

WP/09/98

# IMF Working Paper

---

## Understanding Inflation Inertia in Angola

*Nir Klein and Alexander Kyei*



**IMF Working Paper**

African Department

**Understanding Inflation Inertia in Angola**

**Prepared by Nir Klein and Alexander Kyei**

Authorized for distribution by Francesco Caramazza

May 2009

**Abstract**

In recent years, the decline in inflation in Angola has stalled and further steps may be needed to attain the authorities' medium term goal of meeting the Southern African Development Community (SADC) convergence criteria of a low single digit inflation rate. A Vector Error Correction (VEC) model, which analyzes the factors that affect the inflationary process in Angola, suggests that the inflation path has been largely affected by exchange rate movements. This implies that greater exchange rate flexibility that facilitates a gradual appreciation would be instrumental to moderate price growth through reducing the price of imports and limiting liquidity injection by the National Bank of Angola (BNA). Additionally, the analysis shows that excess liquidity, which is measured by positive deviations of M2 from its equilibrium level, adds to demand pressures, and contributes to inflation with a lag. This underlines the importance of closely monitoring the growth of monetary aggregates as well as improving liquidity management.

**This Working Paper should not be reported as representing the views of the IMF.**

The views expressed in this Working Paper are those of the author(s) and do not necessarily represent those of the IMF or IMF policy. Working Papers describe research in progress by the author(s) and are published to elicit comments and to further debate.

JEL Classification Numbers: E3, E4, E5

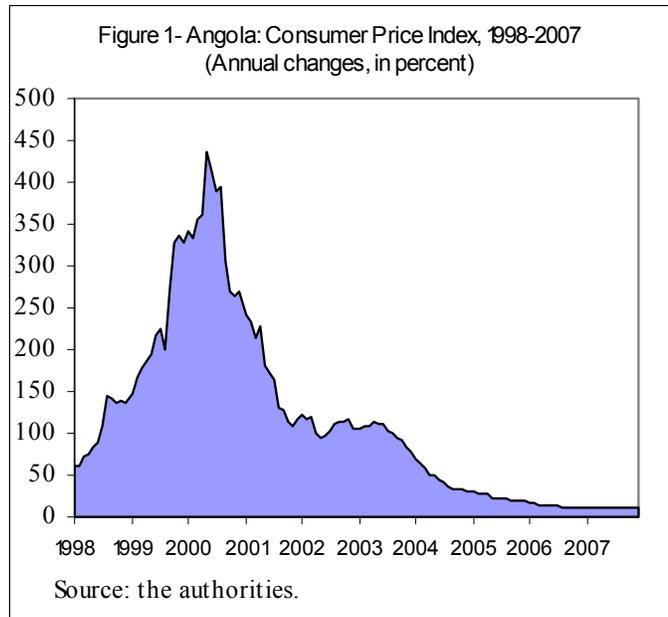
Keywords: Inflation, exchange rate, monetary policy, vector error correction.

Author's E-Mail Address: [nklein@imf.org](mailto:nklein@imf.org), [akyei@imf.org](mailto:akyei@imf.org)

<b>Contents</b>	<b>Page</b>
I. Introduction.....	3
II. Domestic and External Developments.....	4
III. Experiences of Other Oil Exporters.....	7
IV. Economic Model and Methodology.....	9
V. Data and Estimation.....	10
VI. Conclusions.....	16
References.....	18
 Figures	
1. Consumer Price Index, 1998–2007.....	3
2. Domestic and External Developments.....	6
3. Oil Exporters, 2005–07: Broad Money Growth and Inflation.....	8
4. Oil Exporters, 2005–07: Average Change in the Nominal Exchange Rate and Inflation.....	8
5. Oil Exporters, 2005–07: Average Change in the Non-Oil Fiscal Deficit and Inflation.....	8
6. Estimated Long-Run Levels of LnER and LnM2 and the Short-Run Deviations.....	11
7. Rolling Regressions and the Changes in the Adjustment Coefficients.....	13
8. Dynamic Simulation, 1997–2007.....	14
9. CPI: Impulse Response to Various Shocks.....	15
 Tables	
1. Oil Exporters: Selected Policy Indicators, Average 2005–07.....	7
2. Cointegration Tests.....	10
3. Short-Term Dynamics of M2, Nominal GDP, Exchange Rate and CPI.....	12
4. Single Equation Estimation.....	16
Annex.....	19

## I. Introduction

1. **Inflation in Angola declined dramatically in recent years, falling from nearly 430 percent in mid-2000 to about 12 percent since mid-2006.** However, since then the disinflation process has stalled, and for three consecutive years, the authorities' inflation objective of 10 percent has not been met. Furthermore, inflation reverted upwards in the second half of 2008 on the back of higher international food prices and strong domestic demand fueled by rapid money growth. These developments imply that further steps need to be taken to bring inflation down to a low single digit level in line with the authorities' medium term goal of meeting the SADC convergence criteria.



2. **Against this background, the paper looks at the evolution of prices from 1997 through 2007, examines the factors that contributed to the disinflation process, and discusses possible policy responses.** While the results should be viewed with caution, given that the sample period includes structural breaks in both the economic environment and economic policies, the estimated results highlight the role of both domestic policies and external factors in determining the inflation path. In particular:

- The results show a strong long run relation between the exchange rate and the CPI, which implies that further exchange rate appreciation would be instrumental to moderate price growth;
- The analysis finds that money growth above the estimated equilibrium level affects inflation with a lag, thus underscores the need to closely monitor the growth of monetary aggregates to avoid strong demand pressures; and
- International nonfuel commodity prices appear to have a significant impact on the inflationary process given the large share of imported food items in Angola's CPI basket.

## II. Domestic and External Developments

3. **Inflation has declined impressively since 2000.** After peaking at nearly 430 percent in mid-2000, following a sharp exchange rate depreciation, accommodative monetary and fiscal policies and supply bottlenecks associated with the conflict (including substantial pressure on food and transportation components of the CPI), it fell significantly thanks to the adoption of more restrictive policies. These, in particular, include the hard kwanza policy at end-2003, which initiated foreign financing of the budget deficit, specified an inflation objective announced through the annual budget, and enhanced liquidity management. Although disinflation was observed in all the CPI components, the degree differed between the tradable and nontradable sectors, reflecting inter alia, the pace of exchange rate appreciation and changes in international food prices. Only recently, has the growth in prices of the tradable and nontradable sectors converged (Figure 2).

A brief overview of domestic and external developments that may have contributed to the inflationary process in Angola is presented below.

