FOR

AGENDA

SM/09/16
Correction 1

January 27, 2009

To: Members of the Executive Board

From: The Acting Secretary

Subject: **Chad—Selected Issues**

The attached correction to SM/09/16 (1/21/09) has been provided by the staff:

Typographical Error

Page 10, para. 20, line 2: "misaligned or" removed

Questions may be referred to Mr. Sacerdoti (ext. 38514), Mr. Singh (ext. 38227), and Mr. Melhado (ext. 37119) in AFR.

This document will shortly be posted on the extranet, a secure website for Executive Directors and member country authorities.

Att: (1)

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Department Heads

A. The Equilibrium Real Exchange Rate Approach

15. This backward-looking approach is designed to estimate the level at which the real effective exchange rate is aligned with fundamentals. The methodology directly estimates an equilibrium real exchange rate and compares it with the current exchange rate to derive conclusions on any needed exchange rate adjustment.

The equilibrium REER can be estimated using the following basic specification:

Ln REER = $\alpha + \beta_1$Ln TOT$_t$ + β_2LnProd$_t$ + β_3LnOpn$_t$ + β_4Ln GC$_t$ + μ

where:

REER: Real effective exchange rate

TOT: Terms of trade

Prod: Productivity

Opn: Openness

GC: The ratio of government consumption to GDP

μ: Error term

16. The model was estimated using the autoregressive distributed lag (ARDL) technique, which allows to test for cointegrating relationships and is appropriate for short time series. The ARDL technique estimates the long-run parameters and determines whether there is a cointegrating relationship among regressors at different lag definitions. The augmented Dickey-Fuller, Philips and Perron, and Zivot and Andrews tests (see Table 4 for results) enables to detect the presence of unit roots and structural breaks in the series. The Philips and Perron test also enables through a nonparametric process to correct error autocorrelation and heterokedasticity. The hypothesis of the presence of unit roots is rejected after applying first differences to the variables because in the Philips-Perron and the Zivot-Andrews tests the values are below the critical benchmark of significance when the variables are not differentiated.

17. The best equation at two lags does not give enough evidence that a cointegrating vector exists because productivity is the only significant variable. The REER was overvalued by an average of 16½ percent for 2000–07, a period that coincides with the advent of the oil era (see Appendix Figure 3). However, given the lack of significance of most of the variables and the wrong sign for terms of trade and openness, no firm conclusions can be drawn from the estimation. The wrong sign of the terms of trade is puzzling and only could be explained by poor data or the fact that spending from the oil boom is increasing imports substantially and thus neutralizing the effects on the REER.

Table 4. ARDL on Base Specification with Different Number of Lags

Long Run Coefficients	Dependent Variable: ln(REER)		
	Two Lags	One Lag	Three Lags
ln (Terms of Trade)	-0.350	-0.377	-0.560
	1.159	0.823	2.765**
ln (Productivity)	0.649	0.647	0.467
	-7.384***	-4.846***	-7.924***
ln (Government Consumption)	-0.099	0.009	-0.072
	0.489	-0.030	0.529
ln (Openness)	-0.110	0.118	0.256
	0.491	-0.347	-1.704*
Constant	6.655	5.625	6.049
Observations	26	26	26
R-squared	0.93	0.90	0.97
F-Statistic for Bound Test[1]	3.54	25.30	4.23
Akaike Information Criteria	-45.90	-48.81	-55.62
Schwarz Information Criteria	-27.03	-35.85	-31.24
Error Correction	-0.70	-0.46	-0.97

Z statistics in parentheses.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$
[1] Upper level bounds are 6.36 for two lags, 7.84 for one lag, 5.61 for three lags.

18.   A second approach is to drop all the nonsignificant variables and leave only productivity. The equilibrium REER estimated with the ARDL technique at two lags shows an average undervaluation of 6.1 percent for 2000–07 (see Appendix Figure 4). The limitation of this approach is that it relates the REER to only one fundamental, making it difficult to draw definite conclusions.

Ln REER $= 4.5 + 0.62$ LN Prod$_t$

Z statistics   (–1.6)

19.   A third approach imposes the coefficients from a CEMAC pool single time-series estimation to fit the equilibrium exchange rate with Chadian data (Table 5). The results from using the long-term CEMAC coefficients show an average moderate overvaluation of 5 percent for 2000–07.

20.   Although the REER has appreciated since 2000 there is no solid evidence that it is inconsistent with fundamentals. Results from the equilibrium exchange rate approach were inconclusive, showing no significant under- or overvaluation.