

Exchange Rate Pass-Through and Inflation in Ghana: A New Keynesian DSGE Approach

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Research Article

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Abstract

The paper assesses exchange rate pass-through to inflation in Ghana and the effectiveness of the monetary policy rate as a market signaling tool for monetary policy. The New Keynesian Dynamic Stochastic General Equilibrium (DSGE) model is applied using monthly time series data covering the period from 2006 to 2025. The results suggest a high but incomplete exchange rate pass-through to inflation, meaning that depreciation of the cedi causes a significant rise in domestic consumer prices though not by the exact full percentage of the currency depreciation. The estimated coefficient of exchange rate pass-through is 0.7, indicating that a percentage point depreciation of the domestic currency increases inflation in Ghana by 0.7 percentage points and the output gap by 0.6 percentage points. Furthermore, the findings reveal significant impact of the monetary policy rate on inflation and the output gap. For instance, a 1 percentage point (100 basis points) increase in the policy rate reduces inflation by 1.1 percentage points, and the output gap by 1 percentage point.

JEL Classification: E12, E31, E52, E58

1. Introduction

Exchange rate depreciation remains one of the most challenging macroeconomic problems in Ghana (Yazdanie, Frimpong, Dramani and Orehounig, 2024). In 2022, the domestic currency (cedi) depreciated by more than 120% against the U.S. dollar but recovered significantly in 2025, reaching 10 cedi to the U.S. dollar (see International Trade Administration, 2026). Similarly, interest rates remain high (25% and above) because of the high monetary policy rate of the Central Bank for tackling inflation and the high default rate of borrowers (see International Trade Administration, 2026). Ghana is a small open economy and as such exchange rate pass-through has significant impact on domestic inflation and output fluctuations (see Amoah and Aziakpono 2018; Banerjee, Sensoy, Goodell and Pradhan. 2026). The impact of exchange rate shocks is mostly on imports and relative prices (see Amoah and Aziakpono 2018; Boz et al. 2022). Currency depreciation is highly inflationary and the transmission of the shocks substantial when the exchange rate pass-through is high (see Maheswari, Sabu and Ramachandran, 2026). Additionally, a complete pass-through of exchange rate alters relative prices and enables expenditure switching across domestic and foreign goods (see Shah and Garg, 2026) whereas incomplete pass-through leads to the law of one price deviation among traded goods (see Glushenkova and Zachariadis, 2016; Borraz and Zipitría 2022).

The economy of Ghana is vulnerable to exchange rate fluctuations (see Nchor, 2026; Oppong, Idun and Adela, 2026) largely due to high dependence on imports (see World Development Indicators 2026; Dhyne, Kikkawa, Mogstad and Tintelnot, 2023). Moreover, the domestic retail market is dominated by imported goods, and the invoicing of these imports is in foreign currency (see Banerjee, Sensoy, Goodell and Pradhan. 2026). Furthermore, the economy is highly dollarized with some domestic businesses setting prices in foreign currencies (see Bawuah, Agyei-Ampomah, Owusu-Ansah and Atsu 2023), thus, exogenous exchange rate depreciation shocks affect the economy frequently with larger magnitude (see

Nchor, Klepáč and Adamec, 2016). Additionally, Ghana relies heavily on primary commodity exports (see Nchor and Rozmahel, 2026), hence, commodity price shocks in the world market cause significant exchange rate fluctuations. Besides, Ghana features debt denominated in foreign currencies; therefore, sudden depreciations increase debt servicing costs. Against this backdrop, the risk of monetary policy ineffectiveness is high because of the large and frequent currency movements (see Calvo and Reinhart, 2002; Dramé and Léon, 2025). Therefore, assessing correctly, the exchange rate pass-through to inflation in Ghana is important.