### *Domestic factors*

- Historically, **monetary aggregates** have been found to have a close statistical relationship with inflation. From 1997 to 2002, the money growth rate reached three-digit levels and was largely associated with the BNA's credit to the government and quasi-fiscal operations, including of the National Bank of Angola (Alveson and Torres, 2003). Since the stabilization program that was introduced in September 2003, the funding of fiscal imbalances has shifted toward foreign sources, and consequently money growth rates have declined significantly. Still, monetary aggregates continue to grow rapidly, reflecting, inter alia, the ongoing process of financial deepening, the remonetization of money demand that has taken place in tandem with the disinflation process as well as the accumulation of international reserves and the limited sterilization of liquidity. The rapid growth of broad money, which exceeded that of GDP, is reflected in a gradual decline in money velocity.<sup>1</sup>
- With double-digit growth rates recorded in recent years, **GDP** has doubled its size since 2004 and is now approaching its current potential. In this regard, the existing infrastructure constraints together with shortage of skilled labor suggest that boosting aggregate demand without adequate response on the supply side may translate into price pressures.
- In general, **fiscal policy** indicators have improved since 2000. Notwithstanding buoyant oil revenues in recent years, public expenditures declined from nearly 60 percent of GDP in

---

<sup>1</sup> By examining the period 1997–2002, Gasha (2003) found a stable relationship between prices, money, and the exchange rate, in which, over the long run, an increase in money, and exchange rate depreciation caused inflation. In a subsequent paper Gasha (2005), he finds that the correlation of inflation with growth in all monetary aggregates and depreciation decreased in 2002–04 due to the stabilization of the exchange rate achieved through sizeable interventions under the hard kwanza policy. Kyei (2007) also found that the link between inflation and the monetary aggregates has weakened. He attributed this finding to the increased dollarization and remonetization. Kyei also found that inflation appeared to be more strongly linked to the narrower definition of money.

2000 to about 35 percent in 2008. This, alongside the strong growth of the non-oil sector, was reflected in a gradual reduction of the non-oil primary deficit and helped limit aggregate demand pressures on prices. Since 2007, the declining path of public expenditures has reversed, and consequently the non-oil primary deficit has shifted upwards. Along with the declining path of **real interest rates**, that may suggest that demand pressures have increased.

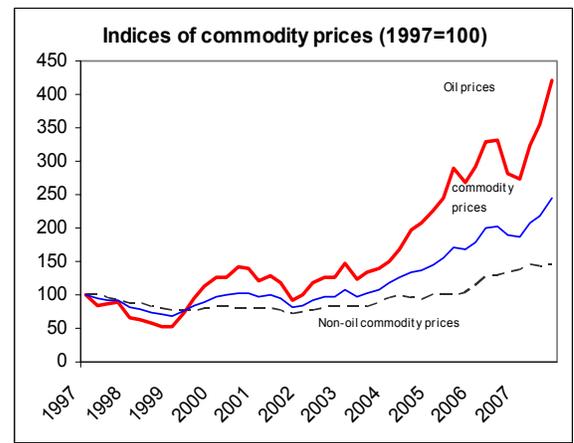
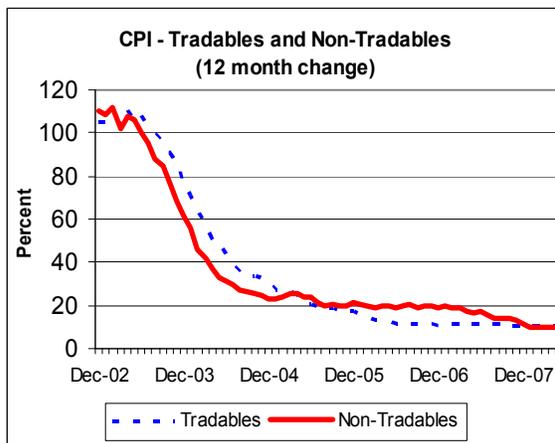
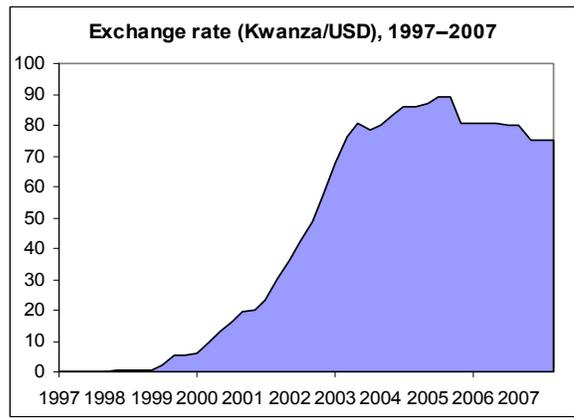
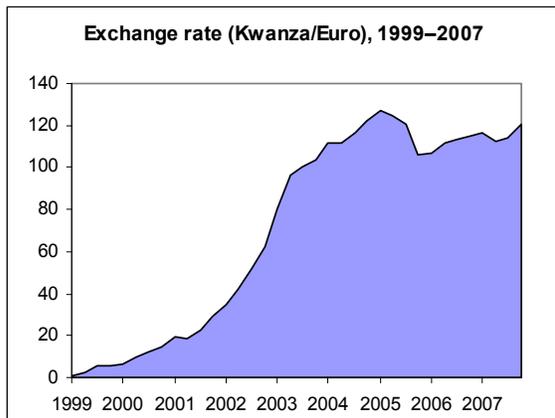
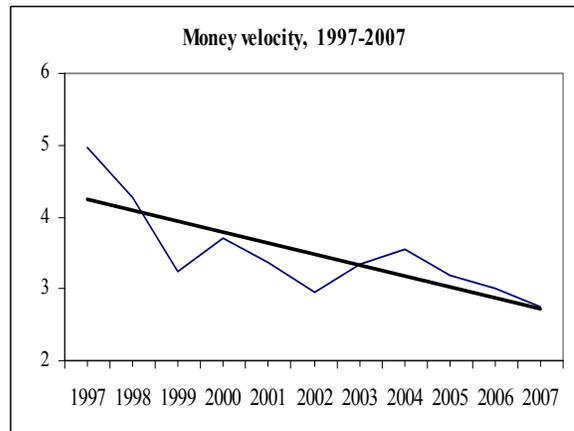
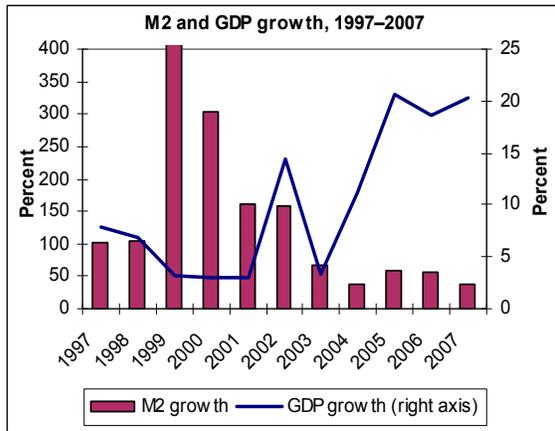
### *External factors*

