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The impact of value-added taxes and inflation threshold on economic growth in the Kingdom of Saudi Arabia

Bilal Louail[1+]
Sami Sobhi Waked[2]
Siham Riache[3]

[1,2,3]*College of Business Administration, Northern Border University, Arar, Saudi Arabia.*
[1]*Email: bilal.louail@nbu.edu.sa*
[2]*Email: sami.waked@nbu.edu.sa*
[3]*Email: siham.riache@nbu.edu.sa*

(+ Corresponding author)

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ABSTRACT

The paper contributes to the literature by examining the effects of inflation on economic growth in Saudi Arabia between 2010Q1 and 2022Q4 and exploring whether the VAT impacted the inflation-growth nexus. The literature on the determinants of economic growth has expanded during the last few decades. The impact of inflation on economic growth has received much attention, with contradictory findings. The study employs the Logistic Smooth Transition Regression (LSTR) model to determine the optimal inflation rate and estimate the repercussions of inflation in each regime. The findings show that the optimal inflation rate is 2.47%. Inflation is demonstrated to improve growth if it remains below 2.47%. Nevertheless, as the inflation rate is beyond this threshold, the effect becomes negative. Subsequently, the study accounts for the influence of Value- Added Tax on the link between inflation and growth. According to the empirical estimation, the threshold level of the inflation rate is determined to be 2.88%. In addition, the adverse implications of inflation on growth are higher when we consider the implementation of VAT. Therefore, the study concludes that there are nonlinear effects of the inflation rate on economic growth in Saudi Arabia. The empirical results of the study have important policy implications for Saudi Arabia.

Contribution/Originality: This study examines the influence of Value-Added Tax on the correlation between inflation and economic growth, employing the Logistic Smooth Transition Regression (LSTR) model. This study holds significant relevance for Saudi Arabia, considering the recent implementation and escalation of VAT, which has the ability to impact the dynamics of economic growth.

1. INTRODUCTION

Inflation is defined as a steady increase in the prices of goods and services. Inflation is a phenomenon that occurs naturally within the global economy, in some cases over a long period of time. It is a fundamental concept in economics with wide-ranging implications for individuals, firms, and governments. Moderate inflation can be beneficial for the economy, but high or unpredictable inflation may lead to a degradation in purchasing power, creating social imbalances among different socioeconomic groups. Central banks and policymakers aim to monitor increases in prices to maintain price stability while supporting economic growth objectives as part of government priority plans. Therefore, understanding the factors contributing to inflation control and formulating monetary policies able to mitigate the adverse repercussions of inflation are crucial for the economy. In economics, *threshold inflation* refers to the optimal range of inflation for a given economy. This range can vary depending on several

factors, including the country under consideration, its stage of development, and the implemented policies. Moderate inflation is beneficial for the economy since it induces increased demand, which encourages expenditure and investment and stimulates economic growth. In addition, it provides opportunities for nominal wages to increase. However, if a given threshold is exceeded, the negative implications of inflation begin to emerge. High or unpredictable inflation rates may deteriorate purchasing power and consumer and business confidence. This can lead to inaccurate financial decisions by individuals and firms, reducing investment and impeding economic growth. It's crucial to recognize that every nation has a unique threshold level that depends on factors like price stability and overall economic health. Central banks and policymakers in developed countries usually try to maintain a target rate between 2 and 3%. Determining the appropriate inflation rate, also referred to as *threshold inflation*, is therefore necessary to develop a sustainable economy. The *threshold inflation*, therefore, refers to the optimal inflation rate that fosters economic growth and stability while avoiding undesirable outcomes such as high prices and deflation. Policymakers play a crucial role in achieving this situation.

