The Role of Energy Price Shocks in the Transmission of Monetary Policy in an Inflation Targeting Country: The Case of Ghana

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Abstract

Energy inflation has become more volatile and has evolved independently of other components of headline inflation over the years. Therefore, the use of one Phillips curve to capture short-run inflation dynamics may be inadequate in terms of helping the monetary policy authorities to determine the appropriate path of the monetary policy rate. Such an approach may introduce noise into the model system, making it difficult to get reliable forecasts for inflation. We extend the existing New-Keynesian model to include separate Phillips curves for energy inflation and non-energy inflation. This approach would help the monetary policy

authority in Ghana to gain a deeper understanding of how shocks to energy prices affect inflation, thereby leading to informed decisions about the appropriate path of the monetary policy rate in Ghana. We also incorporate a fiscal block to capture the effects of fiscal deficits on inflation in Ghana. We use the extended model to study the transmission mechanisms of the real economy, and of the exchange rate. This analysis allows us to understand the importance of these shocks in explaining inflation developments in Ghana and their implications for monetary policy. The results are mixed, indicating that isolating energy price from the rest of prices in the CPI basket does not necessarily improve the forecasts of the key macroeconomic variables, and will therefore not necessarily lead to better policy outcomes.

Introduction

Inflation forecasts play a central role in any inflation targeting framework. Forecast deviations are normally driven by volatile components of variables. Monetary policy does not directly respond to movements in these volatile components. However, these components affect forecast performance and, therefore, influence monetary policy decisions. It is, therefore, important to isolate these volatile components to enhance forecast performance, and therefore improve monetary policy decision-making. Energy inflation in Ghana has become more volatile and has evolved independently of other components of headline inflation over the years (see Figure 1). Therefore, the use of one Phillips curve to capture short-run inflation dynamics may be inadequate in terms of forecast performance. Such an approach may introduce noise into the model system, making it difficult to get reliable forecasts for inflation.

Figure 1: Headline, core, and energy inflation in Ghana
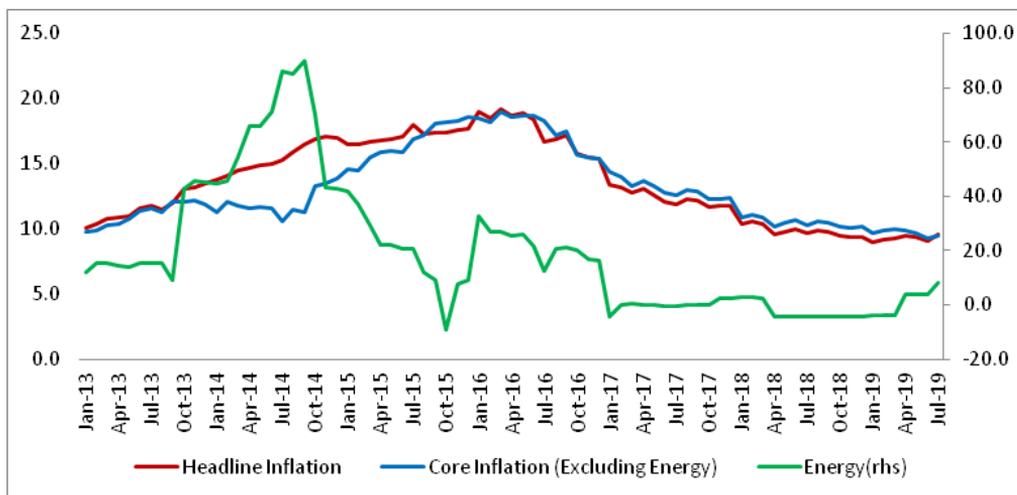
Source: Bank of Ghana.

