

Macroeconomic Determinants of Inflation in Ethiopia

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Abstract

Inflation has emerged as a critical economic challenge for Ethiopia, eroding consumer purchasing power. This study aims to identify the key determinants of inflation by examining its interactions with debt financing, government spending, GDP, exchange rates, and other relevant variables using time series data from 1982 to 2022. Employing econometric techniques like stationarity tests, cointegration analysis, error correction models, and Granger causality, the objectives are to determine significant short-run drivers of inflation and identify long-run influencing factors. In the short run, GDP growth, debt financing, government expenditure, exchange rates, and inflation expectations shape inflation dynamics. Unexpected events like natural disasters, conflicts, and policy changes also play a role. Long-term findings suggest GDP growth, debt financing, government expenditure, and exchange rates significantly impact inflation, though mechanisms differ from conventional economic relationships. The study emphasizes adopting coordinated fiscal and monetary policies, managing inflation expectations through transparent communication, addressing supply constraints, prudent debt management, aligning government spending with productive investments, and stabilizing exchange rates. A comprehensive approach tailored to Ethiopia's unique dynamics can help policymakers navigate inflation challenges and ensure price stability.

Keywords: ARDL model, Determinants, Exchange rate, Ethiopia, Inflation, Macroeconomic, Policy

1. Introduction

Inflation is generally categorized into two main types: Demand-Pull and Cost-Push Inflation. Demand-pull inflation occurs when the demand for goods and services surpasses supply, driving prices up (Samuelson & Nordhaus, 2010). Cost-push inflation, on the other hand, results from increased production costs, such as higher wages or raw material prices, which lead producers to raise prices to maintain profits (Mankiw, 2014). These concepts are widely recognized in economic theory as key drivers of inflationary trends. Scholars have defined inflation similarly, emphasizing its impact on the economy. Mankiw (2022) describes it as a sustained rise in the overall price level, while Samuelson and Nordhaus (2010) highlight the decline in money's purchasing power due to rising prices. Bernanke and Frank (2007) also define it as a continuous increase in the general price level. Additionally, the International Monetary Fund (2022) and the Congressional Research Service (2018) describe inflation as a persistent rise in prices,

weakening consumer purchasing power. Thus, inflation can be summarized as a consistent increase in prices that diminishes the value of money over time.

The trend of inflation in Ethiopia from 1982 to 2022 shows significant fluctuations, reflecting various economic challenges over the decades. According to the World Bank data, Ethiopia experienced relatively moderate inflation during the 1980s and early 1990s, but this was followed by periods of high inflation, particularly in the 2000s and 2010s. From 1980s to Early 1990s inflation rates were relatively stable, often staying in single digits due to the controlled economic policies of the Derg regime. However, occasional spikes were linked to political instability and droughts affecting agricultural output. After the change in government in 1991, inflation increased due to economic liberalization policies, but it generally remained under control throughout the decade.

The period of 2000s was a significant rise in inflation rates, especially during the global food price crisis of 2008, where inflation in Ethiopia peaked at over 40%. This was driven by external factors like increased global oil and food prices, as well as internal challenges including drought and supply chain disruptions. During 2010s inflation remained a persistent challenge, with double-digit rates being common, largely due to rapid economic growth, increased government spending, and expansionary fiscal policies. Inflationary pressures were exacerbated by the devaluation of the Ethiopian Birr and challenges in the agricultural sector. From 2020 up to 2022, recent years have seen even higher inflation, especially in 2022 where it approached nearly 30%. This surge was driven by multiple factors, including the economic impacts of the COVID-19 pandemic, disruptions from conflicts in the region, and rising global commodity prices. For detailed yearly inflation rates, the World Bank provides comprehensive data that can be accessed on (World Bank, 2024).

Inflation has been a critical challenge for Ethiopia, with the consumer price index rising substantially in recent years. Understanding the key drivers of inflation is essential for policymakers seeking to stabilize prices and protect household purchasing power. This study investigates the determinants of inflation in Ethiopia using time series data from 1982 to 2022.

The impact of inflation on consumers is that it erodes purchasing power over time as the same amount of money buys fewer goods and services. Lower-income households are the most affected since necessities comprise a larger share of their expenditures (Kizilirmak & Akkoc, 2021). Inflation in Ethiopia has surpassed 10% annually, indicative of prices aggressively rising. With incomes remaining constant, particularly for retirees and government employees, most consumers struggle to afford living costs.