The implications of inflation on growth are critical for maintaining overall macroeconomic stability. Low to moderate inflation rates are generally associated with positive economic growth. However, high inflation rates can have detrimental effects on the economy. For instance, they can lead to a decrease in consumers' purchasing power, which in turn can negatively impact business decision-making, revenues, and profits. High inflation also creates uncertainty in financial markets, which makes the planning and execution of investments a challenging task. Low or negative inflation rates (deflation) need to be managed with caution because they have the potential to discourage expenditure and slow down economic activity. Policymakers are still searching for a balance between managing inflation and maintaining long-term economic growth by implementing effective monetary and fiscal policies. The repercussions of inflation on growth have been a highly debated topic in recent decades. This is mainly because many countries worldwide have experienced high inflation rates. The existing studies employed many methodologies and covered many regions and countries.

The goal of this article is to explore the outcomes of inflation on growth in Saudi Arabia based on quarterly data between 2010Q1 and 2022Q4. In addition, the study checks if the repercussions of inflation on growth depend on a given threshold. Moreover, the paper examines the role of Value-Added Tax (VAT) in how inflation affects economic growth. The econometric analysis implements the Logistic Smooth Transition Regression (LSTR) model. Studying the implications of inflation on growth in Saudi Arabia is important for many reasons. Saudi Arabia implemented a VAT of 5% in January 2018 and increased it to 15% in July 2020. The implementation of VAT in Saudi Arabia may have significant effects on economic growth. The VAT may directly result in price increases for consumers as a consequence of rising inflation rates. Firms have an important role in this situation. Transferring the tax burden to consumers would worsen the situation by adding pressure on prices. In addition, implementing a VAT may generate additional revenue for the government and enable investments in public infrastructure, such as education and healthcare, which are crucial for long-term growth. However, the impact of VAT on specific sectors and consumer behaviour may be harmful. It is, therefore, essential to investigate how the implementation of VAT affected the inflation threshold and economic growth in Saudi Arabia. Furthermore, it is imperative to comprehend the potential effects of optimal inflation on fostering long-term growth in the context of Saudi Arabia. By revealing these dynamics, policymakers and businesses can develop strategies and make decisions.

This paper is composed of five sections. A summary of the existing literature is provided in Section 2. The data and methodologies are described in Section 3, whereas the empirical findings are discussed in Section 4. Section 5 presents concluding remarks, policy recommendations, and limitations.

2. LITERATURE REVIEW

The linkages between inflation and growth have received much attention, uncovering a robust correlation between the two variables. The existing literature indicates a positive correlation between low inflation rates and

growth. However, high inflation can have negative impacts, such as a fall in the purchasing power of consumers, which can negatively impact the decision-making process in firms, and a fall in investments and economic growth. Sarel (1996) examined data from 1960 to 1996 in his study. The study indicated that the inflation threshold is situated within the range of 8 to 10%. The research demonstrated that inflation rates within this range did not pose any risk to economic growth. However, when inflation rates exceeded this range, it resulted in significant adverse effects. Ghosh and Phillips (1998) conducted a more in-depth investigation than Sarel (1996) establishing a substantially lower threshold of 5.2%. In contrast, Khan and Senhadji (2001) found that developing countries have higher thresholds ranging from 7 to 11%, whereas developed countries have thresholds ranging from 1 to 3%. According to a study by Sweidan (2004) that investigated the Jordanian economy, a positive correlation between inflation and growth exists up to an inflation rate of about 2%, after which it can have negative impacts. Similarly, Hussain (2005) showed that between 1973 and 2005, this threshold in Pakistan occurred between 4 and 7%, with higher levels hindering economic growth.