This study makes four main contributions to the literature. First, we extend the existing New-Keynesian model to include separate Phillips curves for energy and non-energy inflation. This approach would help improve forecast performance. As a result, the monetary policy authorities in Ghana can make informed decisions about the appropriate path of the monetary policy rate in Ghana. Second, we use the extended model to study the transmission mechanisms of shocks to energy and non-energy inflation in Ghana. We use data from the period 2013.01–2019.07. This analysis allows us to understand the importance of these shocks in explaining inflation developments in Ghana and their implications for monetary policy. Third, we also compare the forecast performance of the extended model with the existing model. Finally, we incorporate a fiscal block to capture the effects of fiscal deficits on inflation in Ghana.

One approach of addressing the volatile energy inflation in our model is to decompose energy inflation into its components and model the specific component driving the volatility. The energy market in Ghana is made up of the following sources of power: hydroelectricity, gas, kerosene, charcoal, firewood, petrol, diesel, and motor oil. The deregulation of the energy sector in 2007 removed all subsidies. Figure 2 shows the components of the energy inflation.

Figure 2: Components of energy inflation in Ghana (2013⊓2019)
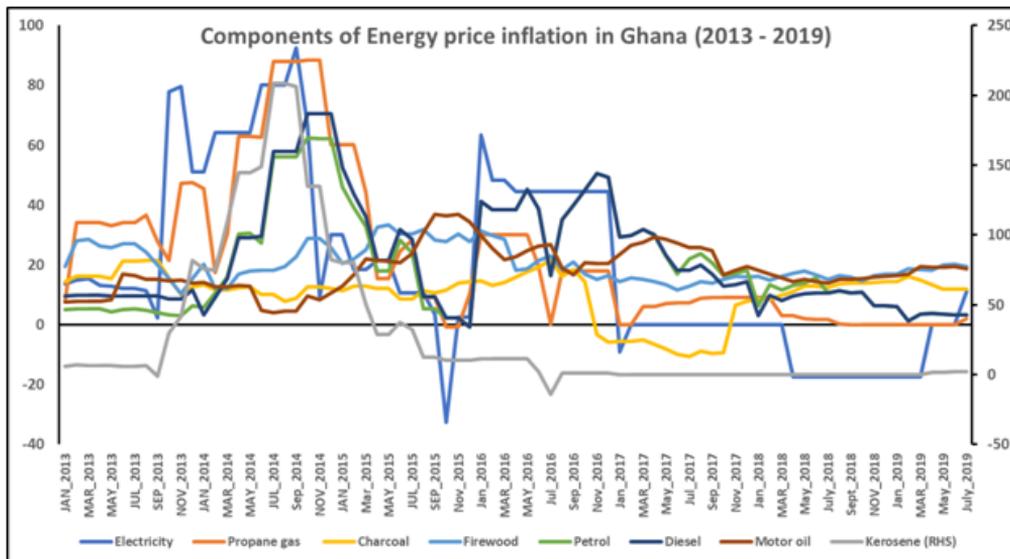
[Source: Bank of Ghana]

No single component appears to be the main driving force behind the movements in energy price inflation. Therefore, modelling a weighted average of the components is enough for our purpose. We, therefore, proceed to disaggregate the Phillips curve into energy and non-energy inflation equations. Decision-making under the inflation

targeting framework requires reasonably accurate inflation forecasts. Therefore, attempts to improve the existing model by disaggregating the Phillips curve into energy and non-energy components will enhance inflation forecast performance, and thereby improve monetary policy decision-making in Ghana.

This paper is timely as deviations from the inflation target have become more persistent and may therefore become costly to bring down in terms of output loss. For example, inflation deviated from the band for almost five years, 2013–2018 (see Figure 3). It is, therefore, reasonable to suggest that attempts by monetary policy to contain inflation during this period may have adversely weighed on output. Although Alichi et al. (2018) observed that the output loss due to the disinflation process did not appear to be that big, they also cautioned that their results were only suggestive and should not be used as evidence for policy.