Identifying factors influencing inflation is imperative for the Ethiopian government to address this economic challenge. Product hoarding, long marketing chains with middlemen, black market trading, herd mentality, smuggling, and weak enforcement of illegal trade have been cited as potential drivers (Wajid et al. 2018 ; Buehn and Farzanegan 2012), yet no consensus exists on the key determinants. This study aims to provide clarity by examining inflation's interaction with

GDP growth rate, government spending, exchange rates, debt financing and other relevant variables.

The intended contribution is an empirical analysis that explores inflation determinants in Ethiopia on a scale not conducted before. With food and energy costs escalating and high public debt in Sub-Saharan Africa (Durevall & Sjö, 2012), tackling inflation is critical for economies like Ethiopia. This study will help identify policy options for stabilizing prices and promoting growth.

With inflation persistently exceeding ideal levels, this study seeks to support policymakers in diagnosing factors fueling rising prices. Results will shed light on the complex inflation-growth relationship and how to achieve greater macroeconomic stability. The research aims to advance academic understanding of inflation dynamics in developing countries like Ethiopia. More broadly, it hopes to contribute ideas that help strengthen the economy and enhance people's well-being.

This study aims to identify the key short- and long-run determinants of inflation in Ethiopia using econometric techniques, including stationarity tests, cointegration analysis, and error correction models. By examining the impact of variables such as GDP growth, government expenditure, and exchange rates, the research seeks to provide evidence-based insights for policymakers to address inflationary pressures and enhance macroeconomic stability. The findings aim to contribute to a deeper understanding of inflation dynamics in developing economies, with the goal of supporting sustainable economic growth and improving well-being.

Past analyses have incorporated some drivers across different periods. Tolasa et al. (2022) looked at money supply, government expenditure, GDP, and interest rates from 1981 to 2015. Melaku (2020) considered oil prices, government expenditure, money supply, external debt, and exchange rates from 1986-2016. Haji and Gelaw (2012) examined food inflation, while Loening and Takada (2008) analyzed money supply and exchange rates. Durevall and Sjö (2012) found global prices, world energy prices, and agriculture supply impacted inflation.

This research differentiates itself from previous studies on inflation in Ethiopia by employing a unique combination of variables and a robust methodology. Unlike earlier works that focused on conventional determinants, this study uses a diverse set of interconnected variables to provide a deeper understanding of inflation dynamics. By including lagged inflation values, it captures the persistence of inflation over time, while the GDP growth rate offers insights into economic performance and its effect on price levels. Additionally, total debt service to exports and government expenditure are incorporated to reflect external debt burdens and fiscal policies, both critical factors in shaping inflation in a developing economy like Ethiopia. The use of the official exchange rate also addresses the impact of currency devaluation and import costs, which are particularly relevant in an import-dependent context.

Furthermore, this research leverages the Autoregressive Distributed Lag (ARDL) model, which stands out for its ability to analyze both short- and long-term relationships between inflation and its determinants. The ARDL model's flexibility in capturing time series data and lagged effects

of economic policies enhances the accuracy of the findings, offering a significant advantage over other models that may overlook such dynamics. This research contributes a comprehensive investigation employing 40 years and an augmented set of explanatory variables.

Lastly, the study is both timely and contextually relevant, examining inflation during a period marked by significant challenges like internal conflicts, COVID-19, political instability, and evolving government policies. These contemporary issues have exacerbated inflationary pressures, providing new insights that previous studies may have missed. Thus, this research offers a more comprehensive and updated analysis of inflation in Ethiopia, making it distinct in both approach and findings.

2. Review of the Literature

Akitoby et al. (2014) studies imply that higher inflation could help reduce the public debt somewhat in advanced economies. Lopes et al. (2014) analyzed the implications of public debt on inflation in a group of 52 African countries between 1950 and 2012 using a time series data from 1950 until 2012 and found that public debt has a positive impact on inflation (Nguyen, 2015).

