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## **Exchange rate misalignments and current accounts in BRICS countries**

Rikhotso, Prayer and Bonga-Bonga, Lumengo

University of Johannesburg, University of Johannesburg

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# **Exchange rate misalignments and current accounts in BRICS countries**

## **ABSTRACT**

This paper assesses the impact of misalignment on the current accounts of BRICS countries using the empirical approaches that address the issue of model uncertainty and asymmetry. The results of the empirical analysis confirm that the relationship between misalignment and current account is asymmetric in that overvaluation of BRICS currencies deteriorate the current account and undervaluation does improve it. Moreover, the results of the empirical analysis advocate the use of real effective exchange rate as an effective macroeconomic policy instrument to enhance relative export competitiveness in BRICS. Further studies in this area should examine the impact of marginal propensity to import and how each country's propensity to import affects the current balance given episodes of overvaluation and undervaluation.

## **1. INTRODUCTION**

The real effective exchange rate (REER) is a crucial macroeconomic instrument for national and regional economic policy, which policy makers can deploy as macroeconomic ammunition instrument to advance external competitiveness and stimulate expansion in non-traditional exports at an international level, especially in developing economies, (Gnimassoun, 2015 and Goldstein, 2010). Given the disconcerting trend of Current Account (CA) imbalances across the globe, currency misalignments have dominated the discourse of global macroeconomic stability, (Obstfeld and Rogoff, 2005). On the balance of forces, the real exchange rate should be companionable with external trade account and internal balances in the equilibrium to circumvent the adverse consequences of misalignments on economic growth and if currency undervaluation boasts economic growth and exports (Bonga-Bonga, 2019). the magnitude of undervaluation ought to be maintained at acceptable levels to avoid inflationary pressures owing to business confidence subversion and rising price uncertainties which could subsequently suppress exports growth and subvert economic performance, (Gnimassoun, 2017).

Given the above context, currency misalignment is a very important factor for the comparative performance in exports markets, mostly for the emerging and developed economies who are playing huge role in the global exports markets, (Bergsten, 2010). A formidable group of emerging markets

that wants to dominate the global trade marketplace, such as the BRICS community (comprising of the five emerging economies, namely, Brazil, Russia, India, China and South Africa) will need to keep growing their market share in the global exports arena beyond the impressive export diversification and export growth realised by BRICS economies in recent memory (Vahálík, 2014). Therefore, the REER is an imperative macroeconomic policy instrument to enhance domestic exports' competitiveness in the global markets, hence the study of the external trade balance and exchange rate misalignments (overvaluation and undervaluation) is critically important as real currency distortions can have materially adverse consequences on the current account, Rodrick (2008).

Berg and Miao (2010) argued on empirical grounds and demonstrated that currency undervaluation is advantageous for developing economies while overvaluation could have adverse impact and these findings are consistent with conclusions of Rodrick (2008). Therefore, BRICS community as a combined force of emerging economies could further assert their respective external trade balances by simply adopting the exchange rate policy framework that deliberately ensure a reasonable currency undervaluation maintained at a threshold that can allow for export competitiveness without triggering inflationary risks and investor confidence cessation, if undervaluation is favourable for current account and this view supported by findings documented by Noura, Plane and Sekkat (2011).

Contrary to previous literature, which examined the export diversification in BRICS economies and concluded that BRICS countries have grown and diversified their export position globally through margins, the main contribution of this study will be the examination of the impact of real exchange rate misalignment on BRICS' external trade balances, which will be extended to show that the currency mispricing impact is asymmetrical (non-linear) on the current account and conclude by demonstrating how the relatively low level of export diversification by products and geographical destinations (that is, high export concentration) and real effective currency distortions jointly affect the BRICS' trade balance in the long run.