- In the past decade, the **exchange rate** with the US dollar has been closely related to the trajectory of the CPI.<sup>2</sup> In mid 1999, the BNA's move toward greater liberalization of foreign currency market, in which it allowed the exchange rate to float, triggered a protracted realignment process that lasted until end-2003. This rapid depreciation fueled inflation and exacerbated dollarization. With the introduction of the "hard kwanza exchange rate policy" in September 2003, the exchange rate stabilized, and from 2005 onward, it has recorded a gradual appreciation reflecting increased oil revenues and rapid GDP growth. Exchange rate stability, and in particular, the gradual appreciation since 2005, seems to be an important factor in the disinflation process (Kovanen, 2007).
- Notwithstanding the relative exchange rate stability that was maintained against the U.S. dollar in recent years, **external cross rates**, and in particular, the exchange rate of the U.S. dollar vis-à-vis the euro may have affected inflation. In this context, the depreciation path of U.S. dollar against the euro in most of the sample period may put an upward pressure on prices, especially given that the major share of Angola's imports originates in the European Union.
- Following a period of stability, the **commodity prices** began to rise significantly in 2004 as demand for commodities increased on the part of fast-growing economies. Given the large share of food items in Angola's CPI basket, the direct impact of the commodity price boom seems to work mainly through the food prices, which rose by nearly 40 percent as of end-2007.

---

<sup>2</sup> Aguilar (1994) showed that the parallel exchange rate seemed to be significant for the determination of prices. Additionally, he showed that, apart from the obvious effects of money expansion, inflation seemed to be dominated by inertia and expectations. Aguilar also observed that price increases are partly driven by the monopolistic structure of the markets in Luanda where companies take advantage of their monopolistic power to increase profit margins.

**Figure 2. Angola: Domestic and External Developments**



### III. Experiences of Other Oil Exporters

4. **Many oil exporters have recently experienced increased inflationary pressures due to both domestic and external factors.** As in Angola, rising food prices played a significant role because in many of these countries food items have a large share in the CPI basket. The direct impact of high energy prices in oil exporters has been much more moderate than in oil-importers, yet the buoyant oil-revenues and export receipts have triggered, in many countries, expansionary macroeconomic policies, and combined with the efforts to resist exchange rate appreciation, resulted in high liquidity and strong demand pressures. Given that in many of these countries inflationary expectations are not yet anchored at low levels and the central banks' credibility is not well established, mounting inflationary pressures pose a significant challenge for policymakers.

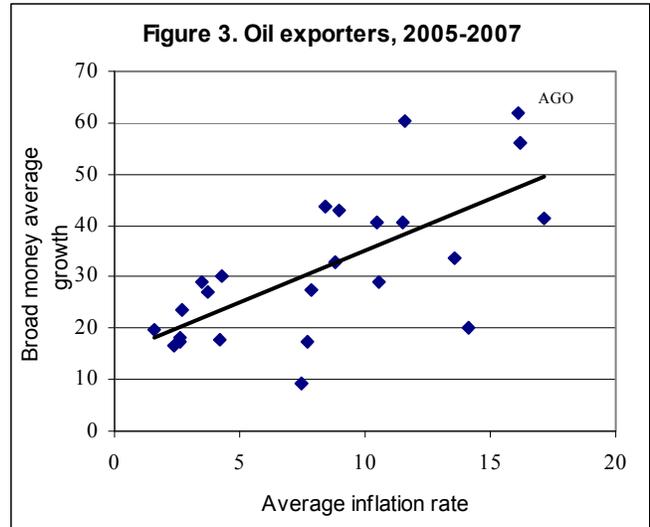
5. **Table 1 illustrates the correlation in oil exporters between the average inflation rate in 2005–07—a period of rapid growth in oil and food prices—and policy indicators.**<sup>3</sup> The table shows that countries with higher inflation (compared to the sample average) have, on average, higher money growth, less appreciation of exchange rates and a higher increase in the non-oil fiscal deficit compared to countries with lower inflation. Angola, in this regard, allowed greater exchange rate appreciation and greater reduction in the non-oil deficit (as a share of non-oil GDP) compared to the sample's average; however, it remained one of the countries with the highest inflation rate and the highest broad money growth among oil exporters. The latter observation may indicate that the rapid growth of broad money could be one of the sources of Angola's high inflation and that greater monetary tightening would be beneficial to curb inflationary pressures.

	Sample Average	Countries with Inflation Above the Average <sup>1</sup>	Countries with Inflation Below the Average	Angola
Inflation	7.8	11.9	4.2	16.2
Broad money growth	30.5	40.7	21.2	56.2
Change in exchange rate (USD/National Currency)	1.2	0.8	1.6	3.4
Change in non-oil deficit	0.7	1.1	0.3	-1.7

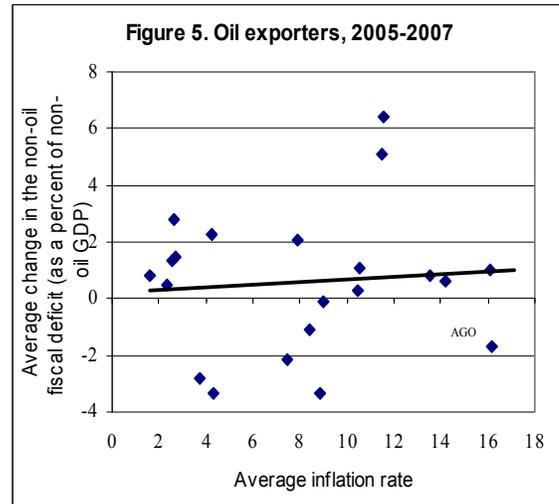
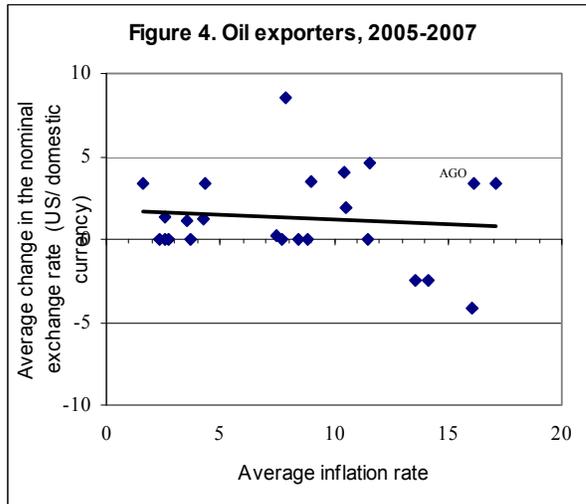
<sup>1</sup> 11 countries out of 23.

