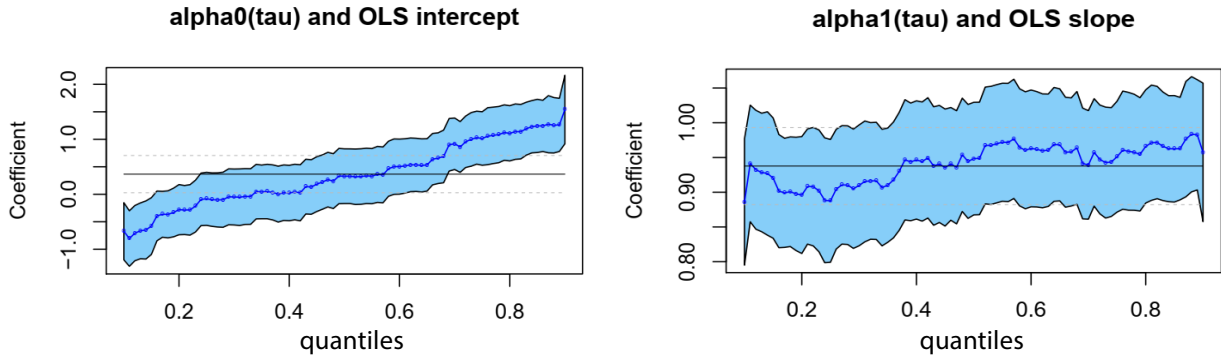
Source: Authors' own calculations

Figure 3: Quantile intercept and autoregressive (QAR) coefficients

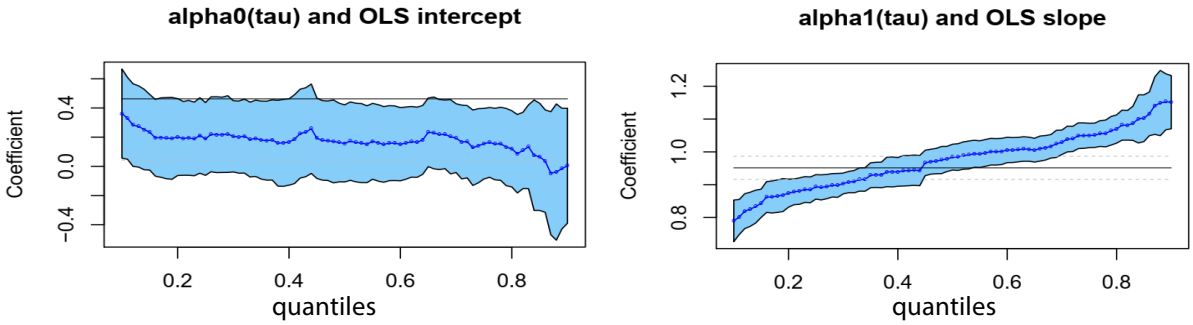
Algeria: Estimated coefficients (inflation rate, before Arab Spring, 1988–2010)



Algeria: Estimated coefficients (inflation rate, after Arab Spring, 2011–2023)



Egypt: Estimated coefficients (inflation rate, before Arab Spring, 1988–2010)



Egypt: Estimated coefficients (inflation rate, after Arab Spring, 2011–2023)