To the best of my knowledge, no empirical study has been conducted to examine effect of real currency distortions on the BRICS countries' external trade account balances considering their rapidly growing relative share and attainment of export dominance in the global exports markets. Therefore, this paper, will employ Least Squares Dummy Variable Corrected (LSDVC) approach to model the current account balance using the dynamic panel model that will correct for cross-sectional dependence and serial autocorrelation while accounting for any model biases that may arise due to model misspecification. In conclusion, this paper will conclude by showing that, albeit being the International

Monetary Fund's (IMF) external balance assessment preferred methodology, Feasible Generalized Least Squares (FGLS) is not an appropriate to technique to model the external account balance as a function of currency misalignments given the dynamic nature of the trade balance evolution for BRICS countries in recent years.

## **2. LITERATURE REVIEW**

The study of exchange rate misalignments has dominated the academic discourse for several decades which mainly focused on how misalignments affect economic growth across several jurisdictions of the global economy (Gnimassoun, 2015; Bergsten, 2010; Goldstein, 2010). Noteworthy is the study by Razin and Collins (1997) which fixated on misalignments effects on economic growth and found evidence of non-linear relationship between currency distortions and economic growth, thereby demonstrating the threshold effect persistence and similar findings with respect to economic growth were documented by the subsequent empirical studies by Aguirre and Calder (2005) and further supported by findings of Bereau et al. (2012), respectively.

The study conducted by Vahalík (2014) sought to study the major causes of exchange misalignments in developed and emerging economies and used empirical data from 1982 to 2008 for analysis and inferences. This paper deployed the fundamental equilibrium exchange rate (FEER) approach and reported that currency misalignments and mainly driven by the extent of trade openness, exchange rate regime of the country as well as the nature of global specialisation and the liberalisation of the financial system of each country, Vahalík (2014). The findings of this paper are consistent with the FEER approach as asserted by Aflouk et al (2010).

On a pioneering empirical study of effects of misalignments on current account in recent memory, Gnimassoun (2017) examined the role of currency distortions on the current account position for the CFA zone covering the West African and Central Africa monetary unions whose central bank is in France and the exchange rate is pegged to the Euro. He used FGLS approach to estimate current account model using the external account balance variables as documented in Edwards (1989) as control factors in the static model that was estimated for the CFA Zone. The empirical results found that misalignments in the CFA Zone degraded the current account asymmetrically, indicating that overvaluation and undervaluation of equal magnitude have varying impact on the CFA external position. Important to note is that overvaluation of CFA Franc deteriorated the current for the period under review, while contrary to theoretical propositions, undervaluation did not improve the external

balance positions for the same period. This result is not surprising for the CFA zone given that currency is pegged to the Euro, which exemplifies the exogenous nature of exchange rate evolution for the region while highlighting that these countries are exchange rate price takers. The negative impact of exchange rate deviations from equilibrium are further aggravated by higher export concentration and the CFA Franc depends on the government expenditure, Balassa–Samuelson effect and terms of trade as determined from the Bayesian model averaging technique.

Contrary to many empirical findings, Zwedala (2013) conducted the study of currency misalignments on economic growth for the period from 1985 to 2011 and concluded that the South African Rand (ZAR) was overvalued and currency misalignment was positive on economic performance, suggestive of a positive and beneficial relationship between ZAR misalignment and economic growth in South Africa. The paper notes that undervaluation would have been more favourable than overvaluation has been and this is consistent with reasonable expectations for exports–powered growth strategy, given that South African economy is mainly primary export–driven, however, the study also proved that ZAR real exchange rate was mean–reverting and REER returned to long run equilibrium level, suggesting that the currency deviations do in fact have favourable internal account impact, although short–lived. The most interesting finding from this paper is that currency misalignments are favourable factors South Africa’s economic growth through external trade balance as the channel of influence but the short–term currency mispricing cannot sustain international export competitiveness in the long–run.