This paper defines exchange rate pass-through as the percentage point increase in domestic inflation linked with a percentage point depreciation of the exchange rate (cedi per U.S dollar). The structural parameter of exchange pass-through is not fixed but varies depending on the specific structural shock and the credibility of monetary policy (see Cuitiño, Medina and Zacheo, 2022; Woodford, 2004; Ascari et al. 2017). The paper employs the New Keynesian DSGE model (see Galí and Gertler, 2007; Galí 2008) focusing on the expectations channel, the domestic demand channel (see Nchor, 2020) and the exchange rate pass-through channel. The model assumes limited access of economic agents to financial markets, Taylor rule for monetary policy (see Taylor, 2011), rational expectations as economic agents optimize utility and profits by forecasting future, monopolistic competition where firms set their own prices rather than taking a market-determined price and lastly, nominal rigidities where prices and wages do not adjust instantly (Calvo-style pricing). This approach helps to explain the link between monetary policy, inflation and the output gap (see Zamarripa, 2021; Meenagh, Minford and Xu, 2026). The goal of the paper is twofold: first, to assess the level of exchange rate pass-through to domestic inflation in Ghana and second, to examine the effectiveness of the monetary policy rate in controlling inflation. The paper contributes to literature in several ways.

The rest of the paper is structured as follows: Chap. 2 describes the data used, the sources and the model transformations. Chapter 3 covers the interpretation and discussion of the findings. Chapter 4 focuses on the conclusion and policy recommendations.

2. Materials and Methods

The paper models an economy in which the growth rate of the exchange rate is exogenous and in which it affects inflation (see StataCorp, 2023). The initial step is to add the growth rate of the exchange rate to the inflation equation in the New Keynesian DSGE model. From equations 1 to 5, y_t is the output gap, which is modeled as an unobserved control variable, r_t is the nominal interest rate, which is modeled as an observed control variable, π_t is the inflation rate, which is modeled as an observed control variable, g_t and μ_t are first-order autoregressive state variables (see StataCorp, 2023). e_t is the growth rate of the exchange rate, which is modeled as an observed exogenous variable (see StataCorp, 2023).

$y_t = E_t (y_{t+1}) - \langle r_t - E_t (\pi_{t+1}) - g_t \rangle$	1
$r_t = \bar{r}_t + \mu_t$	2
$\pi_t = \beta E_t (\pi_{t+1}) + k y_t + \psi e_t$	3
$\mu_{t+1} = \pi_\mu \mu_t + \epsilon_{t+1}$	4
$g_{t+1} = \pi_g g_t + \xi_{t+1}$	5

Equations 1 to 5 do not provide solution to how the observed e_t evolves over time hence cannot be solved. A first-order autoregressive process for the unobserved state variable es_t is then added and an equation linking the unobserved es_t to the observed e_t (see StataCorp, 2023). Eq. 6 represents the dynamic IS curve (Investment-Saving curve). Eq. 7 represents the monetary policy rule (Taylor Rule). Eq. 8 represents New Keynesian Phillips Curve (NKPC) with an added supply shock variable (nominal exchange rate). Eq. 9 specifies how the unobserved state es_t is transformed into the observed control variable e_t . Eq. 12 specifies that the unobserved state es_t is a first-order autoregressive process (see StataCorp, 2023). The parameter k is known as kappa, the slope of the Phillips curve and is predicted to be positive. The parameter β is the discount factor that represents the degree to which agents discount the future relative to the current period. The parameter ψ also known as psi in Eq. 8 represents the sensitivity of inflation to the exogenous exchange rate shock. Under this model with the assumption of nominal rigidities, ψ is governed by the share of producer currency pricing as against the local currency pricing (see Flodén and Wilander, 2006). $\psi = 1$ indicates complete pass-through, $\psi = 0$ depicts zero pass-through. A value of ψ closer to 1 is considered high exchange rate pass-through to domestic inflation.