The current body of research can be broadly categorized into two groups. The first group examined how inflation influences economic growth in a single country, whereas the second group investigated the inflation-growth relationship across many countries. If the inflation rate falls within this range, then the country will experience regular or typical inflation. However, if the inflation rate exceeds the threshold, it hurts the economy, hindering its growth. A study conducted by Mubarik (2005) found that between 1973 and 2000, a threshold level of 9% was established. Once a certain level is surpassed, inflation starts to have a negative impact on economic growth. Using data from 1972–2016, Nazir, Saeed, and Muhammad (2017) examined the association between inflation and growth in Pakistan. Using recently developed techniques, they found that the inflation-growth linkage exhibits a nonlinear trend. Specifically, when the inflation rate falls within the optimal range of around 5.5 to 9%, it may stimulate economic growth. Beyond this threshold, there will be increasing risks of instability associated with high inflation levels, which negatively affect economic growth. In their study, Yemba, Kitenge, and Woodburne (2020) employed a threshold regression model to identify the point at which the repercussions of inflation on growth change the sign in the Democratic Republic of the Congo. Findings indicate a threshold of 17.2%, beyond which inflation harms growth. Additionally, a study by Karahan and Çolak (2020) examined the effects of inflation on economic growth in Turkey. Using the Nonlinear Autoregressive Distributed Lag (NARDL) model with data from 2003 to 2017, the analysis reveals a linear negative association between inflation and growth. In their study, Adaramola and Dada (2020) investigated the repercussions of inflation on Nigeria's growth. By analyzing data from 1980 to 2018, the analysis shows that inflation impacts growth. The causality tests indicate a one-way relationship between inflation and Gross Domestic Product (GDP). Finally, Kusumatrisna, Sugema, and Pasaribu (2022) analyzed the inflation-growth relationship in Indonesia using provincial data. Results indicated a negative effect with a threshold level of 9.59%.

Several other studies have checked the linkages between inflation and growth within a specific set of countries. According to Burdekin, Denzau, Keil, Sitthiyot, and Willett (2004), the outcomes of the inflation rate on growth are dependent on the specific inflation rate. In developing countries, single-digit inflation affects growth. By employing instrumental variables, Vaona and Schiavo (2007) determined that inflation and growth do indeed exhibit a nonlinear relationship. Additionally, Eggoh and Khan (2014) carried out an investigation in which they used Panel Smooth Transition Regression (PSTR) and Dynamic Generalized Method of Moments (GMM) to examine the relationship between inflation and growth. The authors have identified nonlinearity and thresholds in both global and income-specific sub-samples. Additionally, factors like government spending and international trade have an impact on nonlinearity. In a study of ASEAN-5 nations, Thanh (2015) looked at the nonlinear connection between inflation and GDP growth. Inflation has a substantial adverse effect on growth over a 7.84% threshold. Khan and Hanif (2020) used a novel threshold model and the GMM techniques for 113 economies between 1981 and 2015. The results show that once inflation reaches a particular point, it harms economic growth. In addition, Olamide,

Ogujiuba, and Maredza (2022) explored the effects of fluctuating exchange rates on the inflation-growth relationship within the Southern African Development Community from 2000 to 2018. The findings indicate that inflation, economic growth, and exchange rate volatility are inversely related. From 1982 to 2016, Bandura (2022) looked into the relationship between inflation, finance, and growth in 23 SSA countries. The results show that low inflation rates below 31% sustain a positive inflation-growth relationship. In addition, Azam and Khan (2022)utilized fixed effects and Feasible Generalized Least Squares (FGLS) to examine the connections between inflation and growth. The analysis shows a negative correlation between inflation and growth once certain thresholds are exceeded. This suggests that when inflation goes beyond 12.23% and 5.36% in developing and developed countries, it hinders economic growth. Finally, Mignamissi, Minkoé Bikoula, and Thioune (2023) examined the implications of inflation on growth in SSA. The PSTR model shows a single optimal threshold at 12.23%. Below this threshold, inflation positively influences growth, while above it, the relationship turns negative.

With reference to Saudi Arabia, one should note that only a few studies have checked the repercussions of inflation on growth. For example, Alkahtani and Elhendy (2014) analyzed the implications of inflation on growth between 1980 and 2010. The authors concluded the existence of nonlinear effects with a threshold level of 4%. Moreover, Algaeed (2016) analyzed the reaction of non-oil GDP to inflation in Saudi Arabia during the period 1985-2015. The analysis suggests the presence of nonlinear effects and a threshold level for the inflation rate of about 10%. Finally, Alsabban and Alnuwaiser (2021) investigated the nonlinear impacts of inflation on the output gap from 1981 to 2019. The empirical analysis reveals a threshold of 3% for the inflation rate. While the studies mentioned above estimated the optimal inflation rate, they did not estimate the macroeconomic repercussions of inflation during low and high inflation rates.