However, Zwedala (2013) could not conclusively pronounce over the long run bearing of this misalignment on South Africa’s external trade balance. To the best of my knowledge, no empirical study has been conducted to examine the effect of real currency distortions on external trade balance in South Africa. Therefore, this paper will address this question of real misalignment not only in South Africa but in the BRICS countries’ trade account balances considering their rapidly growing relative share and attainment of export dominance in the global exports markets. Therefore, this paper, will employ Least Squares Dummy Variable Corrected (LSDVC) approach to model the current account balance using the dynamic panel techniques that will correct for cross–sectional dependence and serial autocorrelation while accounting for any model biases that may arise due to model misspecification. The paper will argue that, albeit being the International Monetary Fund’s (IMF) external balance assessment preferred methodology, Feasible Generalized Least Squares (FGLS) is not an appropriate to technique to model the external account balance using currency misalignment given the dynamic nature of the trade balance evolution for BRICS countries in recent years. This study will demonstrate

that exchange rate misalignments are favourably associated with external account balance and there exists threshold effects in the misalignment–trade account relationship. The significance of REER as macroeconomic ammunition will be demonstrated and the impact of export concentration given currency misalignments will be examined conclusively.

### **3. Data and Methodology**

This section of the paper describes the data collected for this empirical review and the relevant sources. The study covers a period of twenty-six years from 1990 to 2016 for BRICS countries. Due to limited availability of data, Russia will be excluded from this study, hence the findings relate more to BICS. Historical observations of real effective exchange rate, Current Account, terms of trade, real GDP per capita, foreign direct investment, population growth, trade openness, government expenditure, M2 money supply, GDP growth and export concentration index for the period under review. The data was obtained from the world bank and United Nations Conference on Trade and Development (UNCTAD).

#### **3.1 Long Run Exchange Rate Model**

The study of misalignments requires that the equilibrium exchange rate be forecasted, from which observable currency deviations from expected equilibrium level will establish the presence of currency misalignments. To this effect, several approaches to forecast long–run equilibrium exchange rate level have been established in literature, however, all the approaches suffer from serious model drawbacks and these limitations exacerbate the extent of model uncertainty in forecasting equilibrium exchange rate, Roudet, Saxegaard and Tsangarides (2007). The first, is the Purchasing Power Parity (PPP) relationship which posits that long run exchange rate should equal the relative PPP between countries and technological progress and longer time horizon are prerequisites for this long run convergence to hold, (Gnimassoun, 2017). However, empirical literature has failed to find convincing evidence to support that PPP relation holds, (Odedokun, 2000; Bahmani–Oskooee and Gelan, 2006).

Some studies find that it holds in the short run when lagging the variables while others argue that it does not hold both in the short run and long run. To apply the logic of exchange rate convergence, PPP relation must hold first either in the long run or short run, (Gnimassoun, 2015). Given the sky–high uncertainty and inconclusive empirical evidence of PPP even for studies done focusing emerging economies such as South Africa, the credibility of REER forecasts and misalignments drawn from it will be too questionable, hence, inferential statements about population cannot be confidently drawn from these estimates, Zhang (2001).

The second is the Fundamental Equilibrium Exchange Rate (FEER) approach which postulates and advocates for the use of macroeconomic fundamental factors to forecast equilibrium exchange rate. This approach predominantly used in empirical studies to forecast currency distortions in developing markets, however, it is model is heavily criticised for unconstrained choice of current account benchmarks and the results are often challenged based on exclusion of other significant variables, (Candelon, Kool, Raabe and Veen, 2007; Coudert and Couharde, 2009; Noura. et al., 2011). The speedy evolution of external of BRICS in S renders the normative presumptions inappropriate, thus, compromising the efficacy of FEER to model REER for this study. For instance, Brazil CA balance was  $-4.12\%$  (deficit) in 2001 and recorded  $1.2\%$  surplus in 2006, which reflects  $127\%$  change in four years.