<sup>3</sup> The sample includes 23 emerging and developing countries whose main export earning stems from oil revenue (Algeria, Republic of Congo, Equatorial Guinea, Gabon, Nigeria, Sudan, Azerbaijan, Kazakhstan, Russia, Turkmenistan, Bahrain, Iran, Libya, Oman, Kuwait, Qatar, Saudi Arabia, Syria, UAE, Yemen, Ecuador, Trinidad and Tobago and Venezuela).

- Figure 3 shows the high and positive correlation (0.64) between the average inflation rate and broad money growth. Interestingly, according to the analysis countries like Venezuela, Azerbaijan, Congo and Iran, that failed to sterilize excess liquidity on average experienced higher inflation. In part, this reflects the countries' policy to keep the nominal exchange relatively stable, despite the appreciation pressures stemming from the rising current account surpluses. In this context, countries like Russia, Sudan, and Kazakhstan, which allowed greater nominal appreciation on average experienced lower inflation (Figure 4). Among oil exporters the calculated correlation between the average inflation rate and the average change in the nominal exchange rate (US\$/national currency) is -0.17.



- Although relatively small, there is also a positive correlation between the average inflation rate and the average change in the non-oil fiscal deficit as a percent of non-oil GDP (0.19), which means that lower fiscal discipline is associated with higher inflation (Figure 5).



#### IV. Economic Model and Methodology

6. **The choice of economic model to analyze the inflationary process in Angola should emphasize the role of both external and domestic factors.** Hence, the inflationary process is assumed to be affected by the following components:

$$P = f(ER, \hat{M}, P_{com}^*, R, S) \quad (1)$$

$P$  is the domestic price level measured by the CPI;  $ER$  is the nominal exchange rate against major trading partners' currencies;  $P_{com}^*$  is the international prices of non-fuel commodities,  $\hat{M}$  is the excess money supply, which may also reflect demand pressures;  $R$  reflects the real interest rate; and  $S$  indicates the structural breaks in the political and economic situation as well as in policy implementation.

7. **To assess the factors that affect prices, the paper uses a Vector Error Correction (VEC) model, which allows the short-term dynamics of the variables to react to the deviations from their long-term (cointegrating) relations.** In particular, the paper examines the validity of two cointegrating relations ( $V_i$ ). The first cointegrating relation would be the long-run relation between M2 and nominal GDP (NGDP) as implied in the money quantity theory. The deviations from this equilibrium, indicates the excess liquidity in the economy and can also be viewed as an indication about the existence and magnitude of demand pressures. To capture the process of the financial deepening that has taken place in the past years, the cointegration vector includes a linear trend as shown below:

$$V_1 : LnM2_t - (\alpha_0 + \alpha_1 LnNGDP_t + \alpha_2 Trend) = \varepsilon_{1,t} \quad (2)$$

The second cointegrating vector is the link between the CPI and exchange rate (kwanza/U.S. dollar). Although recently declining, this link remains very strong in Angola, given its high level of dollarization (Kovanan, 2007). This relation can also be viewed as the Purchasing Power Parity hypothesis (PPP), where inclusion of a linear trend captures the evolution of US domestic prices.<sup>4</sup>

$$V_2 : LnER_t - (\beta_0 + \beta_1 LnCPI_t - \beta_2 Trend) = \varepsilon_{2,t} \quad (3)$$

The VEC model, which consists of four short-run equations and includes two cointegrating vectors ( $V_i$ ) can be represented as follows:

$$\Delta Y_{i,t} = c_i + \delta_{1,i} V_{1,t-1} + \delta_{2,i} V_{2,t-1} + \sum_{k=1}^s b_j \Delta Y_{t-k} + \gamma_i X + \varepsilon_{i,t} \quad (4)$$

where  $Y$  indicates the vector of the endogenous variables (LnCPI, LnER, LnNGDP, LnM2) and  $X$  reflects a vector of exogenous variables, including the structural breaks. The parameter  $\delta_i$  indicates the adjustment coefficient to the error correction components.

---

<sup>4</sup> Because the US CPI is completely exogenous in this system, it was not included in the estimation of the long-run equilibrium.

## V. Data and Estimation

8. **The study uses quarterly data for 1997–2007.**<sup>5</sup> The sample period aims to strike the right balance between having sufficient number of observations while reflecting the current economic setting in Angola, which is much different from the economic setting during the conflict period. Summary statistics, which are provided in the Annex, show that, in general, the correlations between the variables behave as expected. For instance, M2 is highly correlated with nominal output while the CPI is highly and positively correlated with M2, the kwanza/USD exchange rate (ER) and the non-fuel commodity prices (P\_COM). There is also high correlation between CPI and nominal output (NGDP), though this may reflect the close link between the GDP deflator and the CPI.

9. **The validity of the assumed two cointegrating relations among the four endogenous variables (LnCPI, LnER, LnNGDP, LnM2) was tested using a cointegration test.**<sup>6</sup> While the results of the co-integration tests need to be taken with caution, given the relative short period of the sample, the values of the maximum Eigenvalue and trace statistics broadly confirm the existence of two long-run relations (Table 2 below).

**Table 2. Angola: Cointegration Tests**

<b>Unrestricted Cointegration Rank Test (Trace)</b>				
Hypothesized Number of Cointegrating equations	Eigenvalue	Trace Statistic	Critical Value (5 percent)	Probability
None *	0.69	92.84	55.24	0
At most 1 *	0.56	44.67	35.01	0
At most 2	0.21	10.97	18.39	0.39
At most 3	0.02	0.94	3.84	0.33

<b>Unrestricted Cointegration Rank Test (Maximum Eigenvalue)</b>				
Hypothesized Number of Cointegrating equations	Eigenvalue	Max-Eigen Statistic	Critical Value (5 percent)	Probability
None *	0.69	48.17	30.815	0
At most 1 *	0.56	33.70	24.25	0
At most 2	0.21	10.02	17.147	0.39
At most 3	0.02	0.94	3.84	0.33

<sup>5</sup> The quarterly data of the nominal GDP was constructed from the data on oil production and the seasonal pattern of the agricultural output.