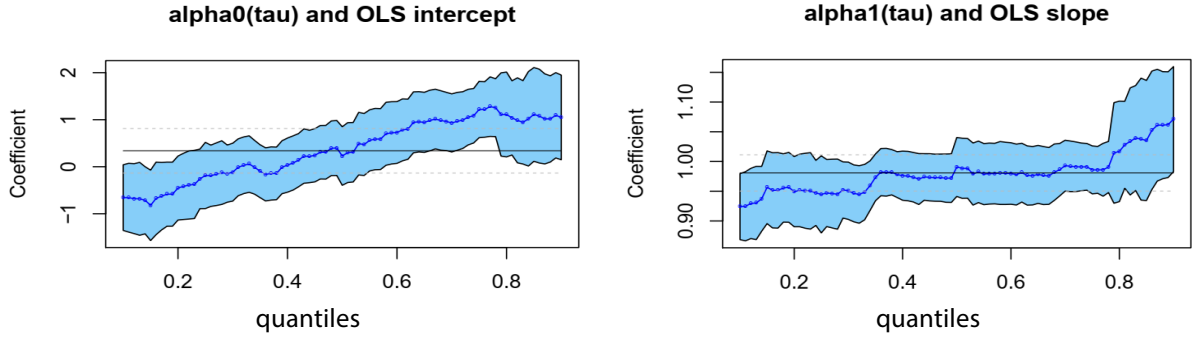
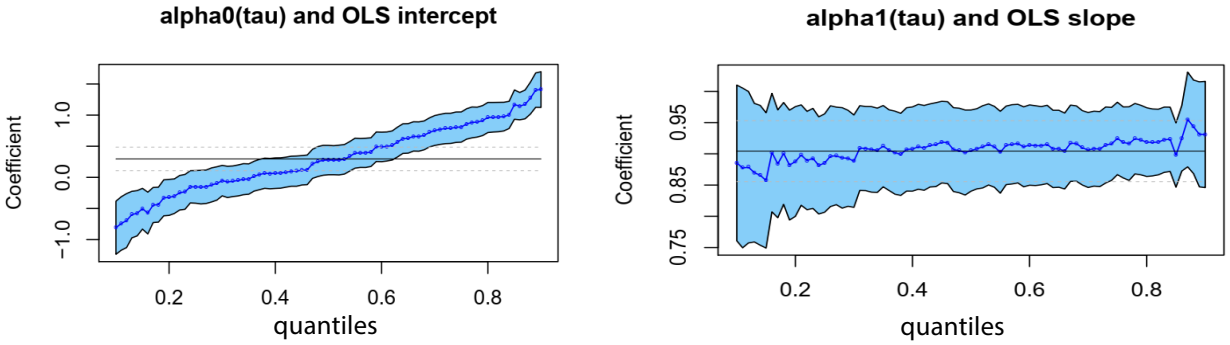
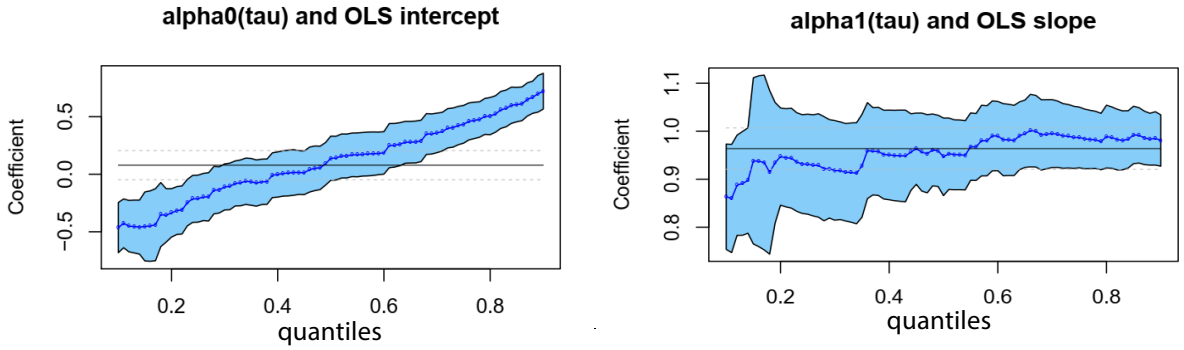