The third approach known as Behavioural Equilibrium Exchange Rate (BEER) model which makes use of the fundamental variables to estimate the regression equation and forecasts of long run relationship will be the subject of discussion and be applied in this study. BEER is relatively easier to estimate but susceptible to variable choice bias. However, this variable selection bias can be circumvented by using a robust econometric approach to identify substantial variables and build BEER Model. To this effect, this paper will make use of Bayesian model selection technique to identify the optimally significant variables to be included in the BEER equation to model exchange rate for each of the five BRICS countries. The BEER equation is estimated deployed macroeconomic determinants of real effective exchange rate as attested in literature, particularly the variables reported by Edwards (1989) and Vahlaik (2014). These fundamentals were inputted into the Bayesian Model Selection Process and the below Table (A) summarises the output BRICS countries.

**TABLE 1. Bayesian Model Selection Output for BRICS countries**

REER Fundamentals	Brazil		INDIA		CHINA		SOUTH AFRICA	
	BMA PIP	Post Mean	BMA PIP	Post Mean	BMA PIP	Post Mean	BMA PIP	Post Mean
popgrth	0.561	-45.122	0.643	-33.310			0.975	-5.015
reer	0.984	-15.234	0.704	-0.558	1.000	-6.391	0.916	-4.140
totrade	-		0.997	-0.469	0.805	0.294		
fdi	-	-	-	-	-	-	-	-
govtexp	-	-	-	-	-	-	0.425	3.182
topen	0.962	-2.879	0.929	5.281			0.566	-7.416
excons	-	-	-	-	-	-	-	-
lrggdp	-	-	-	-	-	-	-	-
popgrth	-	-	-	-	-	-	-	-
lm2stock	0.825	-0.288			0.659	0.094	-	-
lgdp_cap	0.588	0.037	0.598	0.005	0.999	-1.990	-	-

Therefore, the general fundamental BEER equation for each BRICS countries above will incorporate variables whose Posterior Inclusion Probability (PIP) is exceeds 50% (posterior probability assumed to be 0.5) and stated below is the general formula which is adapted to reflect significant variables for each country:

$$(reer_{i,t}) = \alpha_i + \varphi_{i,t} + \theta_t + \beta_1 \ln(gov_{i,t}) + \beta_2 \ln(prod_{i,t}) + \beta_3 \ln(tot_{i,t}) + \varepsilon_{i,t}$$

### 3.2 Misalignments Measurement and Current Account Models

This study will make use of panel series data containing observed REER and forecasted equilibrium REER values obtained from the BEER model discussed in section 3.1 above. The observed data ranges from 1990 to 2016 and Misalignments (*Mis*) vector of observations was derived and used to model CA evolution. Therefore, this paper will examine the impact of exchange rate mispricing on the current account balance by using the current account (CA) evolution model which makes use of misalignment (*Mis*) as an explanatory variable and other literature-supported factors ( $c^i, z^j$ ) are included as control variables. The CA evolution model has the following specifications;

$$ca_{i,t} = a_i + b mis_{i,t} + \sum_{j=1}^n c^j z_{it}^j + \mu_{i,t}$$



Wherein  $n$  represents the number of explanatory control variables,  $\mu_{i,t}$  being the independent and identically distributed error terms, and  $a_i$  denotes country–fixed effects for the panel of BRICS countries. Given the above specification, if the coefficient of *Mis* ( $b$ ) is negative, it means that the currency is undervalued by magnitude  $b$ , while the sign negative (positive) just means that currency is undervalued (overvalued). That is, a positive value of ( $b$ ) means real exchange rate overvalued. Before running the econometric model to test for fixed effects and random effects, unit root and panel cointegration tests we performed to ensure stationary variables are included where possible, results in Appendix– Table A. The results for Hausman test confirm the validity of fixed effects in the panel series, henceforth, the estimated model will capture the country–specific “within effects” in  $a_i$ .

