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The effects of mass media on corruption in South Africa: A MTAR-TEC persepctive

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Abstract

This study becomes the first to examine cointegration and causal effects between mass media and corruption in South Africa for interpolated quarterly data of the corruption perception index and the world press freedom index conducted between the period of 2002 and 2014. The method of empirical investigation is the momentum threshold autoregressive (MTAR) model with a corresponding threshold error correction (TEC) component. Our empirical results reveal a negative long-run cointegration relationship between the two variables with causality running from corruption to the press freedom index. These findings explain why increased mass media has not resulted in a decline in corruption levels and rather suggests that a direct decline in levels of corruption would induce an increase in the freedom of mass media communication.

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1 INTRODUCTION

A growing amount of academic literature worldwide is recognizing that effective mass media development is a crucial element of a country's anti-corruption program. To be specific, mass media has been recognized as playing a dual role in the fight against corruption; those being, (1) raising public awareness about corruption, its causes, consequences and possible remedies and (2) the investigation as well as the reporting of incidences of corruption thus aiding other oversight and prosecutorial bodies (Sowunmi et. al. 2010). The effectiveness of media in fighting corruption depends on the access to information and freedom of expression as well as a professional and ethical cadre of investigative journalism (Stapenhurst, 2000). Moreover, mass media protocol can directly assist in creating a conducive environment for rooting out corruption through the enthronement of a culture of freedom of speech and freedom of expression; governmental accountability and qualitative civil society in direct participation in governance (Djankov, 2000).

Following South Africa's liberation election in 1994, there has been a dramatic upheaval of the mass media broadcasting environment, which is inclusive of the transformation of the South African Broadcasting Corporation (SABC) from a state-controlled broadcaster into an independent public service broadcaster; the establishment of an independent regulatory body, the independent broadcasting Authority (IBA) and the entry into this field a number of new private sector interests (Barnett, 1999). And even with these developments, the levels of corruption in South Africa as indicated by transparency internationals (TI) corruption perception index (CPI) shows that political corruption levels within the economy has been on the rise since 2006. Furthermore, the Human Sciences Research Council (HSRC) annual South African's Social Attitudes Survey shows that the proportion of people who think that tackling corruption should be a national priority has almost doubled from 14 percent to 26 percent over a five-year period dating between 2006 and 2011. Therefore, given this general rise in the level of development and sophistication of mass communication as well as a simultaneous rise in the levels of corruption at national government level within the South African economy, it is both thought provoking and surprising that no literature, to the best of our knowledge, has made an inquire into the possibility of a cointegration relationship between mass media communication and corruption for the South African economy.

Against this backdrop, the current study contributes to the ongoing body of knowledge by investigating cointegration and causality effects between mass communication and corruption in South Africa using the momentum threshold autoregressive (MTAR) model framework as pioneered by Enders and Granger (1998). The empirical analysis is conducted on interpolated quarterly data collected between the periods 2002/Q1 to 2014/Q4. We structure the rest of the paper as follows. The following section describes the MTAR econometric model used in the paper from which unit root testing procedures, cointegration and causality analysis are drawn from. The third section of the paper presents the data and the empirical analysis of the study whereas the final section of the paper concludes the study.

2 *EMPIRICAL FRAMEWORK*

We specify our baseline model via the following long run regression:

$$\begin{pmatrix} CPI_t \\ WPFI_t \end{pmatrix} = \begin{pmatrix} \alpha_{01} \\ \alpha_{02} \end{pmatrix} + \begin{pmatrix} \alpha_{11} & 0 \\ 0 & \alpha_{12} \end{pmatrix} \begin{pmatrix} WPFI_t \\ CPI_t \end{pmatrix} + \begin{pmatrix} \varepsilon_{t1} \\ \varepsilon_{t2} \end{pmatrix} \tag{1}$$

Where CPI_t is the corruption perception index, $WPFI_t$ is the world press freedom index and ϵ_{ti} is the long run regression error term. According to the Engle and Granger's (1987) cointegration theorem, long-run convergence along a steady state path can only exist if the time series variables CPI_t and $WPFI_t$ are first difference stationary variables and the error term ϵ_{ti} remains levels stationary. This condition would ensure that both time series variables increase monotonically over time such that any estimated regression based on the variables will not produce spurious results. In pursuit of Enders and Granger (1998), we model co-integration relations between the time series variables by allowing the regression residuals to behave like a threshold autoregressive (TAR) process i.e.

$$\Delta\varepsilon_t = I_t\rho_1\xi_{t-1} + (1 - I_t)\rho_2\xi_{t-1} + \sum_{i=1}^{p}\beta_i\,\Delta\xi_{t-i} + \mu_t \tag{2}$$