$y_t = E_t (y_{t+1}) - \langle r_t - E_t (\pi_{t+1}) - g_t \rangle$	6
$r_t = \pi_t + \mu_t$	7
$\pi_t = \beta E_t (\pi_{t+1}) + k y_t + \psi e s_t$	8
$e_t = e s_t$	9
$\mu_{t+1} = \rho_\mu \mu_t + \epsilon_{t+1}$	10
$g_{t+1} = \rho_g g_t + \xi_{t+1}$	11
$e s_{t+1} = \rho_e e s_t + \aleph_{t+1}$	12

Equation 9 describes how domestic inflation (π_t) is determined by three components: forward-looking expectations ($E_t (\pi_{t+1})$), domestic economic activity (y_t) or the output gap and external open-economy pressure ($e s_t$). $\beta E_t (\pi_{t+1})$ is the expectations channel, $k y_t$ is the domestic demand channel while $\psi e s_t$ is the exchange rate pass-through channel which captures how exchange rate fluctuations (nominal depreciation) affect domestic inflation. The data for inflation rate and the nominal interest rate are obtained from Bank of Ghana. Nominal interest rate is measured using the monetary policy rate. The exchange rate variable is measured using the nominal exchange rate. The data is monthly and covers the period 2006 to 2025.

3. Results

The results of the DSGE model (see Table 1) show an estimate of the exchange rate pass-through to be 0.72 implying that a percentage point depreciation of the domestic currency (cedi) causes 0.7 percentage points increase in inflation and 0.6 percentage points increase in the output gap. The coefficient of the exchange rate pass-through is closer to 1, suggesting high pass-through of exchange fluctuations to domestic inflation. This means that fluctuations of the cedi are quickly and strongly transmitted to inflation. The economic implication is that the economy of Ghana is highly vulnerable to supply-side inflation. The estimated coefficient of kappa (the slope of the New Keynesian Phillips curve) is 0.78 which is high and consistent with the standard New Keynesian Phillips Curve inflation model where it is generally larger for developing countries. It demonstrates how sensitive domestic inflation is to changes in economic activities (see Guirguis, Dutra and McGreevy, 2022; Doser, Nunes, Rao and Sheremirov, 2023). In this paper the inclusion of exchange rate increases the slope because adding the

exchange rate links domestic inflation directly to imported inputs and foreign prices. This connection amplifies how changes in domestic economic activity translate into firms' marginal costs.

Table 1 Model 1

Sample: 2006m2 thru 2026m1
Log likelihood = -788.55573
(1) [/structural]beta = .95

Number of obs = 240

	Coefficient	Std. err.	z	P> z	[95% conf. interval]	
/structural						
beta	.95	(constrained)				
kappa	.7757126	.2276089	3.41	0.001	.3296075	1.221818
psi	.7191083	.2201453	3.27	0.001	.2876314	1.150585
rho_u	.3167956	.0610933	5.19	0.000	.1970549	.4365363
rho_g	.3359604	.0820077	4.10	0.000	.1752283	.4966925
rho_e	.1198054	.0640561	1.87	0.061	-.0057422	.245353
sd(e.u)	1.492029	.0681016			1.358553	1.625506
sd(e.g)	.8617052	.1668663			.5346533	1.188757
sd(e.es)	.3825138	.0174593			.3482943	.4167334

Source: Author's own work

Exogenous Exchange Rate Depreciation Shock

Figure 1 shows the impact of a sudden exchange depreciation shock on inflation and the output gap. The results reveal a spike in inflation and the output gap. For instance, a 1 percentage point depreciation of the cedi causes inflation and the output gap to increase by 0.7 and 0.6 percentage points respectively. The increase in inflation is explained by the fact that the depreciation of the cedi acts as an adverse supply shock driving inflation upward. The increase in the output gap is explained by the fact that the weaker domestic currency boosts net exports largely through the expenditure-switching effect. In other words, a weaker currency causes consumers and businesses to shift spending away from foreign goods toward the cheaper domestic goods leading to an increase in the output gap. However, as the primary goal of the Central Bank is price stability, a hike in the monetary policy rate follows to curb inflation. This is discussed in Figure 2.

Monetary Policy Shock (Policy Rate Hike)

In Figure 2, the paper assesses the impact of a hike in the monetary policy rate (monetary tightening) on inflation and the output gap. The results reveal that a hike in the monetary policy rate by 1 percentage point (100 basis points) causes inflation and the output gap to decrease by 1.1 and 1 percentage points respectively. The decrease in inflation and the output gap align with standard economic theory because

a hike in the policy rate raises the cost of borrowing and stifles both consumption and investment. This contractionary effect shrinks the output gap and inflation. The hike in the policy rate however increases both nominal and real interest rates.