As argued by Williamson (1990) in what is termed Washington Consensus, any currency distortions are detrimental to trade balance, if this proposition holds for BRICS countries, then the coefficient of *Mis* will be negative, indicative of a negative relationship between currency distortions and external account balance, which would suggest that misalignments have same adverse impact on the external trade balances as is the case for economic growth as asserted by empirical literature, (Gnimassoun, 2015 and Bergsten, 2010). By extension to current account, overvaluation would then deteriorate the CA balance while undervaluation is expected to provide symmetrical improvement if the relationship is only linear, which means that overvaluation (undervaluation) of equal magnitude will have equal impact in the opposite directions. However, the assumption of symmetric impact does not account for the leverage effect which postulates that overvaluation should have much larger adverse downside impact than the (possible) favourable upside impact an undervaluation of same magnitude would be expected to have on the external trade balance, (Razin and Collins, 1997; Aguirre and Calder, 2005).

To capture the leverage effect of misalignments, this paper will further test for the non-linearity and show that the relationship is asymmetric for BRICS and interaction factors with the export concentration and misalignment are significant variables that explain the long run transition of the current account. To this end, a new quadratic term is introduced in the CA model to account for the leverage effect which captures the asymmetric effects of misalignments and that new variable called misalignments squared ( $\text{mis}^2$ ) and it enable the capturing of possible non–linearity (leverage effect) on the external position and the results indicate strong statistical significance of this term and detailed results are tabulated together with the corresponding p-values in appendix and the summary descriptive statistics will be reported and discussed on the results section. After this asymmetric relationship is established, the *Mis* series is further segmented into two time series whereby all positive exchange rate differentials (*Mis*) are grouped into a series called overvaluation while negative currency deviations

(*Mis*) are grouped into undervaluation series. The model was run again using these two variables to delineate the impact of overvaluation and undervaluation of real effective exchange rate on the current account balance and results are tabulated in Table (B).

Further interaction variables are created to ascertain the impact of interaction terms between misalignments and export concentration whereby export concentration refers to the proportion of a specific country's exports that are dominated by a specific product type or product group or specific geographic destination. The export concentration (*excons*) of interest in this study is the product concentration, the closer it is to one, the higher the export concentration, (UNCTAD, 2018). Last but not least, the final vector of interaction variables for export concentration with currency overvaluation (*mis\_over*) and undervaluation (*mis\_under*) are generated as a product of each misalignment series and the export concentration term (*excons*) to create new variables named *over\_excons* and *under\_excons* to capture the effect of export concentration on external trade balance given that the real effective currency is already overvalued and undervalued respectively. The test statistics and model significance of these interaction variables exhibit overwhelming statistical significance for these variables in explaining the external account evolution in the BRICS.

In this study, the IMF's preferred methodology for external account balance assessment (FGLS) will be used to estimate the initial regression equation as it accounts for cross sectional dependence and serial correlation. It will be argued from the empirical results that FGLS approach merely works better if only CA evolution is estimated using the static model (ignoring lags of historical CA observations), thus using misalignment as key variable and include other plausible economic factors as control variables from Edwards (1989) for developing economies. When FGLS is used for the dynamic version of the CA model (including CA lags), this approach yields weak and insignificant results which suggest that currency misalignments and all explanatory variables modelled have no impact on BRICS current account balances. This view is counterintuitive and defy bounds of sound economic reasoning for export-driven economies such as BRICS countries whose relative market share is on the rise in the global trade landscape, (Vahalik, 2014).

To the extent that empirical literature asserts that currency misalignments generally degrade economic growth through external trade imbalances even for non-exports dependent countries (Aguirre & Calder, 2005), then it follows that the trade balances of export-driven economies should somewhat be influenced by currency overvaluation and undervaluation, and the specific nature of relationship can be ascertained empirical results. This is necessary in order realise the effect of exports and imports

onto the internal balance (economic growth) as demonstrated by literature, (Zwedala, 2013). As such, FGLS fails to capture the correct relationship CA and REER misalignments because of the model (mis)specifications and other significant biases that this approach is unable to correct for, thus rendering the results of dynamic version of FGLS meaningless for inferences.