And thereafter we apply the following tests for (i) normal co-integration effects; and (ii) asymmetric co-integration effects, which are respectively implemented under the following hypothesis:

$$H_0^{(i)} : \rho_1 = \rho_2 = 0 \tag{3}$$

$$H_0^{(ii)} : \rho_1 = \rho_2 \tag{4}$$

Furthermore, we assign four indicator functions to the threshold cointegration equation (2). The first indicator function transforms the residuals of equation (2) into a TAR specification with a zero threshold:

$$I_{.t} = \begin{cases} 1, if\, \xi_{t-1} \geq 0 \\ 0, if\, \xi_{t-1} < 0 \end{cases} \tag{5}$$

Whereas the second indicator function is representative of a TAR specification with a consistently estimated threshold value (i.e. c-TAR):

$$I_{.t} = \begin{cases} 1, if\; \xi_{t-1} \geq \tau \\ 0, if\, \xi_{t-1} < \tau \end{cases} \tag{6}$$

The third indicator function transforms the residuals into a momentum threshold autoregressive (MTAR) model:

$$M_{.t} = \begin{cases} 1, if\, \xi_{t-1} \geq 0 \\ 0, if\, \xi_{t-1} < 0 \end{cases} \tag{7}$$

Whilst the fourth indicator function is representative of a MTAR specification with a consistently estimated threshold value (i.e. c-MTAR):

$$M_{.t} = \begin{cases} 1, if\, \xi_{t-1} \geq \tau \\ 0, if\, \xi_{t-1} < \tau \end{cases} \tag{8}$$

Since the value of the threshold variable, τ, under both the c-TAR and c-MTAR model specifications, is unknown a prior. Therefore, we apply Hansen's (2000) grid search method to obtain a true estimate of the unknown threshold values.

In the event that cointegration effects amongst the pair of time series variables can be verified, an error correction mechanism can be modelled between the time series variables. In conformity to our baseline MTAR model, we utilize two sets of corresponding threshold error correction (TEC) models. The first set are the TAR-TEC models which we specify as:

$$\Delta CPI_t = \lambda_{11} I_t \xi_{t-1} + \lambda_{12}(1 - I_t)\xi_{t-1} + \sum_{i=1}^{p} \varphi_{i1} \Delta CPI_{t-1} + \sum_{i=1}^{p} \psi_{i1} \Delta WPFI_t + \mathrm{v}_{t1} \quad (9)$$

$$\Delta WPFI_t = \lambda_{11} I_t \xi_{t-1} + \lambda_{12}(1 - I_t)\xi_{t-1} + \sum_{i=1}^{p} \varphi_{i1} \Delta CPI_{t-1} + \sum_{i=1}^{p} \psi_{i1} \Delta WPFI_t + \mathrm{v}_{t1} \quad (10)$$

Whereas the second set are the MTAR-TEC models and specified as:

$$\Delta CPI_t = \lambda_{11} I_t \xi_{t-1} + \lambda_{12}(1 - I_t)\xi_{t-1} + \sum_{i=1}^{p} \varphi_{i1} \Delta CPI_{t-1} + \sum_{i=1}^{p} \psi_{i1} \Delta WPFI_t + \mathrm{v}_{t1} \quad (11)$$

$$\Delta WPFI_t = \lambda_{11} I_t \xi_{t-1} + \lambda_{12}(1 - I_t)\xi_{t-1} + \sum_{i=1}^{p} \varphi_{i1} \Delta CPI_{t-1} + \sum_{i=1}^{p} \psi_{i1} \Delta WPFI_t + \mathrm{v}_{t1} \quad (12)$$

The indicator functions as given in regressions (5) through (8) are respectively applied to the TAR-TEC and MTAR-TEC specifications (9) through to (12). Through the above described systems of error correction models, the presence of asymmetries between the variables could initially be tested by examining the signs on the coefficients of the error correction terms; whereas granger causality tests can be implemented by using a standard F-test to examine whether the regression coefficients from the error correction models are significantly different from zero. Pragmatically, the null hypothesis of no error correction mechanism can be tested as:

$$H_0^{(iii)}: \lambda^+ \xi_{t-1}^+ = \lambda^- \xi_{t-1}^- \quad (13)$$

Whereas, the null hypothesis that the CPI_t does not lead to $WPFI_t$ is tested as:

$$H_0^{(iv)}: \varphi_{i1} = 0;\ i = 1, \dots, k \tag{14}$$

And the null hypothesis that the $WPFI_t$ does not lead to CPI_t do not is tested as:

$$H_0^{(v)}: \psi_{i1} = 0;\ i = 1, \dots, k \tag{15}$$

3 *DATA AND EMPIRICAL ANALYSIS*

Our empirical data set comprises of the corruption perception index (CPI_t) index and the world press freedom index ($WPFI_t$). The first series is collected from the Transparency International (TI) online database whereas the second series is collected from the Reporter Without Borders online database. The data is collected on an annual basis ranging from 2002 to 2014. Technically speaking, it would have been ideal to user a longer span of data, but due to data availability constraints, consistent annual data for the WPFI could only be collected from 2002 onwards. Therefore, in light of the scarcity of our empirical data we use a time series interpolation method to convert the yearly data into quarterly data for empirical use. Thereafter, as a preliminary step we employ the ADF and PP unit root tests to the empirical data as a means of evaluating the integration properties of the time series. Both unit root tests have been performed without a constant and without a trend. The results of the unit root tests, as reported in Table 1, confirm that both time series variables evolve as first difference stationary variables at significance levels of 99 percent.

Table 1: ADF and PP unit root tests

	Variables			
	CPI		WPFI	
	ADF	PP	ADF	PP
levels	-0.48	0.79	-1.83	-2.71
first differences	-2.96*	-5.12*	-5.89*	-8.78*

Note: The asterix '' denotes the 1% significance level.*

Having this evidence of I(1) behaviour among all the times series variables, we proceed to apply various threshold cointegration and threshold error correction tests to formulated TAR-TEC, c-TAR-TEC, MTAR-TEC and c-MTAR-TEC estimation regressions with CPI as the dependent variable and then with WPFI as the dependent variable. We basically test each of the formulated threshold model regressions for (i) significant normal cointegration effects, and (ii) significant threshold cointegration effects and (iii) significant threshold error correction effects and then we report the results in Table 2 below.

Table 2: Threshold Cointegration and Error Correction Tests Results

	CPI			WPFI		
hypothesis	$H_0^{(i)}$	$H_0^{(ii)}$	$H_0^{(iii)}$	$H_0^{(i)}$	$H_0^{(ii)}$	$H_0^{(iii)}$
model						
tar-tec	1.40	0.08	0.78	0.35	0.07	1.14
	(0.26)	(0.78)	(0.38)	(0.71)	(0.79)	(0.29)
c-tar-tec	1.67	0.60	2.70	0.45	0.27	0.97
	(0.20)	(0.44)	(0.10)*	(0.64)	(0.61)	(0.33)
mtar-tec	1.50	0.27	1.58	1.37	2.08	5.07
	(0.24)	(0.61)	(0.22)	(0.27)	(0.16)	(0.03)**
c-mtar-tec	1.93	1.08	0.23	3.41	6.11	4.32
	(0.16)	(0.30)	(0.64)	(0.04)*	(0.02)*	(0.04)**

*Note: Significance level codes: '***', '**' and '*' denote the 1%, 5% and 10% significance levels respectively. The p-values are reported in parentheses ().*

In referring to the results reported in Table 2, we observe that each of the threshold cointegration regressions fail to reject the first two tested hypotheses of normal cointegration and threshold cointegration effects, that is with the exception of the c-MTAR-TEC model with WPFI placed as the dependent variable in the model regression. Moreover, the c-MTAR-TEC model with WPFI as the dependent variable also manages to reject the null hypothesis of no threshold error correction effects. Therefore, in light of the empirical results obtained thus far, we are able to conclude that the most significant threshold cointegration regression is the c-MTAR-TEC model with WPFI placed as the dependent variable. We thus proceed to provide empirical estimates of this model and report our findings in Table 3 below whereas results of the causality analysis performed for both the time series variables under the same c-MTAR-TEC model are reported in Table 4.

Table 3: c-MTAR-TEC estimates: WPFI as dependent variable

	dependent variable	
	CPI_t	$WPFI_t$
α_{0i}		34.75
		(0.03)*
α_{1i}		-5.12
		(0.02)**
τ		1.32
$\rho_1\xi_{t-1}$		-0.30
		(0.02)*
$\rho_2\xi_{t-1}$		-0.07
		(0.03)*
$\beta_1\Delta\ \xi_{t-1}$		0.03
		(0.84)
$\lambda^-\xi^-_{t-1}$	0.01	0.07
	(0.01)**	(0.45)
ΔCPI^-_{t-k}	0.98	17.70
	(0.02)**	(0.09)*
$\Delta WPFI^-_{t-k}$	0.01	0.24
	(0.38)	(0.19)
$\lambda^+\xi^+_{t-1}$	0.06	-0.01
	(0.76)	(0.01)**
ΔCPI^+_{t-k}	-0.52	-5.52
	(0.09)*	(0.46)
$\Delta WPFI^+_{t-k}$	0.01	-1.03
	(0.96)	(0.00)***
DW statistic	1.88	
p-value	0.03	
LB	0.08	
JB	3.78	