The goal of this paper is to enhance the current body of research on the connection between inflation and growth in Saudi Arabia by examining the impact of VAT on the relationship between them. The findings will provide valuable insights into how tax policy affects the inflation-growth nexus. This is especially relevant in light of the recent emphasis on development and diversification policies under Saudi Vision 2030.

3. METHODOLOGY AND DATA

3.1. Methodology

The empirical investigation conducted in this paper is based on the estimation of a Smooth Transition Regression (STR) model. This approach has the advantage of enabling the endogenous setting of the threshold level (c) and then identifying two regimes. The first regime is defined as being below the threshold level, while the second regime is defined as being above the threshold level. Finally, the STR model enables the determination of the speed at which the transition occurs between different regimes through the utilization of the Gamma parameter.

A standard Smooth Transition Regression (STR) model is defined as follows:

$$GROWTH_t = \varphi_0 + \varphi_1{}'z_t + (\theta_0 + \theta_1{}'z_t)\, G(\eta, c, s_t) + \varepsilon_t \qquad (1)$$
$$t = 1 \ldots\ldots T$$

Where z_t is the vector of explanatory variables (lagged growth rate, inflation rate, fixed capital formation and oil price), $\varphi_1 = (\varphi_i, \varphi_\pi, \varphi_y, \varphi_q)$ represents the parameters to be estimated for the linear part, and $\theta = (\theta_i, \theta_\pi, \theta_y, \theta_q)'$ represents the parameters to be estimated for the nonlinear part. Error terms are assumed to be i.i.d. and follow a zero-average normal distribution. The transition function $G(\eta, c, s_t)$ is assumed to be a continuous function between zero and one, depending on the transition variable s_t.

According to Terasvirta (1994) the transition function can take either a Logistic Transition function (LSTR) or an Exponential Transition function (ESTR). The Logistic Transition function (LSTR) is written as follows:

$$G(\eta, c, s_t) = [1 + exp(-\eta(s_t - c))]^{-1}, \eta > 0 \qquad (2)$$

The Exponential Transition function (ESTR) is written as follows:

$$G(\eta, c, s_t) = [1 - exp(-\eta(s_t - c)^2)], \eta > 0 \quad (3)$$

Where η indicates the smoothness of the transition from one parameter to another, i.e. the speed of the switch from zero to one, c indicates the location parameter.

The first step of the analysis consists of testing the presence of nonlinearity. This involves testing the linearity against an STR model. The zero hypothesis is based on linearity ($H_0: \eta = 0$) against the alternative hypothesis$H_1: \eta > 0$. According to Luukkonen, Saikkonen, and Teräsvirta (1988) determining the existence of nonlinearity is a complex task because the model can only be accurately described if nonlinearity is assumed. In particular, η and c are disturbance parameters which are not present under the zero-linearity assumption. Terasvirta (1994) demonstrated that the issue of identification can be resolved by approximating an expansion of the transition function in relation to the Taylor rule under the H_0 hypothesis ($H_1: \eta = 0$). This approximation, after some parametrization and simplification, gives the following auxiliary regression:

$$INF_t = \beta_0' z_t + \beta_1' z_t s_t + \beta_2' z_t {s_t}^2 + \beta_3' z_t {s_t}^3 + \varepsilon_t^* \quad (4)$$

The alternative hypothesis of linearity becomes ($H_1: \beta_1' = \beta_2' = \beta_3' = 0$) by following a Fisher distribution. Terasvirta (1994) suggested a linearity test for different transition variables. Based on this test, the transition variable corresponding to the lowest p-value is selected. Once linearity is rejected, Terasvirta (1994) considered the following three tests:

$$H_{01}: \beta_3 = 0 \quad (5)$$

$$H_{02}: \beta_2 = \frac{0}{\beta_3} = 0 \quad (6)$$

$$H_{03}: \beta_1 = 0 / \beta_2 = \beta_3 = 0 \quad (7)$$

The choice between the LSTR and ESTR models is based on comparing the p-values associated with the different Fisher statistics. If H_{02} has the lowest p-value compared to $H_{01}$and H_{03}, the ESTR model is selected. Otherwise, we will choose the LSTR model. After choosing the suitable model, the nonlinear model may be estimated. Figure 1 presents the different stages of the empirical methodology.