According to Haile (2019), exchange rate depreciation did not cause inflation in 2004 in Ethiopia and thus future devaluation measures will not necessarily trigger higher inflation. Perhaps the rapid exchange rate adjustment will increase domestic prices and possibly lead to inflation. The analysis finds that inflation was caused by strong economic growth, monetary expansion, and international oil and food price rises (Haile 2019 also see Gurara 2011). Most of the time the main causes of inflation in developing countries like Ethiopia is supply shock, money supply and increase in population that leads to higher demand beyond the supply. In Ethiopia, Demand-driven inflation and supply shocks cause inflation since the mid-2000s have become common. The empirical results indicate that excessive growth in aggregate demand leads to inflation and the demand-pull inflation was at least partly monetary in origin and referred to as "too much money chasing too few goods." The average annual growth in the monetary base increased from 6 percent in 1992 to 20 percent in 2014 and contributed to the higher inflation rates.

The study by Kahssay (2017) examined the effects of some factors on inflation in Ethiopia and employed co-integration and error correction methods using yearly data for 40 years. And found that, in the long run, broad money supply and gross domestic product have a positive relationship with the consumer price index (inflation) while high imports and gross national savings have a negative relationship to inflation. In the short run, a broad money supply (M2) has a more positive effect on inflation than GDP and gross national savings. The credit facility, exports, and imports are found to be insignificant in the short-run in explaining inflation in the country. Based on the findings of the study, it can be concluded that inflation in Ethiopia is determined by demand-side factors as well as supply-side factors but the gross domestic product and money supply are critical.

Gurara (2011) and Tefera et al. (2012) concluded that, the long-run inflation in Ethiopia is due to structural, monetary expansion, lending rates, and expectations. Moreover, exchange rate, money supply, gas Oil prices, and deficit have no significant impact on inflation in the long run. On the other hand, supply-side factors such as food availability play an important role in Determining Ethiopia's price movements (Yemane, 2008).

There are conflicting theories regarding the drivers of inflation and their impact on economic growth. One perspective views inflation as a cyclical phenomenon, rising during economic booms and decreasing during recessions. Another school of thought predominantly considers inflation as a monetary issue, where inflation occurs when the money supply exceeds the demand by wealth holders (Khan 2015).

Cost-push inflation arises when the supply of resources is constrained or when the production costs of resources increase. Structural inflation occurs when producers cannot easily adapt to changes in the economic structure, such as shifts in demand patterns or technological advancements (Kahssay, 2017a; Todorova, 2012). Monetarists contend that inflation results from an expansion of the money supply surpassing real output growth. Inflation can also be caused by an increase in aggregate demand or a decrease in aggregate supply (Kahssay, 2017b).

Inflation is driven by factors such as money supply, interest rates, effective exchange rates, and structural factors like average wages, import price indices, and real output. Escalating energy, prices impacts, agricultural production and transportation costs. While global energy and food prices traditionally contribute to inflation. To influence inflation, governments can set official prices for specific food and consumer items and subsidize essential food products (Dalis & Mohammed, 2018). Likewise, inflation expectations are crucial as they shape behavior. They affect present actions, but policymakers face the challenge of relying on indicators and models, as they cannot directly observe these expectations.

Inflation expectations play a pivotal role in modern monetary policy. Central banks worldwide increasingly rely on these expectations to guide their policies. Consumer expectations evolve with new information, leading to more informed and accurate forecasts. These expectations influence various economic decisions like saving, investing, and spending, thereby impacting actual inflation. Hence, monitoring inflation expectations is vital for central banks. Psychological theories suggest consumers give more weight to price increases, especially when they are substantial, frequent, and already a source of concern (Armantier et al., 2013).

Increased inflation expectations have a significant impact on current consumption. Policymakers must recognize that such expectations can drive current consumer spending and influence present price levels. This link between household inflation expectations and consumer spending holds important implications for monetary policy (Burke and Ozdagli 2021; (Vellekoop & Wiederholt, 2017). Besides, exchange rates exert significant influence over economic variables, including interest rates, balance of payments, inflation rates, unemployment, money supply, and GDP (Dalis & Mohammed, 2018). Exchange rates impact the balance of payments, inflation, unemployment, and various macroeconomic indicators, including interest rates, remittances,

foreign direct investment, money supply, tourism, and government operations (Priyatharsiny, 2017).

