Hand-In Assignment #3
Empirical Relevance of the Purchasing Power Parity Relationship

An important component of many neoclassical economic theory models is the purchasing power parity (PPP) relation. The PPP theory postulates that the exchange rate between two currencies should allow the same amount of goods to be purchased in either currency with the same amount of funds. More specifically, the PPP theory states that

$$\frac{P_t}{P_t^* E_t} \quad \text{is constant,} \tag{2.1}$$

where P_t is the price level in the home country, P_t^* is the price level in the foreign country, and E_t is the exchange rate measured as units of domestic currency per foreign currency unit. Using logarithmic transformations, this amounts to constancy of

$$p_t - \beta_1 \cdot p_t^* - \beta_2 \cdot e_t, \tag{2.2}$$

where lowercase letters denote log-transformed variables: $p_t = \log(P_t)$, $p_t^* = \log(P_t^*)$, and $e_t = \log(E_t)$. The strict version of PPP in (2.1) sets

$$\beta_1 = \beta_2 = 1 \tag{2.3}$$

in (2.2), but in practice the coefficients may differ from unity due to different composition of traded versus non-traded goods, transportations costs, etc. Depending on the setting, the PPP relation in (2.2) could hold either in the long run or, more strongly, also in the short run.

According to the different theoretical rationales for the PPP theory, it is not clear from the outset if it is the foreign exchange market or the goods market that adjust to sustain PPP as an equilibrium. That may depend on the stickiness of prices and the particular exchange-rate regime.

Some examples of very simple empirical analyses of the PPP relationship include Corbae and Ouliaris (1988), Kim (1990), and Taylor (1988).

This assignment asks you to consider the empirical relevance of the PPP relation between Mozambique (with the currency metical, MZM) and South Africa (with the currency rand, ZAR).

The Data

The data file Assignment_3.xls contains (non seasonally adjusted) data for the consumer price index in Mozambique, CPIMZM, and South Africa, CPIZAR, with 2004:1=1, as well as the bilateral exchange-rate, MZM_ZAR, denominated as meticais per rand. All variables are recorded monthly from 2004:1 and are taken from the Mozambique macro database.

For the empirical analysis, consider the log-transformed variables:

$$p_t = \log(\mathsf{CPIMZM}_t), \quad p_t^* = \log(\mathsf{CPIZAR}_t), \quad \text{and} \quad e_t = \log(\mathsf{MZM\_ZAR}_t).$$

The Assignment

Consider the trivariate vector of variables

$$X_t = \begin{pmatrix} p_t \\ p_t^* \\ e_t \end{pmatrix}.$$

Analyze the long-term and the short-term relationship between the variables. Discuss if the findings are in line with the PPP theory. Also discuss which of the variables that adjust to sustain equilibrium.

Hints

(1) Remember that the time series are *not* seasonally adjusted. You probably need to include seasonal dummies.
(2) For the graphical analysis, use any transformations of the variables you find relevant.
(3) You can use any tool from the toolbox for co-integrated variables that you find relevant.
(4) Carefully discuss which assumptions are required to derive the behavior of the estimator and explain if these assumptions are fulfilled or not empirically.
(5) Be precise about the statistical tests you use for testing various hypotheses. Explain which null hypotheses you test, how you test them, and what your conclusions are.

Formal Requirements

(1) You must hand in a report that (*i*) presents your graphical analysis, (*ii*) describes the econometric model, (*iii*) outlines the modeling progress (e.g., the approach you have taken, the alternative models you have tried, etc.), (*iv*) presents your preferred model including interpretation and statements on economic and statistical significance, and (*v*) discusses the potential weaknesses of the model.
(2) The report must be a maximum of 12,000 characters including spaces (corresponding to 5 normal pages of text) plus 2 pages with output in the form of tables and graphs. The report must be written in English. It must be handed in as a pdf document through Peergrade on Absalon.

(3) If you prefer, you are allowed to work in groups of up to three persons (not necessarily in the same exercise class as yours). The assessment criteria are given on the course page on Absalon.

References

[1] Corbae D. and Ouliaris S. (1988): "Cointegration and Tests of Purchasing Power Parity", *The Review of Economics and Statistics,* Vol. 70, No. 3.

[3] Kim, Y. (1990): "Purchasing Power Parity in the Long Run: A Cointegration Approach", *Journal of Money, Credit and Banking*, Vol. 22, No. 4.

[4] Taylor, M.P. (1988): "An Empirical Examination of Long-Run Purchasing Power Parity using Cointegration Techniques", *Applied Economics*, Vol. 20, No. 10.