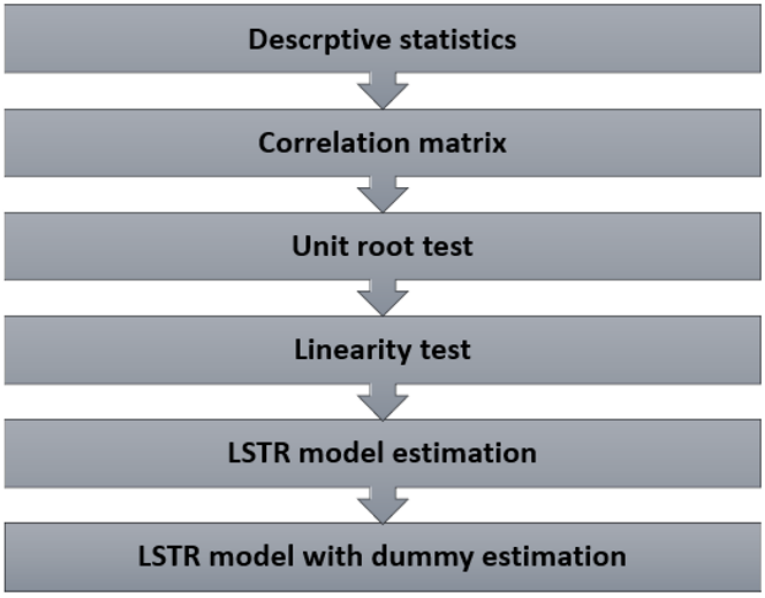

Figure 1. Empirical methodology.

3.2. Data

The study analyzes the influence of inflation on growth in Saudi Arabia between 2010Q1 and 2022Q4. The dependent variable in the GDP growth rate (GROWTH), which is the GDP's percentage growth rate. The inflation rate (INF) is measured by the CPI growth rate. We use two control variables: the growth rate of gross capital

formation (GCF), which represents domestic investment, and the growth rate of Brent crude oil price (OIL). Table 1 provides details on the dataset.

Table 1. Presentation of the dataset.

Variables	Definition	Data source
GROWTH	GDP growth rate	Saudi Central Bank
INF	CPI growth rate	International Monetary Fund
GCF	Gross capital formation growth rate	Saudi Central Bank
OIL	Brent oil price growth rate	World Bank

In order to understand the evolution of the data, Figure 2 depicts the statistical variables considered during the study period.