Additionally, several authors have affirmed the direct correlation between public expenditures and inflation. They suggest that excessive public spending exacerbates demand imbalances, displaces investment, and contributes to an overall increase in price levels (Khan, 2015). Rapid inflation, primarily results from fiscal factors, necessitating reductions in government deficits for effective control (Yemane, 2008b). Conversely, some scholars highlight inflation's positive role in capital accumulation during the shift toward a steady state, supporting the Tobin effect. According to the Mundell-Tobin effect, inflation leads to lower-than-proportional increases in nominal interest rates, fostering increased capital investment and growth (Jeffrey, 2012). An alternative viewpoint posits Sidrauski's super-neutrality of money regarding capital accumulation (Khan, 2015; Tenaw & Demeke, 2020).

In addition to these, price disparities between what consumers pay and what farmers receive stem from various factors, including transaction and transportation costs, product quality, competition, infrastructure, market fees, commissions, labor, and more (Bhoi et al., 2019). Food inflation can result from supply-demand imbalances, increased income, population growth, and rising demand (Lahiri 2012 also see Gautier et al., 2016). Middlemen, acting as intermediaries, often facilitate the journey of goods from producers to consumers, sometimes holding inventories or serving as market facilitators without engaging in actual buying and selling (Gautier et al., 2016).

Moreover, smuggling is a criminal enterprise that involves illicitly transporting goods across national borders, in violation of regulations, to generate income. This unlawful trade constitutes a significant portion of foreign markets in many developing nations. It is characterized by irregular pricing of imports and exports. Such price manipulation and mis-invoicing can be attributed to factors like excessive taxation, tariffs, customs duties, fraudulent activities, capital flight, a thriving underground foreign exchange market, money laundering, and potential financing of terrorism. These activities are part of the criminal underbelly of the economy, exerting adverse effects on the economy and contributing to inflation (Buehn & Farzanegan, 2012). A strong rule of law diminishes smuggling opportunities. Additionally, corruption and the shadow economy often go hand in hand, acting as complements or substitutes and both contributing to higher inflation (Wajid et al. 2018 ;Buehn & Farzanegan, 2012).

Smuggling disrupts international trade, presenting a significant challenge for governments and policymakers and exacerbating foreign goods and services price inflation (Buehn & Farzanegan, 2012; Wajid et al., 2018). It is noted that a heavier tax burden encourages shadow economy participation, and higher inflation rates can foster a black market economy, ultimately contributing to inflation (Wajid et al., 2018).

Furthermore, herd mentality, as defined by Kameda and Hastie (2015), refers to the alignment of thoughts and behaviors in a group, emerging without intentional coordination through local interactions. This phenomenon, described by Dang and Lin (2016), can manifest in various

domains, such as stock prices, consumer buying patterns, and collective societal anxiety. It often results in asset misallocation as consumers rush to buy certain items, straining supply chains. To counteract this negative behavior, understanding its root causes is crucial.

Easley and Kleinberg (2010) suggest that consumers within networks are influenced by the actions of others. Consequently, Cheung et al. (2015) believe that routine items can see irrational value inflation due to flows in demand. Historical instances, like the 2008 rice panic in various countries during a drought and the global rush to buy products post-Fukushima Plant nuclear leak in 2011, illustrate how herd mentality leads to irrational consumer behavior and product scarcity, exacerbating economic problems. Herd mentality encourages individuals to stockpile goods for personal satisfaction, often at the expense of broader societal interests, and can contribute to inflation (Loxton et al., 2020)

3. Methodology

Types, sources of data, and sampling design

This study relied on secondary data from the World Bank, due to their significant sources of macroeconomic variables, making them crucial sources for such data (Pickett et al., 2005). The data encompassed a time series spanning 1982 to 2022. Government expenditure data was obtained from the National Bank of Ethiopia, with availability only up to 2022. Consequently, the study period for all variables was set from 1982 to 2022, based on data availability.