Figure 3: Inflation rate in Ghana
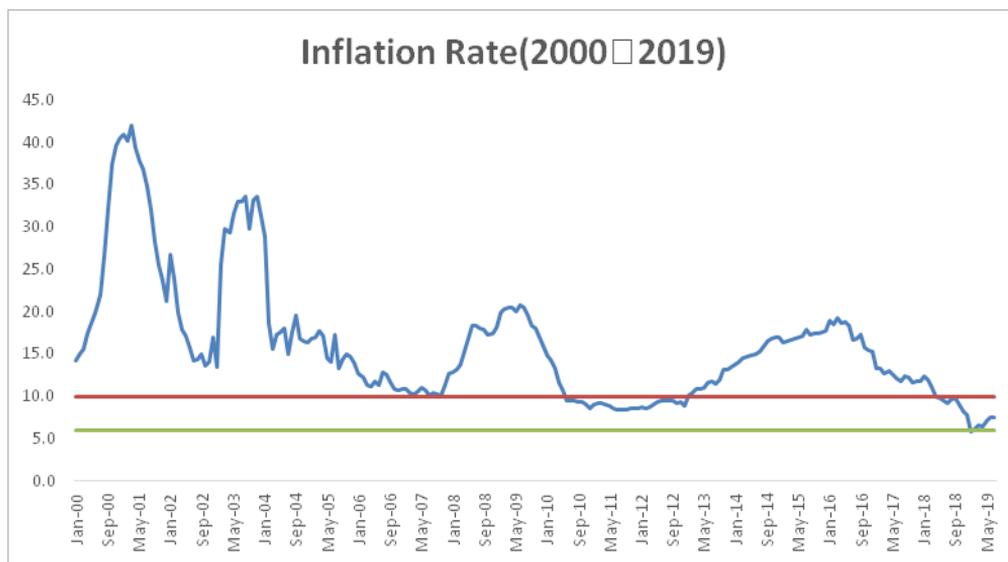
Source: Bank of Ghana.

The results are mixed, indicating that isolating energy price from the rest of prices in the Consumer Price Index (CPI) basket does not necessarily improve the forecasts of the key macroeconomic variables, and will therefore not necessarily lead to better policy outcomes.

We also investigated a fiscal shock and aggregate demand shock, and the results were similar. This suggests that a fiscal policy shock is a major component of the aggregate demand shock. However, the magnitude of the response to the aggregate demand shock was bigger, implying that the other components of aggregate demand were also important. Therefore, adding the fiscal block to the model allows the monetary

policy authorities to capture the separate effects of the fiscal policy shock from the overall aggregate demand shock. This suggests that policy coordination is very critical for macroeconomic stability.

Monetary policy in Ghana

The monetary policy framework in Ghana has evolved over time. Prior to the International Monetary Fund (IMF) and the World Bank sponsored economic reforms in 1983, Bank of Ghana (BOG) operated largely a direct controlled system of monetary management. Under this monetary policy regime, credit was directed to government's priority areas (Bawumia, 2010). The inefficiencies associated with this regime led to high and volatile inflation. It, therefore, became clear that the direct control regime had to be abandoned.

The performance of inflation in Ghana was to a large extent driven by direct monetization of deficits and pressures on the BOG to maintain more accommodative monetary policy stance than was desirable (IMF, 2013). Therefore, the money targeting framework was deemed appropriate to bring down inflation. However, over time, it became clear that the link between inflation and monetary aggregates had broken down (see Figure 4). In July 2002, Ghana began preparatory work to transition to an inflation targeting monetary policy framework, and formally adopted an inflation targeting monetary policy framework in 2007 as part of a broader set of reforms aimed at anchoring inflation expectations through accountable, transparent, and effective communication of monetary policy decisions to government, the investor community, and the public. International evidence shows that countries that adopted the inflation targeting monetary policy framework experienced low inflation in the long run (Roger & Stone, 2005; Mishkin & Schmidt-Hebbel, 2007).