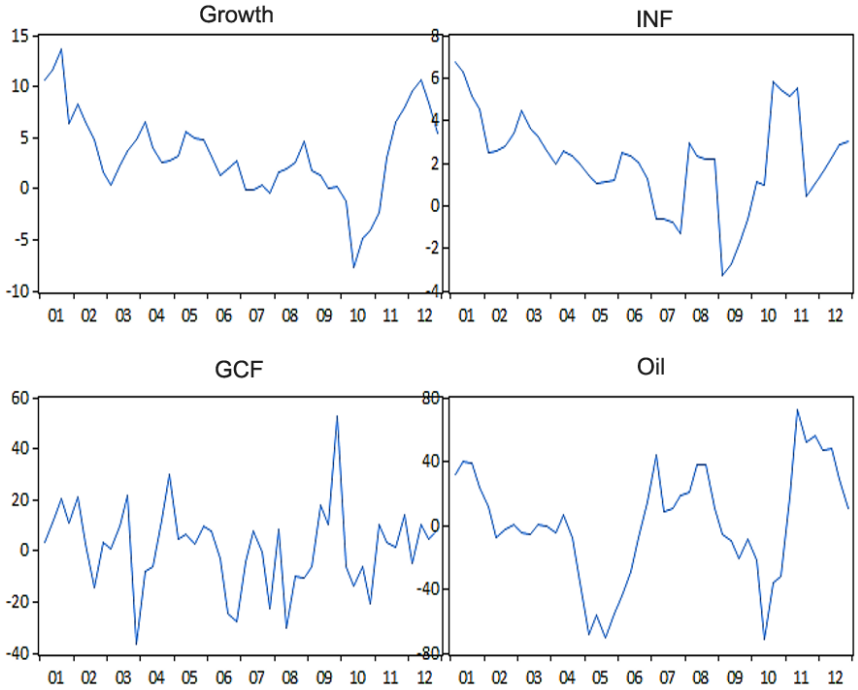

Figure 2. Evolution of the different variables.

4. ESTIMATION RESULTS

4.1. Descriptive Statistics and Correlation

Before starting the empirical part, it is important to provide some dataset properties. Table 2 reports the results of the descriptive statistics of the various series.

Table 2. Descriptive statistics.

Variables	Growth	INF	GCF	Oil
Mean	3.396	2.145	1.479	1.778
Median	2.912	2.293	3.265	0.262
Maximum	13.600	6.764	52.781	72.826
Minimum	-7.663	-3.255	-36.787	-71.688
Std. dev.	4.238	2.240	16.108	34.659
Skewness	0.034	-0.188	0.125	-0.308
Kurtosis	3.336	3.021	4.301	2.646
Jarque-Bera	0.236	0.284	3.512	1.012
Probability	0.888	0.867	0.172	0.602

The table shows that average GDP growth is 3.396%, which ranges from -7.663% to 13.600%. The average inflation rate is 2.145%, ranging from -3.255% to 6.76%. The Skewness, Kurtosis, and Jarque-Bera tests show that there is no evidence of nonnormal distribution for all variables. In Table 3, we report the correlation matrix for the various variables. As shown, economic growth is positively correlated with the inflation rate (0.247), which means that higher inflation rates are positively associated with GDP growth. Furthermore, there exists a positive connection (0.453) between economic growth and oil prices, which proves the importance of oil as a revenue source and a catalyst for economic expansion in Saudi Arabia. There is a strong connection between growth and gross capital formation, with a correlation coefficient of 0.234. Therefore, domestic investment positively impacts GDP growth in Saudi Arabia.

Table 3. Correlation matrix.

Variables	Growth	INF	GCF	Oil
Growth	1	-	-	-
INF	0.247	1	-	-
GCF	0.234	-0.015	1	-
Oil	0.453	0.182	-0.012	1

4.2. Unit Root Test Results

Prior to analyzing the influence of inflation on GDP growth, it is crucial to assess the stationary of all variables, as the STR model necessitates stationary time series, including economic growth, inflation rate, oil price growth, and GCF growth. The outcomes of the Augmented-Dickey Fuller (ADF) unit root test are documented in Table 4. The test is conducted with and without a trend. The results show that the ADF statistics are below the critical values at the 1% significance level (GCF) and 5% significance level (GROWTH, INF, and OIL). Therefore, we can conclude that all variables are stationary at this level. In this case, it is possible to move to the estimation of the STR model and explore the threshold effects of inflation on growth.

Table 4. Unit root test results.

Variables	Constant	Constant and trend
Growth	-3.470**	-3.610**
INF	-3.190**	-3.940**
GCF	-5.600***	-5.560***
OIL	-3.490**	-3.750**
Critical values		
1%	-3.565	-4.148
5%	-2.919	-3.500
10%	-2.597	-3.179

Note: *** and ** denote the rejection of a unit root at the 1% and 5% levels of significance, respectively.