Model specifications

To investigate the primary drivers of inflation in Ethiopia, we examined both the long-term and short-term relationships between inflation and other variables within the time frame of 1982 to 2022, employing the following model.

$$INF_t = \alpha_0 + \alpha_1 GDP_t + \alpha_2 INF_{t-i} + \alpha_3 DBF_t + \alpha_4 GOVE_t + \alpha_5 EXR_t + \varepsilon_t \text{-----} (1)$$

Where INF_t Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly. The Laspeyres formula is generally used (INF_t) Source Ethiopia | Data (worldbank.org)

GDP Rate = Annual percentage growth rate of GDP at market prices based on constant local currency. Aggregates are based on constant 2015 prices, expressed in U.S. dollars. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources (GDP_t .) Source Ethiopia | Data (worldbank.org)

Total debt service to exports of goods, services and primary income. Total debt service is the sum of principal repayments and interest actually paid in currency, goods, or services on long-term debt, interest paid on short-term debt, and repayments (repurchases and charges) to the IMF(DBF_t) Ethiopia | Data (worldbank.org)

Government Expenditure (Current plus Capital Expenditure) (GOV_{Et}) Source National Bank of Ethiopia

Official exchange rate refers to the exchange rate determined by national authorities or to the rate determined in the legally sanctioned exchange market. It is calculated as an annual average based on monthly averages (local currency units relative to the U.S. dollar) (EXR_t) Source Ethiopia | Data (worldbank.org)

α_0 , is constant terms, $\alpha_1, \alpha_2, \dots, \alpha_5$ are coefficients of the parameters and

ε_t is the white noises

4. Result

Unit root test

Table 1 Unit root test

variables	At level			At 1st difference			5% critical value
	value of Test	Statistic	Z(t)	value of Test	Statistic	Z(t)	
loginft		-5.971	0.0000		-9.391	0.0000	-3.542
loggdpgt		-5.766	0.0000		-8.250	0.0000	-3.542
logdbft		-1.635	0.7786.		-6.898	0.0000	-3.542
loggovet		-1.362	0.8716.		-5.385	0.0000	-3.542
logexrt		-1.412	0.8573.		-3.417	0.0492	-3.542

Source: Model result, (2024)

The ADF test statistics reveal that loginf and loggdpgt are stationary at the level; the remaining variables (logdbft, loggovet, logexrt) have test statistics that exceed the 5% critical value at the level, indicating non-stationarity. However, their test statistics at the first difference fall below the 5% critical value, suggesting stationarity after differencing. Having completed the stationarity testing, the subsequent step involves selecting the optimal lag length for the model.

Lag length selection

As we have seen from the unit root test all our variables are stationary at different orders of integration. That means loginf and loggdpgt are stationary at the level while the remaining variables (logdbft, loggovet, logexrt) are stationary at their first differences. In such cases, we should see the lag order of the variables separately. Finally, we get the following table.

Table 2: Lag length selection

Variables	lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
loginft	0	-53.3415				1.10464*	2.93738*	2.95273*	2.98092*
loggdpgrt	0	-22.2859				0.206147*	1.2587*	1.27405*	1.30224*
logdbft	1	-15.5029	54.97*	1	0.000	0.15082*	0.946104*	0.976803*	1.03318*
loggoverc	1	27.3298	199.5*	1	0.000	0.014892*	-1.36918*	-1.33848*	-1.2821*
logexr	2	32.5187	9.3402*	1	0.002	0.011877*	-1.54956*	-1.55437*	-1.46499*

Source: Model result, (2024)

The ideal lag length minimizes these criteria. Here, LR and AIC minimize the values and, indicate 0, 0, 1, 1, and 2 are the optimum length for loginft, loggdpgrt, logdbft, loggoverc, and logexr respectively. These lags give the lowest out-of-sample forecast error. AIC also chooses these lags confirming it as the preferred specification. Based on these diagnostic criteria, a lag order of the above is selected for the ARDL before estimating the model.

Short run ARDL result

Table 3: ARDL model

ardl loginft loggdpgrt logdbft loggoverc logexr,maxlags(2)aic						
ARDL(1,1,1,0,1) regression						
Sample: 1984 - 2022			Number of obs = 39			
			F(8, 29) = 9.45			
			Prob > F = 0.0000			
			R-squared = 0.7159			
			Adj R-squared = 0.6086			
Log-likelihood = -30.858337			Root MSE = 0.6186			
loginft	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
loginft						
L1.	0.1364083	.1342917	1.02	0.318	-.1378519	0.414924
loggdpgrt						
.	-0.5833309	0.1842721	-3.17	0.004	-0.9596647	-0.2069972
L1.	1.050992	0.2054358	5.12	0.000	0.6314364	1.470548
logdbft						
.	-0.7231511	0.2931297	-2.47	0.020	-1.321802	-.1245004
L1.	0.4677289	0.3070426	1.52	0.138	-0.1593357	1.094794
loggoverc	0.6259346	0.2361546	2.65	0.013	0.1436426	1.108227
logexr						
.	2.318533	1.010704	2.29	0.029	0.2543991	4.382667
L1.	-3.425862	1.038169	-3.30	0.002	-5.546086	-1.305637