*Note: Significance level codes: '***', '**' and '*' denote the 1%, 5% and 10% significance levels respectively. The p-values are reported in parentheses (). DW and LB denote the Durbin Watson and Ljung-Box test statistics for autocorrelation whereas JB denotes the Jarque Bera normality of the residuals.*

Table 4: Ganger Causality tests results

Hypothesis	f-statistic
$H_0^{(iv)}: CPI\ granger\ causes\ WPFI$	3.10
	(0.06)*
$H_0^{(v)}: WPFI\ granger\ causes\ CPI$	0.42
	(0.66)

Note: The asterix '' denotes the 10% significance level. The p-values are reported in parentheses ().*

In summarizing the empirical results reported in Tables 3 and 4, we arrive at the following four conclusions. Firstly, as indicated by the negative OLS long-run regression coefficient, α_{1i}, there exists a negative long-run cointegration relationship between the corruption index and press freedom index in which the press freedom index is the driving variable in the system. We particularly obtain a long run regression coefficient of -5.12 which indicates that a 1 percent reduction in the corruption index results in approximately a 5 percent increase in the press freedom index. Secondly, given that the threshold error term coefficient in the upper regime of the MTAR part of the model (i.e. $\rho_1\xi_{t-1}$) is of grater absolute value in comparison to its lower regime counterparts (i.e. $\rho_2\xi_{t-1}$), we deduce that positive deviations from the steady state are eliminated at a quicker rate than that of negative deviations. Thirdly, based on the estimated threshold error correction model, we find a significant long-run convergence of the residuals to the steady state equilibrium as depicted by the significantly negative error correction term found in the upper regime of the TEC regime (i.e. $\lambda^+\xi_{t-1}^+$). We note that this significant negative error correction term only occurs when shocks to the system are driven by the press freedom index. Lastly, the causality tests show that the null hypothesis of the corruption index not granger causing the press freedom index is rejected at a 10 percent significance level whereas the null hypothesis of the freedom press index granger causing the corruption index cannot be rejected at all levels of significance. This specific result points to a uni-directional causality running one-way from the corruption index to the press freedom index.

4 CONCLUSION

Primarily motivated by the absence of academic evidence depicting the empirical relationship between mass media and corruption in South Africa, our study endeavoured into investigating threshold cointegration and causality effects between the time series variables for interpolated quarterly data collected from 2002 to 2014. Our overall empirical study reveals a number of interesting phenomenon. Firstly, the negative long-run cointegration relationship established between the corruption index and press freedom index signifies an inverse relationship existing between the time series variables in which they move in opposite directions over the long-run. We specifically find that a percentage decrease (increase) in the corruption index leads to a five percent increase (decrease) in the press freedom index. Secondly, and more importantly, we find causality effects running uni-directional from the corruption index to the press freedom index. This implies that greater press freedom can lead to less corruption in South Africa but not vice versa. A plausible explanation for this outcome may be attributed to the controversial Secrecy bill which is essentially a piece of legislation that inhibits freedom of mass media expression in South Africa and provides a statutory provision or platform for covering up some of the corruption issues within government. So whilst this study proves that mass media is significantly related to levels of corruption within the South African economy, we conclude that only through a reduction in the levels corruption can there be higher freedom in mass media reporting and yet press freedom in isolation cannot decrease levels of corruption within the economy..

REFERENCES

Barnett C. (1999), "The limits of media democratization in South Africa: Politics, privatization and regulation", *Media, Culture and Society*, 21(5), 649-671.

Engle R. and Granger C. (1987) "Co-integration and error correction representation, estimation and testing", *Econometrica*, 55(2), 251-276.

Djankov S. (2000), "Who owns the media?", Policy Research Working Paper No. 2620, World Bank.

Engle R. and Granger C. (1987) "Co-integration and error correction representation, estimation and testing", *Econometrica*, 55(2), 251-276.

Enders W. and Granger C. (1998), "Unit root tests and asymmetric adjustment with an example using the term structure of interest rates", *Journal of Business and Economic Statistics*, 16(3), 304-311.

Hansen B. (2000), "Sample splitting and threshold estimation", *Econometrica*, 68(3), 575-603.

Sowunmi F., Raufu A., Oketokun F. Salako M. and Usifoh O. (2010), "The role of media in curbing corruption in Nigeria", *Research Journal of Information Technology*, 2(1), 7-23.

Stapenhurst R. (2000), "*Just business: Ethics in action*", 2^{nd} Edition, Oxford University Press, Oxford.