4. Discussion

The results from the DSGE model suggest a high but incomplete exchange rate pass-through to inflation in Ghana meaning that depreciation of the cedi causes a significant rise in domestic consumer prices although not by the exact full percentage of the currency depreciation. The estimated coefficient of the exchange rate pass-through is 0.7 implying that a 1 percentage point depreciation of the Ghana cedi leads to an increase in inflation by 0.7 percentage points and an increase in the output gap by 0.6 percentage points. The increase in inflation is mainly driven by the exchange rate pass-through. In the event of a contractionary monetary policy, the results reveal that a 1 percentage point (100 basis points) increase in the monetary policy rate decreases inflation by 1.1 percentage points and decreases the output gap by 1 percentage point. The high value of the exchange rate pass-through means that it is beyond the dampening effect of local currency pricing (see Edwards and Cabezas, 2022). This high exchange rate pass-through is an indication that a dominant share of firms is setting prices in the exporter's currency (producer currency pricing), thus, causing border import prices to move one-for-one with nominal exchange rate fluctuations (see Bampinas, et al. 2026). Even with price stickiness, the impact of exchange rate fluctuations is magnified by high exchange rate pass-through (see Bampinas, et al. 2026).

The results of this paper are consistent with the findings of Obeng et al. (2022) who conclude that exchange rate pass-through is incomplete in the period of depreciation. The results also correspond to the findings of Valogo, Duodu, Yusif and Baidoo (2023) who found the exchange pass-through to inflation to be 0.70%. Additionally, the findings of this paper agree with Shah and Garg (2026) who argue that high exchange rate pass-through is a result of foreign exporters setting prices in their own currency instead of the destination market and Gereziher and Nuru (2023) who argue that developing countries depend largely on imported goods making the pass-through of exogenous exchange rate shocks faster and stronger (see Nchor, Klepáč and Adamec, 2016). Lastly, the results align with many empirical studies (see Bwire et al. 2013; Nchor and Adamec, 2016) who show that incomplete pass-through is a common phenomenon and de Mendonça and Tostes (2015) who argue that when Central Banks lack monetary policy credibility, exchange rate pass-through of currency is high.

5. Conclusion

The paper analyzes the level of exchange rate pass-through to inflation in Ghana and assesses the effectiveness of the monetary policy rate as a market signaling tool for tackling inflation. The New Keynesian DSGE model is applied assuming nominal rigidities. The results suggest that there is a high but incomplete exchange rate pass-through to inflation in Ghana which implies that the depreciation of the cedi does not translate into a proportional one-to-one increase in inflation. The paper obtains an

exchange rate pass-through estimate of 0.7, suggesting that a percentage point depreciation of the cedi leads to an increase in inflation by 0.7 percentage points and a 0.6 percentage point increase in the output gap. The estimated value of the pass-through is high given that it is closer to 1 indicating that the dampening effect of local currency pricing is largely muted, yielding high transmission of exchange rate depreciation to inflation. It also indicates that a larger proportion of firms are setting prices in the exporter's currency. In other words, there is a dominant share of producer currency pricing compared to local currency pricing. The results further reveal significant impact of the monetary policy rate as a policy tool. For instance, if the Central Bank increases the monetary policy rate by 1 percentage point (100 basis points), inflation rate decreases by 1.1 percentage points, and the output gap decreases by 1 percentage point.

The adoption of the inflation targeting mechanism helps to anchor inflation expectations and reduce the second-round effects of exchange rate fluctuation however, there is the need for strict independence of the Central Bank to freely pursue monetary policy goals devoid of political interference. Moreover, the communication of monetary policy initiatives should be clear and transparent to reduce market uncertainty. Given the vulnerability of the economy to exchange rate fluctuations, industrialization will increase export diversification with improved value additions to attract higher foreign exchange earnings and strengthen the cedi. Lastly, there is the need for the country to control the dollarization of the domestic economy whereby goods and services produced in the domestic economy are priced foreign currencies. This is because dollarized or partially dollarized Central Banks lose full control over money supply and bad news about currency depreciation triggers panic and increases downward pressure causing the cedi to depreciate even faster.