4.3. Linearity Test Results

As mentioned earlier, an important stage before estimating the STR model is to determine the suitable STR model for the analysis. To this end, we conducted the LM test previously presented. The P-values of the LM test, which follows a Fisher distribution under the null hypothesis, are summarized in Table 5. The first column presents the findings of the linearity test against nonlinearity based on the STR model. The remaining three columns show the different selection criteria between the ESTR and LSTR models (H_{01}, H_{02} and H_{03}).

Table 5. Linearity test result.

Variable	H_0	H_{01}	H_{02}	H_{03}	Best model
INF	3.180 (0.006)	2.650 (0.040)	1.120 (0.340)	0.750 (0.510)	LSTR1

According to Terasvirta (1994) it is possible to simultaneously reject the null hypotheses H_{01}, H_{02} and H_{03}. In this case, the choice is the one with the lowest p-value. Therefore, thelogistic transition function (LSTR1) is suitable for the analysis.

4.4. The Threshold Effect of Inflation on GDP Growth

The findings of the LSTR model, with the inflation rate variable as a transition variable, are reported in Table 6. The location parameter "c" is significant at the 1% statistical level. The threshold was found to be equal to 2.47%. As a result, an inflation rate below 2.47% characterized the low-inflation regime (linear part), while the high-inflation regime (nonlinear part) is characterized by an inflation rate above 2.47%. These findings suggest that the threshold level is relatively low compared to the threshold found for other developing countries. For instance, Khan and Senhadji (2001) conclude that the threshold level in developing countries is relatively high and ranges from 7 to 11%. In developed countries, the threshold level varies between 1 and 3%. The analysis found a threshold of 2.47% in Saudi Arabia, indicating a low threshold level similar to that of developed countries. The threshold level found in this study is also close to that obtained by Sweidan (2004) who concluded a positive correlation between inflation and growth in Jordan up to about an inflation rate of 2%, after which it negatively affects growth. In addition, the results of this study are close to the findings of Alsabban and Alnuwaiser (2021) who indicated a threshold level of 3% in Saudi Arabia. In addition, Alkahtani and Elhendy (2014) indicated that the threshold level is equal to 4% in Saudi Arabia. The LSTR model also allows for determining the transition speed from one regime to another. The Gamma parameter reported at the bottom of Table 6 could be able to capture this. As shown, the Gamma parameter is positive and significant at 1%, which means that there is a rapid change from one regime to another.

Table 6. LSTR model results.

Variables	Coefficient	Standard error
Linear part		
Constant	-0.520	0.608
Growth (-1)	1.145***	0.174
INF	0.575*	0.315
GCF	0.021***	0.002
OIL	0.021**	0.103
Nonlinear part		
Constant	-0.958	2.890
GROWTH (-1)	-0.568**	0.201
INF	-0.561***	0.202
GCF	-0.101	0.567
Oil	0.028	0.023
Gamma	8.910***	2.010
Threshold level (c)	2.470***	0.249

Note: ***, ** and * indicate coefficients are significant at 1%, 5% and 10% levels.

Regarding the transition variable (inflation rate), it displays statistically significant coefficients for both regimes (linear and nonlinear). The implications of the inflation rate are positive and significant (+0.575) when the inflation rate is less than 2.47%. On the other hand, the impact of inflation is negative (-0.561) when the inflation rate is above 2.47%. These findings confirm our initial intuition that a high inflation rate has nonlinear effects on economic growth. These findings support previous research that has established a positive relationship between inflation and economic growth at low inflation rates and a negative relationship at high inflation rates. This conclusion is consistent with studies conducted by Mubarik (2005) and Nazir et al. (2017) in Pakistan, and Yemba et al. (2020) in the Democratic Republic of the Congo.The gross capital formation and oil price have positive and significant coefficients only in the first regime when the inflation rate is below 2.47%. On the other hand, the effect remains insignificant during the high inflation regime. In conclusion, the threshold analysis strongly confirms that inflation

positively affects GDP growth in Saudi Arabia with an inflation rate below 2.47%. Then, inflation hampers growth when the rate of inflation surpasses 2.47%.