Consequently, this paper will rely on Least Squares Dummy Variable Correction (LSDVC) approach to estimate the dynamic form of the BRICS CA evolution model by including first lag of the CA and this model yields optimal results for a balanced panel series whose time period is less than thirty (30), as argued by Judson and Owen (1999) in their study to compare the optimal panel techniques for macroeconomic empirical analysis. Kiviet (1995) argued that benefit of LSDVC is that it corrects for model biases in addition to accounting for cross sectional dependence and serial correlation in the current account data when using the dynamic model of external trade balance. The BRICS panel data under review is strongly balanced and has period less than 30 (T=26). The trade account balance historical analysis revealed that, contrary to CFA Zone, when given BRICS country runs a trade account deficit (surplus), the next period trade balance always follows the previous year's deficit (surplus), thus, suggesting that lags of the trade account balance play a major role in the explaining the evolution of trade balance over time and proving that the BRICS trade account is not static. Therefore, a dynamic model needs to be estimated to accurately capture the empirical relationship of currency misalignments and external trade balance, hence LSDVC is the best optimal technique to be deployed for this study, (Aflouk. et al, 2010; Keviet, 1995).

#### **4. Empirical Results and Interpretation**

The empirical current account model was preceded by the Hausman test to ascertain the prevalence of fixed effects and/or random effects. The test results confirmed the dominance of fixed effects in the current account model formulated in section 3.2 above. This section of the paper will discuss the empirical findings and discuss what the findings mean for the BRICS economies under study. The below table (B) summarises all the econometric test results obtained from FGLS and LSDVC and it will be shown by the results that, contrary to IMF's approach, LSDVC is the better econometric technique to model the dynamic external trade balance evolution for the countries under review and the results are robust.

##### **Current Account Model and Significant determinants**

The universal effect part of the above table depicts the coefficients and significance levels of the various variables deployed in modelling the current account movement over time. As shown in the

methodology section, the trade account balance in BRICS is dynamic in nature and needs to be modelled using a dynamic process and this paper deployed the dynamic form of FGLS to estimate coefficients of the model and also performed LSDVC dynamic cross-sectional regression to obtain the coefficients and study the underlying relationship between currency misalignments and current account balance and this approach is consistent with the guidelines by Judson and Owen (1999) and Keviet (1995).

From the dynamic model estimated, the first lag of CA balance is highly significant (at 0.1% level), thus, providing overwhelming evidence to confirm the dynamic nature of BRICS trade balance position and both FGLS and LSDVC estimates reinforce this fact beyond reasonable doubt. The positive coefficient of 0.7 means that the current account realisations of the past period positively affect the trade account balances of the present period (by a factor of 0.7), holding everything else constant. Albeit the estimated coefficients of misalignment being positive from both models, the FGLS estimate is statistically insignificant even at 20% significance level, indicating the failure of FGLS to capture the empirical relationship. Considering this defect in FGLS, inferences about the empirical relationship between misalignments and current account cannot be drawn from the FGLS based model as it fails to account for model risk biases and these biases render the model highly deficient for empirical inferences. The other consequence of these biases is that almost all explanatory variables are rendered statistically insignificant, including currency misalignment which is the variable of consequence in this study, Edwards (1989).