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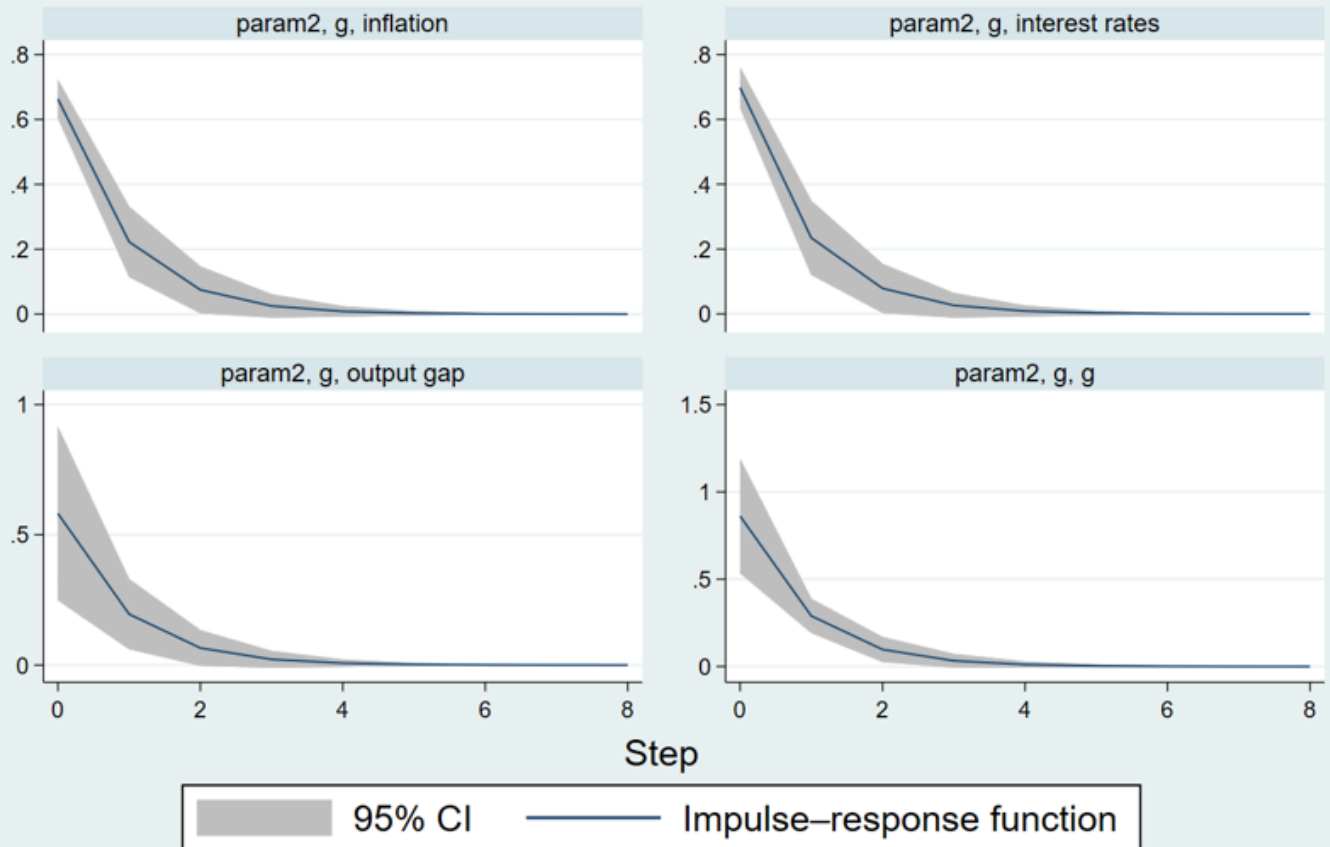
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Figures