Figure 3: Continuation

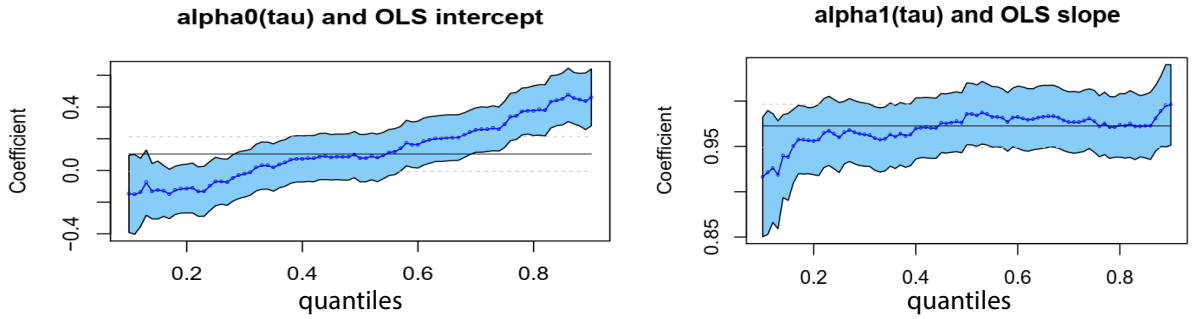
Morocco: Estimated coefficients (inflation rate, before Arab Spring, 1988–2010)



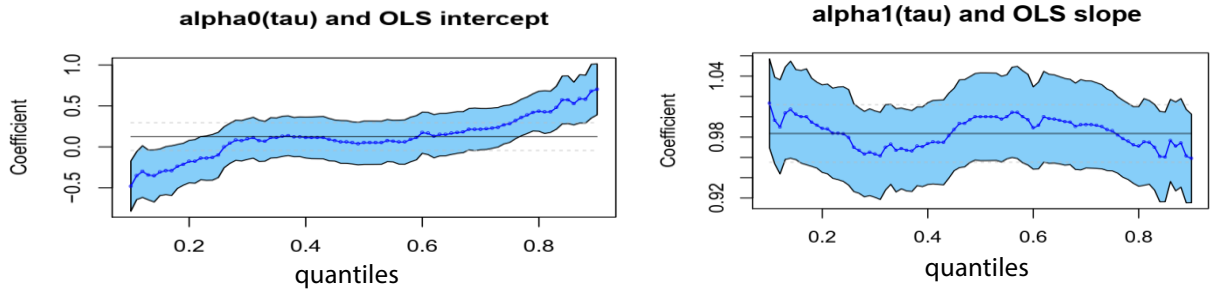
Morocco: Estimated coefficients (inflation rate, after Arab Spring, 2011–2023)



Tunisia: Estimated coefficients (inflation rate, before Arab Spring, 1988–2010)



Tunisia: Estimated coefficients (inflation rate, after Arab Spring, 2011–2023)



Source: Authors' own elaboration

In the last stage, we seek to determine the critical quantile (threshold quantile) above which inflation rates become persistent. For this purpose, we distinguish periods of inflation rates that exhibit a unit root from other stationary periods using the method proposed by Gaglianone *et al*. (2018). The estimated critical quantiles for each country are presented in Table 5. Based on the critical quantile results in Table 5, the critical quantile for Algeria before the Arab Spring is $\tau_{crit} = 0.27$. This suggests that Algeria's inflation rate exhibited non-stationary (persistent) behaviour for approximately 73% of the period before the Arab Spring. However, the critical quantile decreased to 0.1, implying a notable increase in non-stationary behaviour in the period after the Arab Spring (approximately 90%). For Egypt, the critical quantile in Table 5 shows a significant decline from 0.49 before the Arab Spring to 0.14 after the Arab Spring. This corresponds to a substantial increase in non-stationary (persistent) behaviour, rising from 51% to 86% after the Arab Spring. Morocco's estimated inflation-critical quantile substantially decreased in magnitude from 0.81 before the Arab Spring to 0.11 after the Arab Spring. This suggests a significant increase in the inflation persistence. More precisely, for approximately 90% of the periods after the Arab Spring, Morocco's inflation rate witnessed more persistent behaviour. Likewise, Tunisia also experienced a sharp fall in its critical quantile after the Arab Spring (from 0.49 to 0.1 in Table 5). Consequently, Tunisia's inflation rate exhibited persistent behaviour for approximately 90% of the period after the Arab Spring.