_cons	-2.709815	1.714078	-1.58	0.124	-6.21043	0.7908003
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Source: Model result, (2024)

R-squared (0.7159) and Adj R-squared (0.6086) indicate that the model explains a significant portion of the variation in the dependent variable. The coefficients of the independent variables (loginft, loggdpgrt, logdbft, loggoverc, logexr) show the impact of each variable on the dependent variable, D.loginft, in both the short run and long run. Notably, loggdpgrt, logdbft, and logexr have statistically significant coefficients, suggesting that they have an impact on D.loginft.

$$\text{loginft} = -2.709815 + 0.1364083\text{Lloginft} - 0.5833309\text{loggdpgrt} + 1.050992\text{Lloggdpgrt} - 0.7231511\text{logdbft} + 0.4677289\text{Llogdbft} + 0.6259346\text{loggoverc} + 2.318533\text{logexr} - 3.425862\text{Llogexr} \dots\dots\dots (2)$$

Where “L” represents the lagged values of the variables

Bounds test

Table 4: Bonds test

Pesaran/Shin/Smith (2001) ARDL						Bounds Test		
H0: no levels of relationship						F = 14.638		
						t = -6.503		
critical Values (0.1-0.01), F-statistic, Case 3								
	[I_0]	[I_1]	[I_0]	[I_1]	[I_0]	[I_1]	[I_0]	[I_1]
	L_1	L_1	L_05	L_05	L_025	L_025	L_01	L_01
k_4	2.45	3.52	2.86	4.01	3.25	4.49	3.74	5.06
Accept if F < critical value for I(0) regressors								
Reject if F > critical value for I(1) regressors								
Critical Values (0.1-0.01), t-statistic, Case 3								
	[I_0]	[I_1]	[I_0]	[I_1]	[I_0]	[I_1]	[I_0]	[I_1]
	L_1	L_1	L_05	L_05	L_025	L_025	L_01	L_01
k_4	-2.57	-3.66	-2.86	-3.99	-3.13	-4.26	-3.43	-4.6
accept	if	t	>	critical	value	for	I(0)	regressors
reject	if	t	<	critical	value	for	I(1)	regressors
k: # of non-deterministic regressors in long-run relationship								
Critical values from Pesaran/Shin/Smith (2001)								

Source: Model result (2024)

In this test, the null hypothesis (H0) suggests no long-term relationship among variables. The computed F-statistic is 14.638, and the t-statistic is -6.503, used to accept or reject the null hypothesis. Critical values from Kripfganz and Schneider (2020) guide this decision for various significance levels (10%, 5%, 1%). Both statistics significantly exceed critical values for I(1) regressors, leading to null hypothesis rejection at all significance levels. Cointegration presence is confirmed by comparing the F-statistic to lower bounds, indicating stable long-term connections among variables like inflation, GDP growth rate, debt financing, government expenditure, and exchange rate. ARDL model and bounds test support this, suggesting an error correction model's feasibility for long-term analysis.

Long run ARDL

Table 5: Long run error correction model

. ardl loginft loggdpgrt logdbft loggoverc logexr,lags(1 1 1 0 1)						
ARDL(1,1,1,0,1) regression						
Sample: 1983 - 2022			Number of obs		=	40
R-squared		=	0.8275			
Adj R-squared		0.7830				
Log likelihood = -31.290342			Root MSE		=	0.6010
D.loginft	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
ADJ						
loginft						
L1.	-0.8559963	.1316337	-6.50	0.000	-1.124465	-0.5875276
LR						
loggdpgrt	0.5741311	0.3828237	1.50	0.144	-0.206643	1.354905
logdbft	-0.2970118	0.1762483	-1.69	0.102	-0.6564726	0.0624489
loggoverc	0.7308728	0.2712919	2.69	0.011	0.1775694	1.284176
logexr	-1.31675	0.5444823	-2.42	0.022	-2.427229	-0.206271
SR						
loggdpgrt						
D1.	-1.059147	0.2021171	-5.24	0.000	-1.471368	-0.6469264
logdbft						
D1.	-0.4562784	0.3022094	-1.51	0.141	-1.072639	0.1600818
logexr						
D1.	3.419822	1.024972	3.34	0.002	1.329377	5.510267
_cons	-2.746335	1.690684	-1.62	0.114	-6.194507	0.7018375

2021Source: Model result (2024)

From the above table, we got that the optimal lag order for loginft is 1, loggdpgrt is 1, logdbft is 1, loggoverc is 0 and logexr is 1. After this result, we should run the ARDL Bounds Test using these lags.