Impulse Response Function of an Exchange Rate Shock



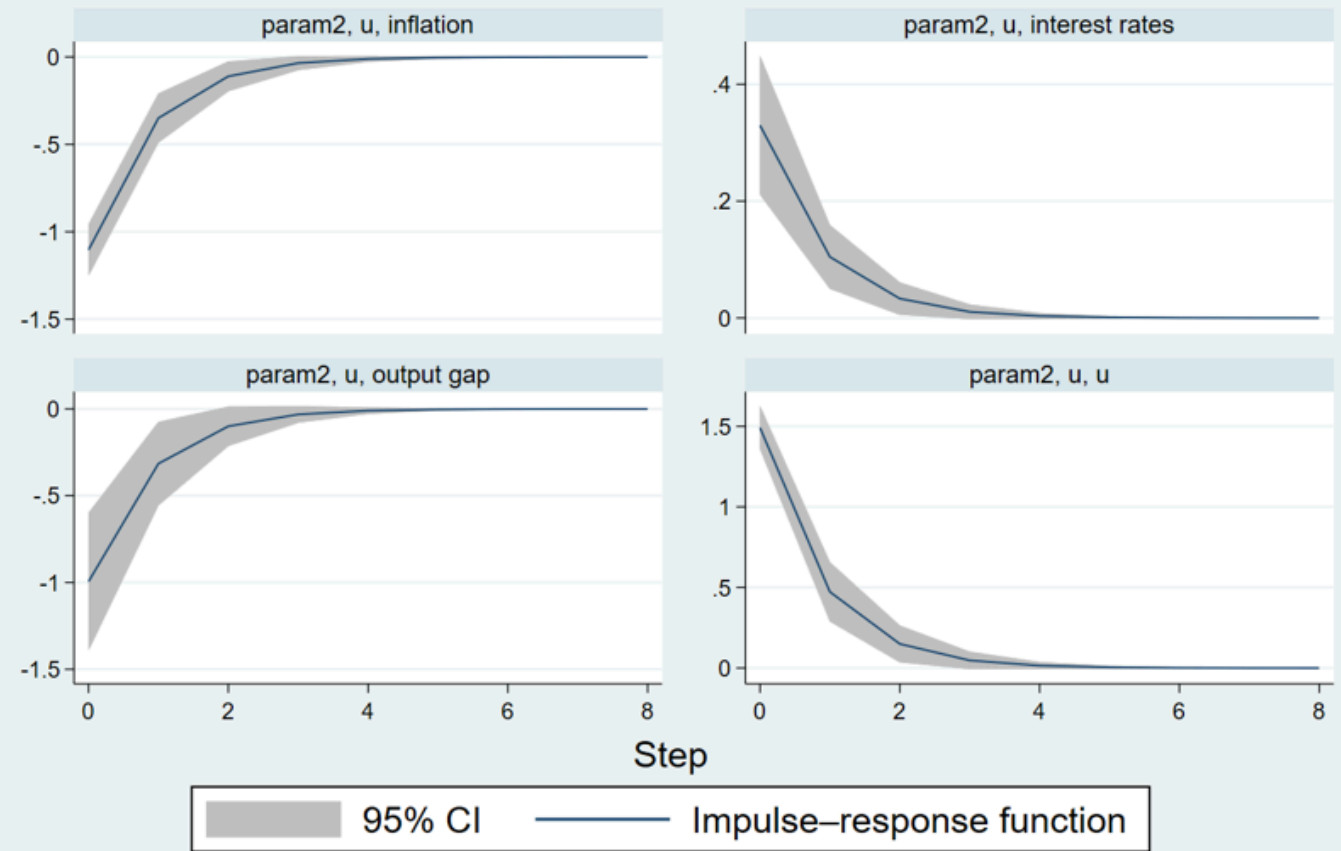
Graphs by irfname, impulse variable, and response variable

Source: Author's own work

Figure 1

Exogenous Exchange Rate Depreciation Shock

Impulse Response Functions of a Monetary Policy Shock (Policy Rate Hike)



Graphs by irfname, impulse variable, and response variable

Source: Author's own work

Figure 2

Impulse Response Functions of Monetary Policy Shock