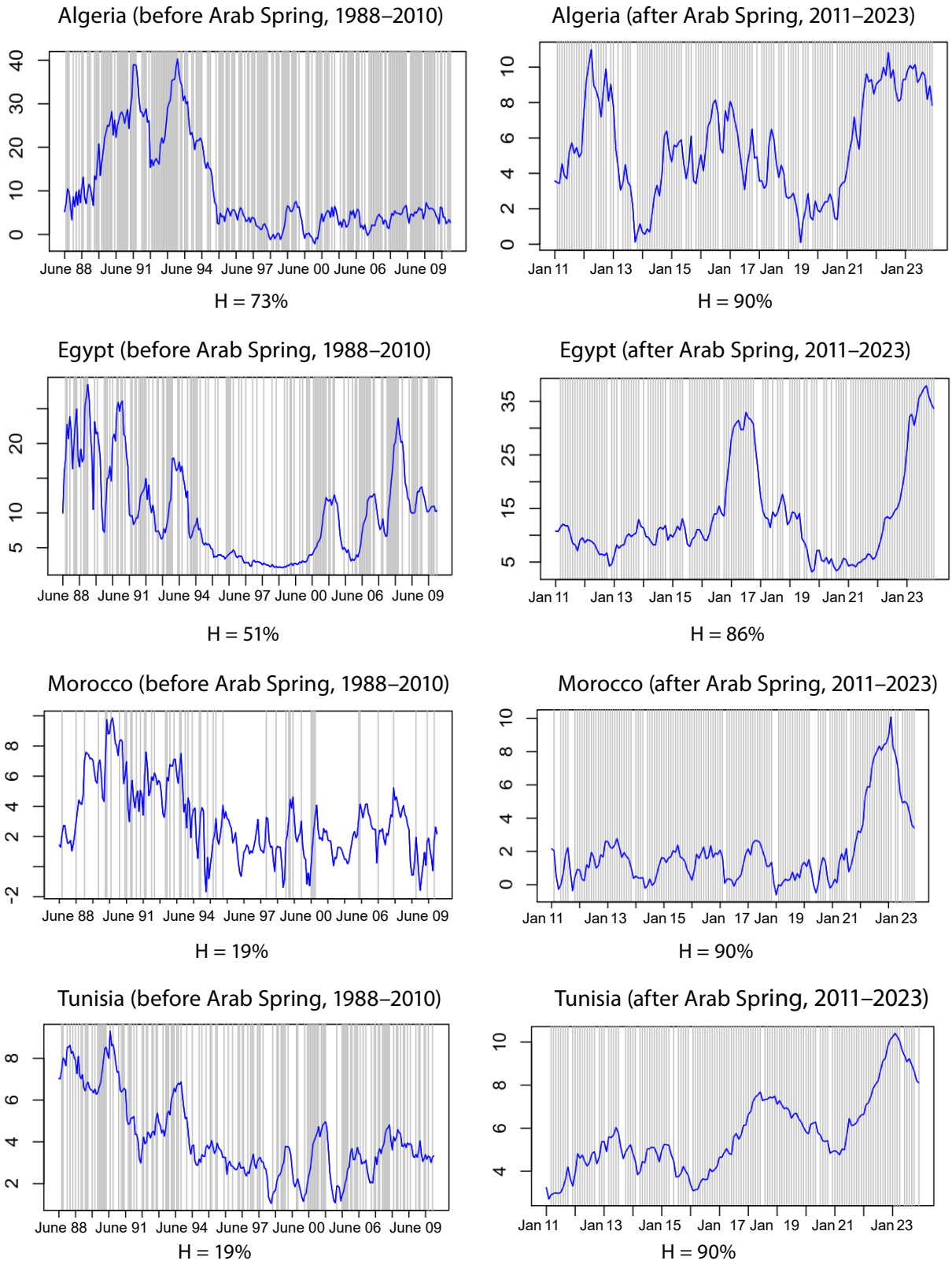
Table 5: Critical quantiles and the ratio of non-stationary periods