**Table 2. Econometric Model Estimates under FGLS and LSDVC Framework**

Current Account Variables	Universal effects				Specific effects		Export Concentration Effects			
	Linear effect		Theshold Effect		Misalignment effects		Export Concentration		Misalignment & Export Concentration	
	FGLS	LSDVC	FGLS	LSDVC	FGLS	LSDVC	FGLS	LSDVC	FGLS	LSDVC
cal_bal.L(1)	0.7579***	0.7344***	0.7647***	0.7411***	0.7693***	0.7534***	0.7609***	0.7369***	0.7726***	0.7540***
mis	0.0129	0.0327***	0.1162	0.0283***	-	-	0.0941	0.1379*	0.0706	-
mis2	-	-	0.0015	0.0017***	-	-	-	-	-	-
overvaluation	-	-	-	-	0.00184	0.0019***	-	-	-	-
undervaluation	-	-	-	-	0.00154	0.0012	-	-	-	-
mis_excons	-	-	-	-	-	-	-0.6706	-0.8851*	-	-
underval_miscons	-	-	-	-	-	-	-	-	0.0619**	0.0146
overval_miscons	-	-	-	-	-	-	-	-	-0.0109	0.0159***
excons	-1.3061	5.3609	-1.3077	6.1331**	-1.7680	0.1406	-2.6924	6.6421	-	-
reer	3.3876***	-0.0427***	-0.0332***	-0.04471***	-0.0311***	-0.0315***	-0.0298***	0.0432***	-0.0328***	-0.0374***
fdi	-0.1053	-0.0670	-0.1046	-0.0928	-0.0993	-0.0669	-0.0785	-0.0601	-0.0865	-0.0949
popgrth	-0.3396	-1.1596***	-0.5582	-1.1913***	0.5543	-0.9874***	-0.3722	-1.055***	-0.5235	-0.9518***
govtexp	0.0776	-0.0774**	0.0768	-0.0809	0.0697	-0.0529***	0.0733	-0.0944	0.0829	-0.0472
totrade	0.0129*	-0.0259**	-0.0175	-0.0249	0.0165	-0.0226	-0.0176	-0.0251**	-0.0211	-0.0211**
topen	0.0049	-0.0264**	0.0041	-0.0272	0.0044	-0.0199	0.0059	-0.0276	0.0023	-0.0168
m2stock	-0.0014	-0.0101	-0.0019	-0.0118	-0.0017	-0.0097	-0.0011	-0.0118	-0.0017	-0.0098
lgdp_cap	0.1656	0.2113	.0651	0.3420	0.0465	0.2432	.0528	0.2782	0.0307*	0.3227
Constant	4.0260		4.1795		4.1481		3.7998			
Observations	104	104	104	104	104	104	104	104	104	104

NOTE: \*\*\*, \*\*, \* reflects variables that are statistically significant at 1%, 5% and 10% levels, respectively

On the contrary, the LSDVC estimate is significant at 0.1% level, thereby exuding the efficacy of the LSDVC based model to accurately capture the trade account evolution in BRICS countries and this efficiency arise from the fact that LSDVC estimates already corrected any potential biases, thus producing robust coefficient estimates and bootstrapped standard errors after correcting for cross sectional dependence and serial correlation in the panel, Judson and Owen (1999). In this version of the model, the fundamental factors that drive exchange rate misalignments in emerging markets (trade openness, export specialization or concentration and exchange rate) become significant in the LSDVC

based CA model and the listed variables emanate from empirical findings of Aflouk, Mazier and Saadaouui (2011). Therefore, the remainder of the paper will rely on the LSDVC coefficient estimates to draw inferences on the misalignments' effect on trade balance as well as to delineate on the interaction terms to establish the impact of export concentration on external account balance.

As depicted in the table above, empirical findings show that misalignments are favourable for the current account balance in the BRICS set of countries for the period 1990 to 2016. Based on the linear effects model, this empirical association means that a unit increase (decrease) in exchange rate misalignment will result in 0.0327-units increase (decrease) in external account balance, irrespective of whether it is an undervaluation or overvaluation episode, implying the both undervaluation and overvaluation have the same magnitude of effect on the external balances. The linear effect model implies a symmetric relationship, but empirical literature has shown that overvaluation degrades external trade balance more while undervaluation does not yield any current account benefits particularly for the developing markets, (Gnimassoun & Mignon, 2014; Gnimassoun, 2015 and Schroder, 2013). Given this empirical fact, assumption linearity is overly restrictive as it overstates the prospective benefits arising from currency devaluation while overstating the deterioration expected from exchange rate overvaluation.

