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Macroeconomic shocks and fluctuations in African economies

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ABSTRACT

We estimate a monetary DSGE model to examine the role of macroeconomic shocks in generating fluctuations in ten African countries. The model is estimated with the Bayesian technique using twelve macroeconomic variables. The findings indicate that both the internal and external shocks significantly influence output fluctuations in African economies. Over a four quarter horizon, internal shocks are dominant and over eight to sixteen quarter horizons, external shocks are dominant. Among the external shocks, external debt, exchange rate, foreign interest rate and commodity price shocks account for a large part of output variations in African economies. Money supply and productivity shocks are the most important internal shocks contributing to output fluctuations in African countries.

1. Introduction

This paper quantifies the role of different shocks in driving macroeconomic fluctuations in African economies. Sharp and persistent economic fluctuations in developing countries have been a major concern for economists and policymakers. However, findings on the dominant shocks provoking

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economic fluctuations in developing countries have been rather inconclusive. A strand of literature attributes the recurrent economic fluctuations in developing countries to external shocks (Mendoza, 1995; Kose, 2002; Hammed, 2003). In contrast, other studies emphasize that internal shocks are largely responsible for output fluctuations in developing countries (Hoffmaister et al., 1998; Raddatz, 2007).

The significance of understanding the sources of macroeconomic fluctuations is that policymakers can formulate appropriate policies to mitigate the effects of adverse shocks on their economies. For example, Guillaumont et al. (1999) find that macroeconomic fluctuations lower economic growth and reduce welfare in African economies. However, as in other studies that focus on the role of different shocks, studies on African economies yield conflicting results. Kose and Riezman (2001) find that external shocks exert a dominant influence on output fluctuations in Africa. On the other hand, Hoffmaister et al. (1997) and Sissoko and Dibooğlu (2006) find that internal shocks largely explain output variations in Africa. Therefore understanding the relative importance of these shocks is crucial for sound macroeconomic management.

The gap that this paper seeks to fill is that existing studies do not use a monetary DSGE model estimated for each of the African economies. Furthermore, the existing studies investigate relatively few shocks in their models. For example, Kose and Riezman (2001) calibrate a non-monetary DSGE model for a typical African economy. They consider the relative importance of terms-of-trade and foreign interest rate shocks in driving macroeconomic fluctuations. Muhanji and Ojah (2011) estimate a monetary DSGE model for several African economies. They, however, only focus on the impact of commodity price and world interest rate shocks on external debt accumulation. Cashin et al. (2004) focus on the impact of commodity price shocks on the real exchange rate of commodity exporting countries. Hoffmaister et al. (1997) and Sissoko and Dibooğlu (2006) use VAR to examine the relative contributions of internal and external shocks to macroeconomic fluctuations in sub-Saharan African countries.

The contribution of this paper is to formulate and estimate a monetary DSGE model for ten African economies. The ten African countries are selected based on the availability of consistent quarterly time series data. We build on Kose and Riezman (2001) by incorporating the role of money, inflation and external debt dynamics in the DSGE model. Our paper also builds on Muhanji and Ojah (2011) in that we consider a broader set of shocks. Our model incorporates eleven structural shocks that are considered empirically relevant for African economies. Moreover, we estimate our model with the Bayesian technique for each of the ten African countries in order to capture the heterogeneity that may exist among these economies.

The paper is structured as follows: Section 2 reviews existing literature on different shocks and their impact on macroeconomic fluctuations, Section 3 presents stylised facts for Africa in the spirit of Agenor et al. (1999), in Section 4 we formulate our DSGE model, Section 5 provides data description and estimates the model's parameters and Section 6 concludes with some policy recommendations.

2. Review of literature

There is inconclusive evidence on the sources of economic fluctuations in developing countries. For example, Basu and McLeod (1992), Mendoza (1995), and Agenor et al. (1999) find that terms of trade shocks significantly affect output fluctuations in developing countries. Similarly, Kose and Riezman (2001) and Bleaney and Greenaway (2001) find that trade shocks significantly explain output fluctuations in Africa. In contrast, Hoffmaister and Roldós (2001) and Raddatz (2007) find that terms of trade shocks have little impact in developing countries. In Africa, Hoffmaister et al. (1997) and Sissoko and Dibooğlu (2006) find that trade shocks have limited effects on output variations.

A number of authors have examined the contribution of commodity price shocks to output and inflation dynamics in commodity exporting developing countries. Edwards (1984) finds that a higher price of coffee generates a higher growth of money and a higher rate of inflation in Colombia. Raju and Melo (2003) find that positive coffee price shocks increase real output and inflation in Colombia through revenue and spending effects. Similarly, Mehrara and Oskoui (2007) find that oil price shocks affect output fluctuations in Iran and Saudi Arabia. Iwayemi and Fowowe (2011), however, find that oil price shocks do not have significant effect on output and inflation in Nigeria.