Before Arab Spring (1988–2010)			After Arab Spring (2011–2023)		
Country	τ_{crit}	$H_{1988–2010}$	**Country**	τ_{crit}	$H_{2011–2023}$
Algeria	0.27	73	**Algeria**	0.10	90
Egypt	0.49	51	**Egypt**	0.14	86
Morocco	0.81	19	**Morocco**	0.11	90
Tunisia	0.49	51	**Tunisia**	0.10	90

Note: H: the percentage of periods in which inflation exhibits non-stationary behaviour (inflation inertia).
Source: Authors' own calculations

Figure 4 depicts the actual data of the inflation rates along with the corresponding non-stationary and stationary periods. The shaded areas in each plot of Figure 4 represent periods during which the inflation rates are non-stationary, thus exhibiting persistent behaviour. Figure 4 illustrates that non-stationary periods seem to frequently occur when the inflation rates are increasing, whereas stationary periods often appear when the inflation rates are falling or slowing down. What is noteworthy from this figure is the striking upward shift in inflation persistence across these countries following the Arab Spring compared to the period before the Arab Spring. Figure 4 also reveals a significant rise in inflation persistence across all the four selected MENA countries since 2011, the year in which the Arab Spring began. This trend is evident in the distinct bands of shaded areas depicted in Figure 4. This outcome indicates that the inflation rates do not demonstrate mean-reverting behaviour during periods of high inflation. Consequently, this result confirms the validity of the hypothesis that inflation has become more persistent in these MENA countries after the Arab Spring. As a result, it underscores the necessity for monetary authorities in the examined countries to promptly intervene during episodes of high inflation, in order to curb the potential for persistent inflationary trends. The above results partially support the evidence from Bolat *et al*. (2017), who found that the inflation rates in the MENA countries are not mean-reverting in both the high and low quantiles.

Figure 4: Inflation rate and non-stationary periods



Note: The vertical bars indicate the non-stationary periods.