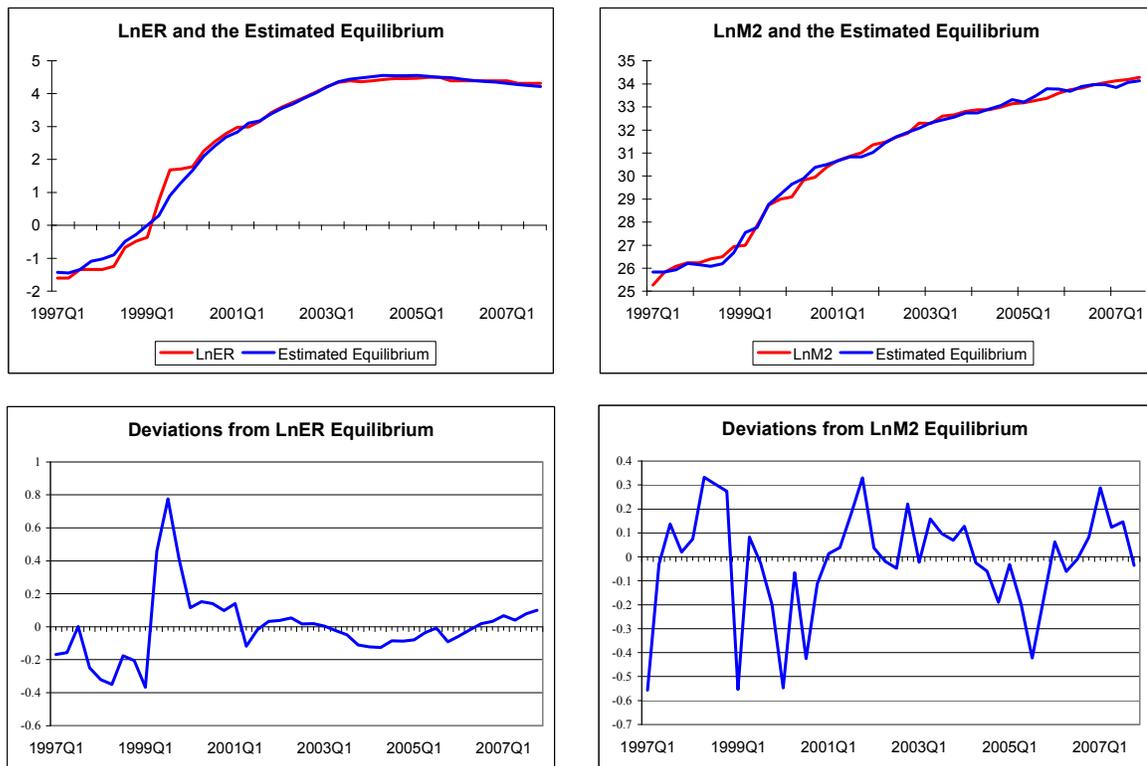
<sup>6</sup> The results of Phillips-Perron test for unit root reveal that all variables are I(1) - Table I.3 in Annex.

10. **The estimated long-run equations provide additional support for the existence of the two cointegrating relations.** In the first long-run relation, the coefficient of LnM2 was restricted to 1 and the estimated coefficient of output, which also indicates the long-run elasticity of M2 to GDP, is not significantly different from one. The positive sign of the coefficient of the trend may reflect both financial deepening and the decline in velocity during the sample period. In the second long-run relation, the coefficient of LnER was restricted to 1 and the coefficient of CPI is significant with the expected sign. The estimated long-run relations of M2 and the exchange rate as well as the deviations from the estimated equilibrium levels are as follows:

$$V_1 : \quad \text{LnM2}_t - (5.511 + 1.019 * \text{LnNGDP}_t + 0.004 * \text{trend}) = \varepsilon_{V_1,t} \quad (5)$$

$$V_2 : \quad \text{LnER}_t - (0.547 + 1.272 * \text{LnCPI}_t - 0.069 * \text{trend}) = \varepsilon_{V_2,t}$$

**Figure 6. Angola: Estimated Long-Run Levels of LnER and LnM2 and the Short-Run Deviations**



11. **Table 3 below summarizes the results of the estimated VEC model.** The system provides a relatively high explanatory power to the short-run dynamics of the CPI. It also shows that the deviations from exchange rate long-run equilibrium ( $V_2$ ) are adjusted through both the exchange rate and the CPI. More specifically, a positive deviation of exchange rate

(depreciation) from its equilibrium level leads to an upward adjustment in the CPI and to a downward adjustment (appreciation) in the exchange rate. This result is in line with Aguilar (1994) and Gasha (2003), who also found a close relationship between the exchange rate and inflation in Angola.

**Table 3. Angola: Short-Term Dynamics of M2, Nominal GDP, the Exchange rate and the CPI, 1997Q1–2007Q41**

	<i>D(LNM2)</i>	<i>D(LNNGDP)</i>	<i>D(LNER)</i>	<i>D(LNCPI)</i>
<i>Adjustment Coefficient V<sub>1</sub></i>	-0.275** (0.145)	0.582* (0.241)	0.218 (0.213)	0.091 (0.079)
<i>Adjustment Coefficient V<sub>2</sub></i>	-0.015 (0.203)	-0.060 (0.337)	-0.660* (0.297)	0.214** (0.110)
<i>D(LnM2(-1))</i>	-0.709* (0.167)	-0.042 (0.277)	-0.151 (0.244)	-0.056 (0.091)
<i>D(LnM2(-2))</i>	-0.187 (0.162)	-0.075 (0.269)	-0.019 (0.238)	-0.059 (0.088)
<i>D(LnNGDP(-1))</i>	0.397* (0.157)	0.461*** (0.261)	0.802* (0.231)	0.194* (0.086)
<i>D(LnNGDP(-2))</i>	0.343* (0.112)	0.179 (0.187)	0.655* (0.165)	0.091 (0.061)
<i>D(LnER(-1))</i>	0.871* (0.151)	0.585* (0.251)	0.644* (0.221)	0.118 (0.082)
<i>D(LnER(-2))</i>	-0.307*** (0.181)	-0.239 (0.300)	-0.619* (0.265)	-0.183** (0.098)
<i>D(LnCPI(-1))</i>	-0.401 (0.325)	-0.385 (0.540)	-0.370 (0.477)	-0.240 (0.177)
<i>D(LnCPI(-2))</i>	-0.053 (0.292)	1.237 (0.485)	0.050 (0.428)	0.266*** (0.159)
<i>C</i>	0.303** (0.156)	-0.145 (0.260)	-0.013 (0.229)	0.317 (0.085)
<i>TREND</i>	0.003 (0.004)	-0.001 (0.006)	0.004 (0.005)	-0.007* (0.002)
<i>D(LnP_COM(-1))</i>	0.937*** (0.526)	-0.158 (0.875)	1.677* (0.772)	0.551** (0.287)
<i>DUM_POSTCONFLICT</i>	-0.053* (0.020)	0.000 (0.034)	-0.072* (0.030)	-0.018*** (0.011)
<i>DUM_STABILIZATION</i>	-0.252* (0.088)	0.199 (0.146)	-0.240** (0.129)	-0.050 (0.048)
<i>Adj. R-squared</i>	0.802	0.522	0.682	0.839