Figure 4: Money supply and inflation
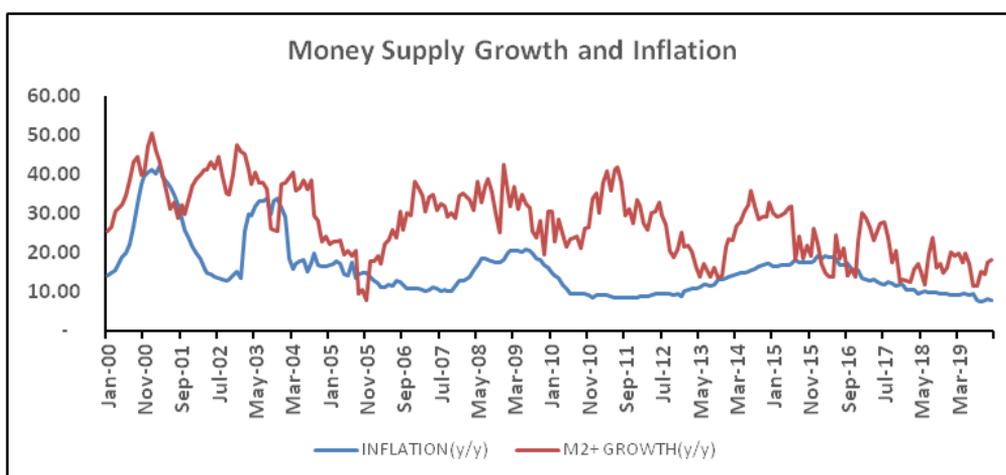
[Source: Bank of Ghana]

The appropriate path for monetary policy in Ghana, given the inflation target of 8 ± 2 percentage points and macroeconomic fundamentals, is based on a reduced-form New-Keynesian model that includes the open economy version of the traditional IS curve, a hybrid Phillips curve to capture the short-run dynamics of headline inflation, a version of uncovered interest parity (UIP) condition that captures the financial relationship with the rest of the world, and Bank of Ghana's policy reaction function.

Figure 4 shows that inflation targeting was initially successful in reducing inflation. The level and volatility of inflation dropped significantly after the adoption of this framework. However, as shown in Figure 5, inflation in Ghana has rarely stayed within the band. It is, therefore, important to improve the model that underpins our inflation forecast to enable Bank of Ghana to tackle the persistent inflation problem.

Figure 5: Inflation history in Ghana (1970–2014)
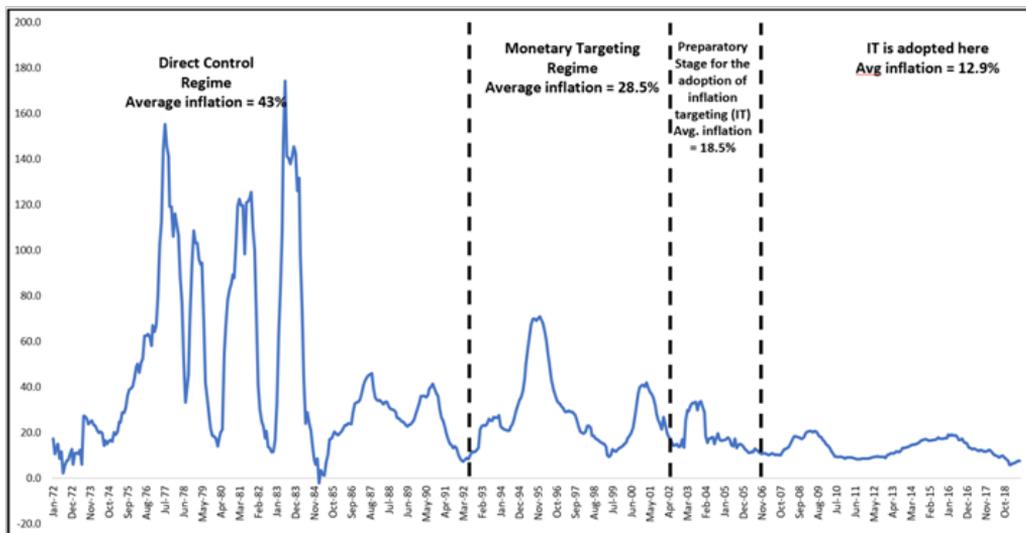
Source: Bank of Ghana.

