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MODELLING AFRICAN INFLATION RATES:
NON-LINEAR DETERMINISTIC TERMS AND LONG-RANGE DEPENDENCE

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ABSTRACT

This paper estimates a fractional integration model with non-linear deterministic trends for the inflation rates of five African countries. The results indicate that non-linearities are present in the case of Angola and Lesotho, but not in Botswana, Namibia and South Africa. Moreover, the degrees of differentiation are higher in the latter group of countries.

Keywords: Non-linear models; fractional integration; Africa

JEL Classification: C22, E31

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conflicts. The structure of the paper is as follows: Section 2 briefly describes the

methodology, Section 3 presents the data and the main empirical results, and Section 4

coefficients. Note that the model combining (1) and (2) becomes linear and d can be parametrically estimated or even tested as in Robinson (1994), Demetrescu, Kuzin and Hassler (2008) and others (see Cuestas and Gil-Alana, 2012).

3.   Data and empirical results

The series examined are the monthly inflation rates, from January 2002 to December 2013, in Angola, Botswana, Lesotho, Namibia and South Africa (see Figure 1).

[Insert Figure 1 about here]

Table 1 displays the estimates of d and the corresponding 95% non-rejection intervals in the model given by equations (1) and (2), for the cases of m = 0, 1, 2 and 3 and white noise errors. Very similar results were obtained under the assumption of (weakly, e.g., AR) autocorrelated errors. For m   2 the model contains non-linear deterministic terms. This is the case for two of the countries examined, Angola and Lesotho, where all the estimated coefficients on the Chebyshev polynomials are statistically significant (see Table 2). For the remaining three countries (Botswana, Namibia and South Africa) the model with an intercept is sufficient to describe the deterministic part of the process.

[Insert Tables 1 and 2 about here]

Concerning the estimates of the differencing parameter, it can be seen that for the two cases of non-linear terms the unit root null hypothesis cannot be rejected; however this hypothesis is decisively rejected in favour of higher degrees of integration (d > 1) in the three countries with linear processes.

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4.   Conclusions

This paper proposes a model that combines fractional integration with non-linear deterministic terms in the form of Chebyshev polynomials for the analysis of inflation rates in five African countries (Angola, Botswana, Lesotho, Namibia and South Africa). The results provide evidence of non-linearities in the cases of Angola and Lesotho only. Moreover, the unit root null hypothesis cannot be rejected for the non-linear processes, while it is decisively rejected in favour of higher degrees of integration for the linear models.

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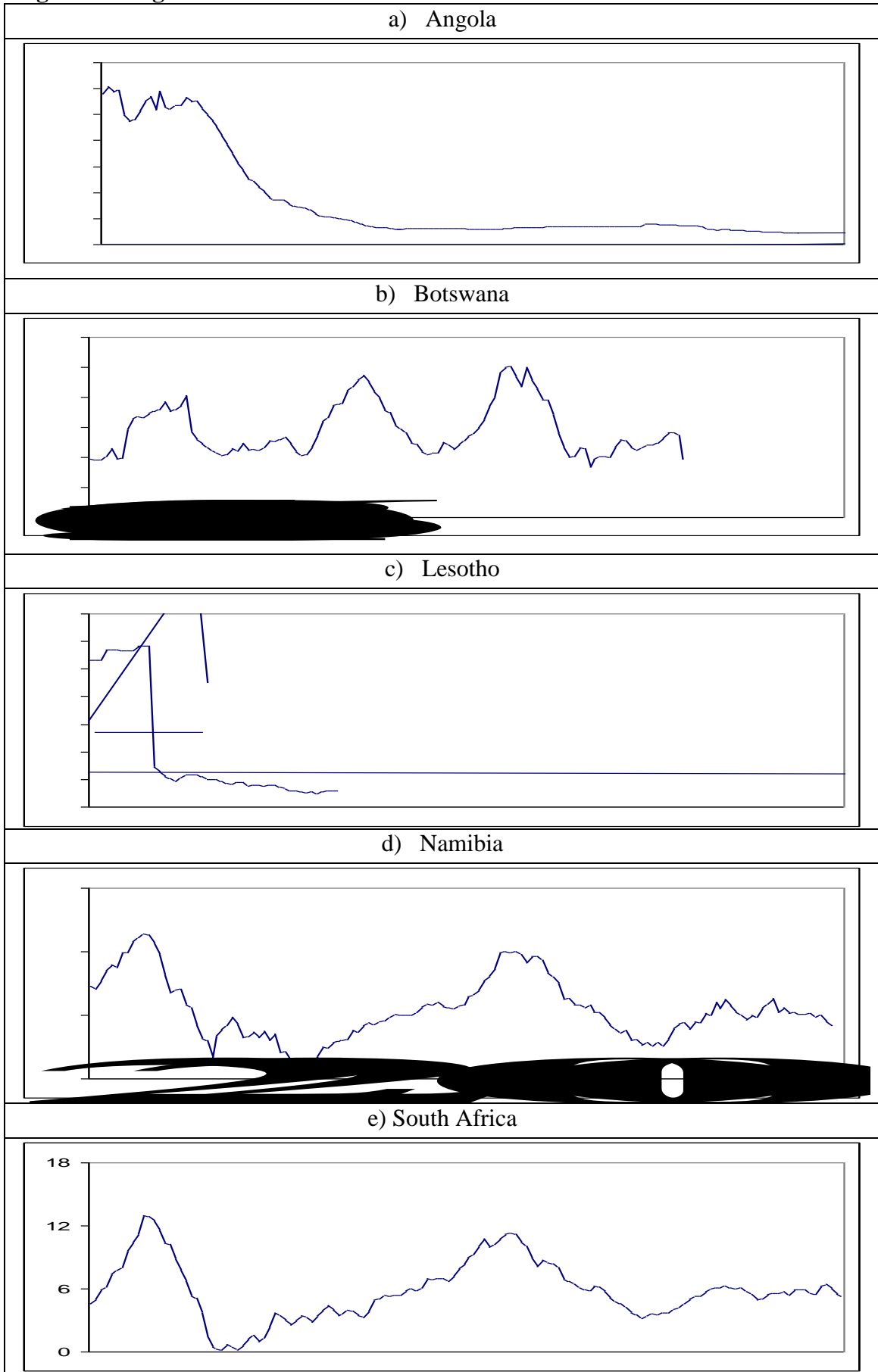
Figure 1: Original time series

a) Angola

b) Botswana

c) Lesotho

d) Namibia

e) South Africa

Table 1: Estimates of d in a non-linear set-up based on Chebyshev polynomials

Series	$m = 0$	$m = 1$	$m = 2$	$m = 3$