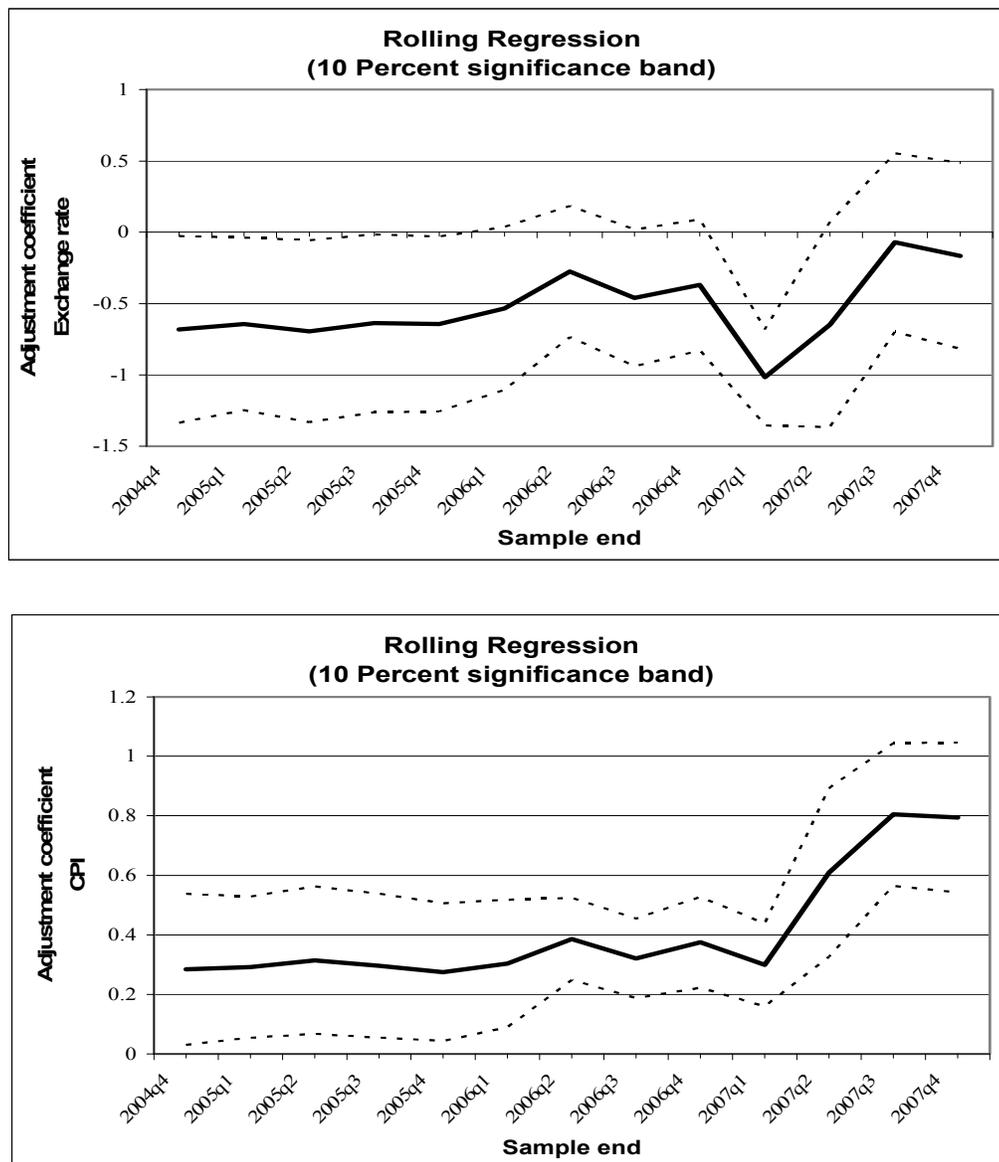
Significance level: \* Significant at 1 percent.  
 \*\* Significant at 5 percent.  
 \*\*\* Significant at 10 percent.

<sup>1</sup> The lags of the VEC are set as 2 according to Schwartz Criterion.

12. **The results also indicate that adjustment to the long-run equilibrium level is relatively fast.** The size of the adjustment coefficients imply that it takes three to four quarters until the CPI and the exchange rate converge to their equilibrium level. That said, the estimation of rolling regressions reveals that the level of the adjustment coefficients of

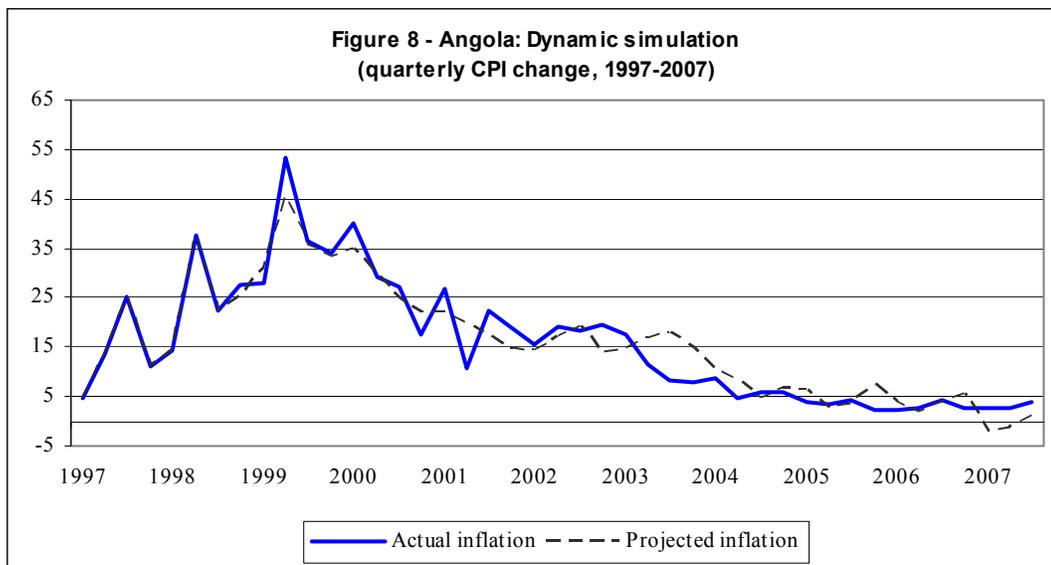
both the CPI and the exchange rate is not stable over time. In particular, the estimated results show that, while the exchange rate's adjustment coefficient has declined, on average, in recent years, the adjustment coefficient of the CPI has increased dramatically from 0.3 to 0.8 (Figure 7). This may reflect the fact that, in recent years, the exchange rate has been heavily managed by the BNA and consequently the deviations from the equilibrium level are mostly adjusted through the CPI. The deviations of M2 from its equilibrium level appear to be adjusted by both M2 and output and the combined magnitude implies that it takes three to four quarters of adjustment until M2 and NGDP converge to their equilibrium level. These adjustments seem to affect the CPI mainly through the short-run dynamics of the nominal output, reflecting the reaction of the CPI to both movements of the GDP deflator (inflation inertia) and to the demand pressures arising from money growth.