Based on the ARDL error correction model results, the long-run equation can be generated as:

$$\begin{aligned} \text{loginft} = & -2.746335 + 0.5741311\text{loggdpgrt} - 0.8559963\text{loginf}(t-1) - 0.2970118\text{logdbft} + \\ & 0.7308728\text{loggoverc} - 1.31675\text{logexr} \dots\dots\dots (3) \end{aligned}$$

5. Discussion

Short run analysis

In the short run, a 1% increase in GDP growth is associated with a 0.58% decrease in inflation, holding other factors constant. This inverse relationship aligns with the Phillips Curve, suggesting higher growth initially reduces unemployment but increases inflationary pressures.

Past research by (Haile, 2019), found that Ethiopia's sustained economic growth has been accompanied by high inflation. They conclude inflation was caused by strong growth. The current analysis finds that GDP growth positively affects Ethiopian inflation in the long run, while significantly negatively impacting inflation in the short run. This short-run relationship aligns with standard economic theory and the Phillips Curve, which suggests an inverse inflation-unemployment tradeoff in the short term as higher growth reduces unemployment but increases inflationary pressures. Kahssay, (2017) found similar results. More research on the specific drivers in Ethiopia is needed to explain the divergence from conventional relationships.

An increase in debt financing is associated with a short-term reduction in inflation by approximately 0.72 units. This could be explained by a crowding out effect, where higher interest rates from increased borrowing discourage private spending and investment, easing inflationary pressures.

Past research has found that large budget deficits in developing countries not only lead to inflation but can also impose a burden on future generations (Nguyen, 2015; Yemane, 2008b). The empirical results obtained in this research are directionally similar, showing an insignificant long-run relationship between deficits and inflation in Ethiopia.

A 1% increase in government expenditure corresponds to a 0.63% rise in inflation in the short run. Higher government spending can boost aggregate demand faster than aggregate supply, generating excess demand that pulls up prices, especially if financed through money creation rather than taxes or borrowing.

In the short run, a 1% increase in the current exchange rate (currency depreciation) leads to a 2.32% increase in inflation, as imports become more expensive. However, with a lag, a 1%

exchange rate depreciation is associated with a 3.43% decrease in inflation, as consumers switch to cheaper domestic substitutes.

Inflation exhibits inertia, with a 1% increase in lagged inflation resulting in a 0.14% decrease in the current inflation change. This negative feedback effect suggests high past inflation tends to moderate current inflation as expectations adjust and contractual rigidities limit full adjustment.

Previous studies have found that appreciation of the exchange rate directly causes inflation (Gurara, 2011; Priyatharsiny, 2017). The results obtained in this research are consistent, showing a significant positive short-run effect of exchange rate appreciation on inflation in Ethiopia.

Past studies by Gurara, (2011) and; Tefera et al., (2012) found that exchange rates and deficits have no significant long-run impact in Ethiopia. Additionally, (Tenaw & Demeke, 2020), explained major inflationary periods in Ethiopia were associated with droughts and the 2007 global financial crisis. An IMF (2008) study found internal factors play a bigger role than external factors in Ethiopian inflation. Rising inflation remains a critical challenge for the Ethiopian economy. These past findings highlight that structural issues, food supply shocks, and domestic macroeconomic policies seem to be the main drivers of Ethiopian inflation, rather than external factors.

Internal conflicts and political instability within Ethiopia can disrupt economic activities, leading to reduced production and supply chain disruptions. This can result in shortages and higher prices for goods and services. Furthermore, peace instability can affect the agricultural sector, which is a significant part of Ethiopia's economy. Conflicts and displacement of rural populations can disrupt farming activities and lead to food shortages, driving up food prices. This has been observed in some parts of Ethiopia in recent years.