Implementation of the Forecasting and Policy Analysis System (FPAS) in Ghana

The Forecasting and Policy Analysis System (FPAS) has gained popularity among central banks in emerging markets and developing economies due to its simplicity and flexibility. The FPAS process in Ghana can be summarized as follows: data collection and analysis by sector experts, setting initial conditions, forecast review, drafting monetary policy report, pre-MPC meeting (staff level meeting), monetary policy committee (MPC) meeting, press conference, and publishing monetary policy report.

Monetary policy decisions under the inflation targeting framework rely heavily on the inflation forecast that depends on a well-specified model. The process starts with data collection and analysis by sector experts. This is followed by setting initial conditions for the inflation forecast. Inflation is then forecast, based on the quarterly projection model. Ghana's quarterly projection model, like many other central banks, is a semi-structural macroeconomic model with four main blocks: aggregate demand or IS-type equation, price setting or New Phillips curve, uncovered interest rate parity equation, and monetary policy rule.

The initial forecast, along with sector reports, is presented at a staff kick-off meeting. The meeting is intended to provide comments and suggestions to improve the sector reports. The meeting is particularly important for the model team since forecast assumptions are revised based on these presentations. After this preparatory meeting, the sector expects fine-tune their reports and the model team produce their final forecast incorporating the additional information from the sector presentations.

The revised sector reports and the final inflation forecast are presented to the monetary policy committee which meets every other month. The Bank of Ghana forecasts inflation considering a broad set of indicators, including both domestic and external factors. After weighing the balance of risks to inflation, the monetary policy committee adjusts the monetary policy rate (MPR) to influence the cost of funding for banks in the interbank market, and ultimately the level of retail deposit and lending interest rates. The meeting ends with a press conference to announce the decision of the committee and factors that went into their decision. In addition to the press conference, Bank of Ghana publishes all the sector reports that formed the basis of the monetary policy committee's decision.

Various central banks (Georgia, Indonesia, Vietnam, South Africa, etc.) have tried to extend the baseline quarterly projection model to reflect current developments and trends in their economies. In Ghana's context, the inclusion of explicit roles for energy and non-energy inflation would improve the existing monetary policy framework and thereby strengthen monetary policy decision-making in the country. In addition, Andrle et al. (2013) argue that an important task of monetary policy analysis is to disentangle the role of external factors versus the contribution of monetary policy decisions and other domestic factors, and the FPAS model is well-suited to accomplish that task. Apart from this study enriching the forecasting framework of central banks across the world, it demonstrates how the Phillips curve can be disaggregated to incorporate divergence in the different components of inflation in monetary policy formulation.

Data source

Data on inflation, disaggregated by Classification of Individual Consumption by Purpose (COICOP), was obtained from Ghana Statistical Service, while domestic monetary variables were compiled from Bank of Ghana. Fiscal data was obtained from Ministry of Finance. Foreign variables and their forecasts were purchased from Consensus Forecast.

Conclusions and policy recommendations

This paper addressed four main issues and makes four main contributions to the literature. First, we extend the existing New-Keynesian model to include separate Phillips curves for energy and non-energy inflation. This approach was thought to help improve forecast performance. As a result, the monetary policy authority in Ghana can make informed decisions about the appropriate path of the monetary policy rate in Ghana. Second, we use the extended model to study the transmission mechanisms of shocks to energy and non-energy inflation in Ghana. This analysis allows us to understand the importance of these shocks in explaining inflation developments in Ghana and their implications for monetary policy. Third, we also compare the forecast performance of the extended model with the existing model. Finally, we incorporate a fiscal block to capture the effects of fiscal deficits on inflation in Ghana.

The results are mixed, indicating that isolating energy price from the rest of prices in the CPI basket does not necessarily improve the forecasts of the key macroeconomic variables, and will therefore not necessarily lead to better policy outcomes.

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The fact that the two models give us different results, especially with respect to the magnitudes of the responses to shocks, implies that not separating them will lead to some information loss. We, therefore, recommend the separation of volatile items in modelling the Phillips curve to improve forecast performance and ensure a more accurate policy decision. Also, given the importance of fiscal shock in aggregate demand, policy coordination with the fiscal authorities will be necessary to control inflation in Ghana.

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