**Figure 7. Angola: Rolling Regressions and the Changes in the Adjustment Coefficients**



13. **The results of the VEC model also indicate that international nonfuel commodity prices have a significant influence on domestic prices.** This is not surprising given the high share of food items in Angola's CPI basket and the fact that a significant share of these items is imported to Luanda, where the CPI is measured. The inclusion of two dummy variables—for the post-conflict era (DUM\_POSTCONFLICT), and for the period starting with the implementation of the stabilization program (DUM\_STABILIZATION) confirm the structural breaks in the second half of the sample, when the policy implementation has been strengthened.<sup>7</sup>

14. **To test the reliability of the estimated model, a dynamic simulation was performed.** The simulation starts from 1999Q1 onward and, apart from the nominal output (NGDP), all endogenous variables were solved within the model. The simulation (Figure 8) shows that the model nicely captures the inflation path, including the hike in 1999–2000 and the disinflation process that followed.

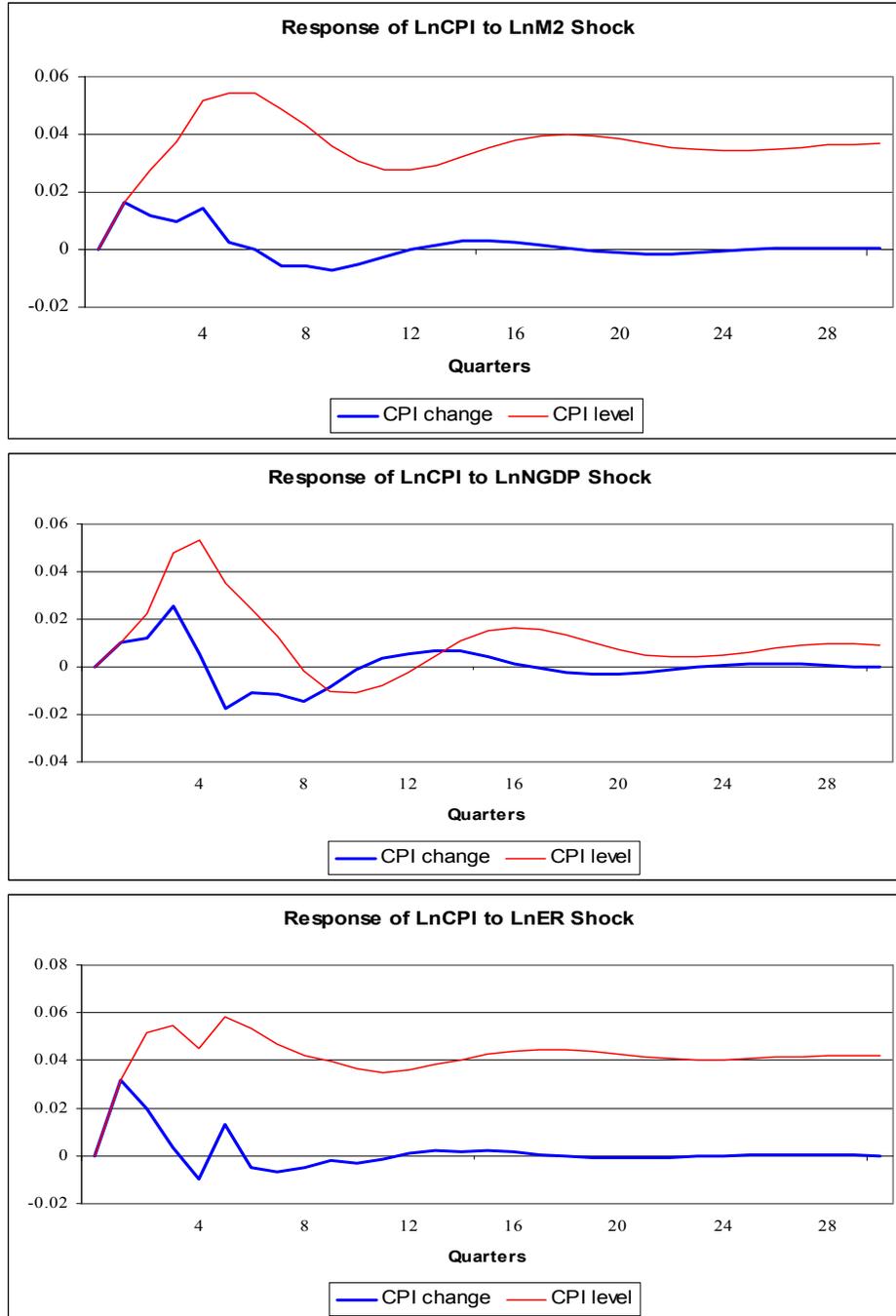


15. **The impulse response analysis, which shows the dynamic response of a specific variable to various shocks, broadly confirms the impact of exchange rate and M2 on the CPI (Figure 9).** A one percent standard deviation shock to the endogenous variables shifts the CPI to a higher level. In this regard, a shock to money supply, that leads to a positive deviation from its equilibrium level, triggers an upward adjustment in output, which in turn increases inflation. Similarly, a shock to the exchange rate (depreciation) has a direct and

<sup>7</sup> The impact of other variables, including the inflation in trading partners, the Kwanza/EUR exchange rate, the real lending rate and the fiscal balance were also examined. However, given their insignificant impact in this system, the results are not shown in the table.

positive impact on inflation, but it is short-lived given the nature of exchange rate and CPI to quickly revert to their new equilibrium level.

**Figure 9. Angola: CPI: Impulse Response to Various Shocks**



16. To complement this analysis, a single equation was estimated using the results of the VEC model (Table 4). As in the VEC model, the estimated results show that a positive deviation of M2 from its equilibrium level leads to an increase in inflation with a four-quarter lag and the deviation of the exchange rate from its equilibrium significantly affects inflation with one-quarter lag. Additionally, the exchange rate against the euro (LnKZ\_EUR) strongly

affects the inflation process. This is not unexpected given that the largest share of merchandise imports (35 percent) comes from the European Union.<sup>8</sup> The results also show that the international prices of nonfuel commodity prices positively affect domestic prices. Finally, the single-equation results confirm that higher real lending rate (REALINT) contributes to lower inflation with a lag of six quarters.