Source: Authors' own elaboration

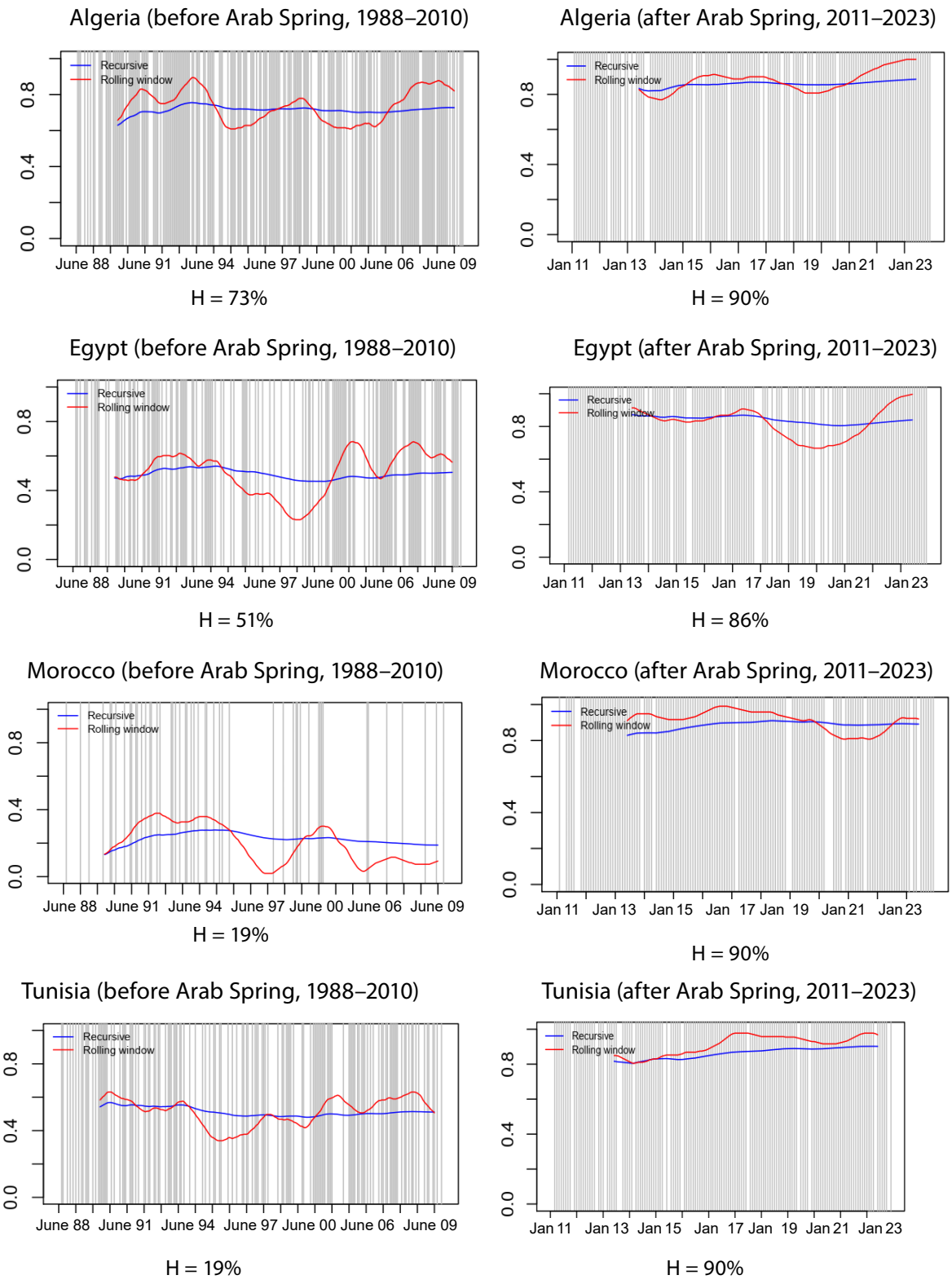
6.3 Recursive estimation

To closely examine inflation persistence over the past decades, we re-estimate the QAR(p) models for each country by employing the recursive estimation framework proposed by Gaglianone *et al*. (2018). The graphical representations in Figure 5 offer distinct evidence of notable upward trends in inflation persistence during the periods following the Arab Spring across all the selected countries. Essentially, there was evidence of a remarkable increase in inflation persistence in Algeria before and during the Arab Spring period. The country witnessed a significant increase in inflation persistence during the 1980s, followed by a brief period of stable persistence in the 1990s and 2000s. Notably, there has been a remarkable surge in persistence since the 2010s that continues to the present day. In the case of Egypt, there is evidence of an increase in inflation persistence in the late 2010s, particularly just before the Arab Spring events. However, since 2021, Egypt's inflation has become even more persistent. For Morocco, the inflation remained relatively stable before the Arab Spring, but then became highly persistent after the Arab Spring. Likewise, Tunisia's inflation exhibited high stability before the Arab Spring. Since then, it has become highly persistent. To summarize, our recursive estimation findings suggest a significant rise in inflation persistence across Algeria, Egypt, Morocco and Tunisia following the Arab Spring. This result aligns with the quantile autoregressive analysis, showing a high degree of inflation persistence after the Arab Spring compared to the period before.

Ultimately, the finding of increased inflation persistence in Algeria, Egypt, Morocco and Tunisia following the Arab Spring is significant, as it signals a profound transformation in the inflation dynamics of these countries. The political turmoil unleashed by the Arab Spring and its aftermath, characterized by instability, supply chain disruptions and eroded confidence, likely contributed to this trend. The subsequent COVID-19 pandemic exacerbated these challenges, leading to a prolonged period of inflationary pressures. Moreover, the implementation of expansive social policies, primarily aimed at appeasing the public discontent, such as wage hikes, increased social benefits, food subsidies and public sector employment, have further fuelled inflation by boosting aggregate demand without a corresponding increase in supply. These measures, while essential for social stability in the short term, have contributed to inflationary pressures and made it more difficult to reduce inflation in the long run, thereby increasing the risk of widespread unrest in these countries.