4.5. The Role of VAT in the Threshold Effect of Inflation on GDP Growth

As previously mentioned, the second goal of the paper is to examine whether the introduction of VAT affects the linkage between inflation and growth. In this section, we will introduce an interaction variable between the inflation rate and a dummy variable, taking the value one from the first quarter of 2018. This date corresponds with the adoption of the VAT reform in Saudi Arabia. The outcomes are summarized in Table 7.

Table 7. LSTR model with VAT results.

Variables	Coefficient	Standard error
Linear part		
Constant	-0.325	0.624
GROWTH (-1)	1.090***	0.174
INF	0.044**	0.022
INF× D2018	1.020	0.590
GCF	0.025	0.022
OIL	0.028**	0.010
Nonlinear part		
Constant	-7.640	6.400
GROWTH (-1)	-0.740***	0.075
INF	-0.260***	0.088
INF× D2018	-0.501***	0.126
GCF	0.028	0.075
OIL	0.029	0.280
Gamma	4.850**	2.010
Threshold level (c)	2.880***	0.209

Note: *** and ** indicate coefficients are significant at 1% and 5% levels.

The threshold level is equal to 2.88% and is significant at the 1% level. When the inflation rate is below this rate, inflation positively impacts growth with a coefficient of 0.044. Once the inflation rate surpasses 2.88%, the coefficient of the inflation rate becomes negative (-0.260) and significant. In addition, the coefficient of the interaction term is statistically significant in the second regime and is equal to -0.501. The price of oil also has a positive impact on GDP growth when inflation rates are low. Therefore, the effect of inflation without VAT reform is -0.260 against -0.761 ((-0.260) +(-0.501)) when accounting for the dummy variable corresponding to the implementation of the VAT reform. Thus, it may be inferred that the VAT reform exacerbated the detrimental effects of inflation on economic growth, particularly when the inflation rate surpasses 2.88%. The Gamma parameter is equal to 4.850 and holds significance, indicating a moderate shift from the low-inflation to the high-inflation regime.

5. CONCLUSION, POLICY RECOMMENDATIONS AND LIMITATIONS

The present study has two main goals. First, it estimates the repercussions of inflation on growth in Saudi Arabia between 2010 Q1 and 2022 Q4. Second, it examines the effects of the VAT on the inflation-growth nexus. The study employs the Logistic Smooth Transition Regression (LSTR) model with one threshold to determine the threshold. The outcomes suggest that the threshold level for the inflation rate is equal to 2.47%. When the inflation rate is below 2.47%, it is found to boost economic growth. However, when inflation surpasses this threshold, the impact becomes negative. We then account for the role of VAT in the linkage between inflation and GDP growth. The estimation reveals a threshold of 2.88%. The same results are found as those discussed above. In addition, the

detrimental effect of inflation on growth becomes more significant when we take into account the introduction of VAT.

The outcomes of this study have valuable insights for designing and implementing monetary policy in Saudi Arabia. The central bank should stay informed about the changes in the inflation rate. Indeed, an inflation rate exceeding 2.47%-2.88% may induce a decline in economic growth in Saudi Arabia. Actions that may be undertaken may be linked essentially to the money supply, which represents a tool for the central bank that allows it to reduce inflation. This threshold level is close to the inflation rate considered natural in developed countries. Although the present study provides some novel insights into the macroeconomic effects of inflation in Saudi Arabia and the potential impact of VAT on this relationship, it is important to acknowledge its limitations. First, the present study may be improved by computing the optimal inflation rate for other Gulf Cooperation Council oil-exporting countries, such as the United Arab Emirates and Kuwait. Second, future studies may estimate the potential asymmetric effects of inflation on growth by taking into consideration the effects of negative and positive variations in the inflation rate. Finally, the different sources of inflation may also be considered when estimating the effects of inflation on growth. Such an analysis might be beneficial in formulating appropriate policy recommendations.

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