**Table 4. Angola: Single-Equation Estimation**

Dependent Variable: D(LnCPI)					
	Model 1	Model 2	Model 3	Model 4	Model 5
<i>C</i>	0.259*	0.210*	0.215*	0.157*	0.078**
<i>DUM_POSTWAR</i>	-0.035*	-0.033*	-0.040*	-0.028*	-0.022*
<i>DUM_STAB</i>	-0.171*	-0.103*	-0.118*	-0.072**	-0.016
<i>EC_ER(-1)</i>	0.183*	0.213*	0.198*	0.246*	0.190*
<i>EC_M2(-4)</i>	0.158*	0.152*	0.168*	0.088**	0.119*
<i>REALINT(-6)</i>		-0.001**	-0.001**	-0.001*	-0.001*
<i>D(LnP_COM(-1))</i>			0.520***	0.417***	0.319
<i>D(LnKZ_EUR)</i>				0.194*	0.190*
<i>D(LnCPI(-2))</i>					0.339*
<i>Adjusted R-squared</i>	0.772	0.807	0.823	0.894	0.902
<i>Durbin-Watson stat</i>	1.875	1.674	1.814	2.131	1.792

Significance level: \* Significant at 1 percent.  
 \*\* Significant at 5 percent  
 \*\*\* Significant at 10 percent.

## VI. Conclusions

17. **Angola has made an impressive progress in reducing inflation in the past few years.** However, price stability has not been achieved yet and further steps need to be taken to reduce inflation to a low single digit level in line with the authorities' goal of meeting the SADC convergence criteria. In this context, while the econometric results should be viewed with caution given the relative short sample, they suggest that the inflation path in the last decade was largely affected by exchange rate movements. From a medium term perspective,<sup>9</sup> this implies that greater exchange rate flexibility that would facilitate a gradual appreciation would be instrumental to moderate the price growth through reducing the price of imports and limiting liquidity injection by the BNA. If the exchange rate remains heavily managed or pegged, the adjustment in the real exchange rate resulting from high oil revenues will come through domestic prices, which could develop their own momentum even after oil prices have stabilized.

<sup>8</sup> The magnitude of the coefficients of *EC\_ER* and *D(LnKZ\_EUR)* in model 5 imply that, ceteris paribus, a one percent downward deviation (appreciation) of the Kwana from its equilibrium level, would lead to 0.38 percent reduction in the CPI inflation.

<sup>9</sup> Assuming that oil prices will recover and the balance of payments will strengthen again.

18. **The extent of exchange rate flexibility needs to be considered against the benefits of keeping the kwanza stable.** Nevertheless, further nominal exchange rate appreciation could also enhance the confidence in the kwanza and accelerate the declining path of dollarization, which is needed to further strengthen the effectiveness of monetary policy. Additionally, it could anchor inflationary expectations at low level, thus affecting inflation inertia in the long run. The impact of such nominal appreciation on the external competitiveness is likely to be mute given that the expected moderation of inflation is expected to leave the real effective exchange rate (REER) broadly neutral<sup>10</sup> and given that the impediments to the non-oil sector growth mainly stem from structural weaknesses (Qureshi, 2008).

19. **The results also demonstrate the impact of money on inflation.** In this regard, the estimations show that it is not money growth *per se* that affects inflation, but its deviations from its equilibrium level. More specifically, excess liquidity, which is measured by positive deviations of M2 from its equilibrium level, adds to demand pressures, and contributes to inflation with a lag. This underlines the importance of closely monitoring the broad money growth as well as improving liquidity management. In this context, while greater sterilization efforts by the BNA are warranted to curb the rapid money growth, the analysis also suggests that fiscal policy has a role to play in sharing the burden of further disinflation by ensuring that public spending is in line with the existing macroeconomic and administrative capacity.

---

<sup>10</sup> Assuming that the REER is not significantly misaligned (as was demonstrated in the 2008 Article IV staff report). The speed and the magnitude of the pass through may differ in off-equilibrium cases.

**REFERENCES**

- Aguilar, Renato, 1994, "Informe de Consultoria. Inflation en Angola", Mimeo.
- Alvesson, Magnus and Torres, Alfredo, 2003, "Central Bank Operations and Macroeconomic Stabilization in Angola" Angola: *Selected Issues and Statistical Appendix*.
- Gasha, Jose Giancarlo, 2003, "A note on Inflation," Angola: *Selected Issues and Statistical Appendix*.
- , 2005, "Inflation and the Hard Kwanza Policy," Angola: *Selected Issues and Statistical Appendix*.
- Kyei, Alexander, 2007, "Options to Strengthen the Monetary Framework in Angola", Angola: *Selected Issues and Statistical Appendix*.
- Kovanan, Arto, 2007, "Fundamental Determinants of the Real Exchange Rate in Angola", *Selected Issues and Statistical Appendix*.
- Qureshi, Mahvash, 2008, "Competitiveness of Angola's Non-oil Sector: Challenges and Prospects", Angola: *Selected Issues*.

## ANNEX

Table A1. Angola: Summary Statistics

	CPI	ER	GDP*	M2*	P_COM	G/GDP
<i>Mean</i>	71.04	44.29	368.41	186552	93.47	32.61
<i>Median</i>	43.05	45.32	132.50	62735	86.77	33.03
<i>Maximum</i>	194.77	89.20	1666.35	855069	143.49	49.42
<i>Minimum</i>	0.22	0.20	0.38	94.61	70.68	14.26
<i>Std. Dev.</i>	70.11	35.93	455.99	243450	20.64	8.34
<i>Skewness</i>	0.42	-0.07	1.16	1.33	1.24	-0.06
<i>Kurtosis</i>	1.56	1.23	3.29	3.60	3.41	2.15
<i>Jarque-Bera Probability</i>	5.10 0.08	5.78 0.06	10.04 0.01	13.54 0.00	11.55 0.00	1.36 0.51
<i>Sum</i>	3125	1948	16209	8208320	4112	1434
<i>Observations</i>	44	44	44	44	44	44

\* Measured in billions of kwanzas.

Table A2. Angola: Correlation Matrix

	CPI	ER	GDP	M2	FOOD	G/GDP
<b>CPI</b>	1.00					
<b>ER</b>	0.92	1.00				
<b>GDP</b>	0.94	0.77	1.00			
<b>M2</b>	0.92	0.72	0.96	1.00		
<b>P_COM</b>	0.81	0.55	0.87	0.93	1.00	

Table A3. Angola: Phillips Perron Tests, 1997–2007

Null Hypothesis: Unit Root

	Level	1st Difference
<i>LnCPI</i>	1.00	0.01
<i>LnER</i>	0.99	0.00
<i>LnNGDP</i>	0.96	0.00
<i>LnM2</i>	0.97	0.00
<i>LnP_COM</i>	0.56	0.00
<i>LnEUR</i>	0.131	0.00
<i>REALINT</i>	0.102	0.00

Source: IMF staff estimates.

\* Constant and trend have been included in the estimation.

\*The estimation used Newey-West bandwidth.