The region has grappled with persistently high inflation rates in recent years. In 2022, 2023 and into 2024, these countries have experienced significant price increases across various goods and services. While the global economic context, including supply chain bottlenecks and rising energy costs, has contributed to this inflationary surge, domestic factors, such as currency depreciation and food price volatility, have exacerbated the problem. To address this issue, policymakers must prioritize monetary policy stability, supply-side reforms and social and economic development.

Figure 5: Frequency of periods with non-stationary dynamics (with recursive and rolling window estimation)



Note: The vertical bars indicate the non-stationary periods.

Source: Authors' own elaboration

7. Conclusion

The Arab Spring events and food inflation that shook the MENA region have made inflation a key variable of concern for the region's policymakers. The surge in inflation after the Arab Spring and after the COVID-19 pandemic in many Arab countries to dramatic levels has raised concerns about whether this is becoming a persistent problem. This study provides fresh insights into inflation dynamics in the MENA region for the periods before and after the Arab Spring.

We applied the newly developed quantile autoregression unit root test, as proposed by Koenker and Xiao (2004), to analyse the dynamics of inflation persistence in Algeria, Egypt, Morocco and Tunisia. The quantile unit root approach has the ability to account for the potential asymmetric adjustment of inflation rates towards their long-run equilibrium. For comparison purposes, we utilized classical unit root tests such as the ADF and PP tests. Additionally, we considered the Clemente–Montanes–Reyes (1998) structural break unit root test to account for potential breaks in the data.

Our empirical findings indicate that the inflation rates in Algeria, Egypt, Morocco and Tunisia display global non-stationarity, as demonstrated by conventional and structural break unit root tests. However, in these aforementioned countries, the inflation rates exhibit stationarity in the lower quantiles and non-stationarity in the higher quantiles, as revealed by the QAR statistics. In other words, our QAR analysis suggests that the magnitude of the shock to the inflation rates (higher quantiles) correlates with a higher likelihood of exhibiting persistent behaviour.

Furthermore, in order to capture potential shifts in the inflation dynamics in the period after the Arab Spring, we employed the QAR test for the timeframe spanning from 2011 to 2023. The outcomes reveal that the inflation rates in the selected MENA countries demonstrate considerable persistence following the Arab Spring compared to the period before the Arab Spring. As a result, shocks that hit inflation may not remain transitory and instead have a persistent inflationary impact.

These findings carry significant implications for policymakers in these countries. Policymakers need to carefully monitor any potential rise in inflation, as positive shocks to inflation tend to be highly persistent. Moreover, persistently high inflation could lead to social unrest and protests, a particular concern in MENA countries with a history of uprisings such as the 2011 Arab Spring. Accordingly, central banks in MENA countries need to implement more robust monetary policies to effectively control inflation. Additionally, the non-stationarity of inflation, especially after the Arab Spring, can be considered an important factor in adopting inflation targeting frameworks to reduce the persistence. Thus, a switch to inflation targeting regimes can ensure that temporary shocks to inflation caused, for example, by food price spikes (such as occurred during the Arab Spring protests in late 2010 or after the COVID-19 pandemic) remain temporary. Fiscal discipline, including measures such as more effectively targeting subsidies and reducing the fiscal deficit, is also key to reducing inflation persistence and thereby lowering the costs of disinflation.

Despite the compelling results presented in this paper, there are certain limitations. This study evaluated inflation persistence solely based on inflation time series data. However, inflation in these countries is also influenced by other factors such as oil price shocks, geopolitical events and exchange rate fluctuations. Therefore, we suggest that future studies adopt multivariate methodologies that account for the economic and political context of MENA countries to achieve more robust results in studying inflation persistence.

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