Conflict-induced displacement can also lead to the movement of people within the country, straining local resources, infrastructure, and services, potentially impacting the cost of living in affected areas. Additionally, peace instability can deter foreign investment and negatively affect economic growth. Reduced investment can limit job opportunities and economic expansion, which can indirectly contribute to inflation.

Overall, the short-run equation provides insights into how changes in inflation are influenced by various economic factors. In this context, past inflation, GDP growth, debt financing, government expenditure, and exchange rate movements all play a role in shaping short-term inflation dynamics in Ethiopia.

Long run analysis

In the long run, a 1% increase in GDP growth rate is associated with a 0.57% increase in inflation, though the relationship is not statistically significant. The model rejected the hypothesis that GDP growth does not affect inflation. The positive link can be explained by demand-pull inflationary pressures, as higher output increases demand, allowing firms to raise prices according to Say's Law.

Changes in debt financing have a detrimental impact on inflation in the long run. An increase in debt financing is linked to a 0.29% decline in inflation. This negative effect can be attributed to higher interest rates discouraging private borrowing and spending, reducing demand and inflationary pressures (the crowding out effect). However, the impact depends on whether the debt-financed spending is productive or not.

Inflation in Ethiopia is positively influenced by government expenditure in the long run. A 1% increase in government expenditure corresponds to a 0.73% rise in inflation. Government spending injects money into the economy, boosting aggregate demand and exerting upward pressure on prices. This aligns with Keynesian theory linking higher government spending to higher inflation through increased demand.

In the long term, a 1% appreciation of the exchange rate is associated with a 1.32% decrease in inflation. Currency appreciation makes imported goods cheaper, reducing import prices and overall inflation. The large coefficient suggests inflation is highly responsive to exchange rate changes in Ethiopia. Appreciation improves real incomes, reduces production costs through cheaper imports, anchors inflation expectations by signaling policy commitment, and shifts consumption towards cheaper imports.

The analysis found an insignificant long-run relationship between deficits and inflation in Ethiopia, contrasting with earlier research linking large deficits to inflation in developing countries. This could reflect changes in how deficits impact inflation due to the shifting composition of spending or financing sources in Ethiopia's economy over time.

Overall, the findings suggest GDP growth, debt financing, government expenditure, and exchange rates play important roles in shaping long-run inflation dynamics in Ethiopia, though the specific mechanisms and magnitudes differ from conventional economic relationships observed in some past studies or other country contexts.

6. Conclusions

The findings underscore the importance of adopting a coordinated approach to fiscal and monetary policies in managing inflation in Ethiopia. Given the impact of adaptive expectations on inflation, authorities must focus on shaping inflation expectations among households and businesses through clear and transparent communication of policies and economic conditions. This can help reduce expectations of high inflation and influence behavior to mitigate demand-pull pressures.

While GDP growth may initially lower short-term inflation, policymakers must actively monitor and address potential supply constraints that could emerge over time to prevent long-term inflationary pressures. Identifying and mitigating supply bottlenecks can help sustain economic growth without exacerbating inflation.

The analysis cautions that while debt financing initially reduces inflation, subsequent lags lead to rising inflation. A thoughtful approach to public borrowing, considering timing and methods, is crucial to ensure inflation remains manageable over time.

Government spending consistently fuels inflation in Ethiopia. Policymakers should review the composition of expenditure to align with productive investments that stimulate growth without significantly contributing to inflation. Fiscal policies must avoid exacerbating inflationary pressures, particularly during economic expansions.

Exchange rate management is vital for controlling inflation, especially in import-reliant economies. Policies aimed at stabilizing exchange rates can mitigate the impact of currency depreciation on inflation and control imported inflation's effects on overall inflation.

Further research is necessary to fully comprehend the complex relationships between budget deficits, public debt, exchange rates, and economic growth in the context of Ethiopian inflation. Policymakers should remain open to exploring these evolving relationships and consider the changing economic landscape when making decisions.

To effectively tackle inflation, Ethiopia must adopt a comprehensive approach tailored to its unique economic dynamics. This involves implementing coordinated policies, efficiently managing expectations, and addressing both short-term and long-term inflationary factors. Heeding these recommendations can help policymakers successfully navigate current inflation challenges and ensure price stability.

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