To account for this reality, the threshold effect model was estimated, and the results confirmed overwhelming statistical evidence of non-linearity given that the coefficient of *mis*<sup>2</sup> (misalignments squared) is non-zero and positive, implying that there is an increasing threshold effect in the evolution of external trade balance of BRICS countries. This means that in BRICS, the current account balance is likely to improve (deteriorate) given an episode of misalignment (linear effect term) while the quadratic term proclaims a threshold limit (on REER misalignments) by which the external account balance will start deteriorating if the currency mismatch breaches that point of inflection after a period of improvement owing to real currency deviations from market clearing exchange rate.

By taking the derivative of CA (with respect to misalignments) where  $CA_i = 0.0283mis + 0.0017(mis^2)$  and set it equal to zero, it can be determined that current account balance for BRICS will start deteriorating when the misalignments exceed mispricing level of  $-8.34412$  (undervaluation by more than 8.344). The practical implication of this finding is that BRICS countries can proactively implement macroeconomic policy that ensure the currency undervaluation is kept within this limit and such policy will enhance the external trade balance owing to export competitiveness brought by REER mispricing in the global trade markets. Indeed, this result is achievable and empirical evidence of the

success stories of this policy initiative to enhance export competitiveness of the manufacturing sector for some developing markets is asserted by Noura, Plane and Sekkat (2011).

Having established the threshold effects (asymmetric upshot) in the BRICS external trade account model above and highlighting the plausible policy implications of the established empirical relationship, it is crucial to understand which direction of misalignment will have higher impact on the current account. The question to be answered is that, given the observed asymmetric nature of relationship, will overvaluation have higher (favourable/adverse) effect than undervaluation? This question is answered by the specific effects tab of table B. That is, the dynamic model was run again using the observed misalignments and strong evidence of positive effects of overvaluation is found from the empirical observations while support for benefits of undervaluation is deficient and conclusive inferences cannot be established from available factual data. That, in BRICS, overvaluation of the real exchange rate is favourable to the current account balance and this result is consistent with the findings of Zwedala (2013) who uncovered the existence of positive empirical relationship between misalignments and economic growth in South Africa, supporting findings of Barro (1991). Zwedala (2013) further argued that, while this empirical finding contradicts propositions in literature, it is an achievable and a reasonably common empirical outcome for export-driven economies, particularly in developing countries. Therefore, BRICS countries are likely to enhance external account position by experiencing episodes of real currency overvaluation, all else held constant.

The study of misalignments on BRICS's external trade account would not be complete without demystifying the impact that currency misalignments and export concentration jointly have on the current account. The export concentration index indicates the relative possibility of economic (trade) casualties given external shocks and it also captures the economic structure of the countries, (UNCTAD, 2018; Gnimassoun, 2017). The significance of export diversification is that it provides automatic cushion to absorb external trade shocks and withstand adversative currency movements while providing a room to exploit favourable currency fluctuations, (Gnimassoun, 2017; Gelb, 2011). To this end, the interaction variables of interest are export concentration index (*excons*) and misalignment given concentration (*miscons*) in the dynamic LSDVC model. The estimated coefficients show that *excons* is statistically insignificant, implying that export concentration is merely not beneficial nor detrimentally delinquent for BRICS economies – that is, there is no enough observable evidence to confirm that exports concentration alone degrades or progresses trade account balance.

However, when you consider the level of export concentration given an episode of exchange rate misalignment, then there is strong empirical evidence to validate that adversarial relationship exists between current account and export concentration when real currency mispricing episode occurs in BRICS and this finding agrees with the conclusion of Gnimassoun (2017) who reported adverse interaction in the CFA Zone. However, this interaction term relies on symmetric influence (ignores threshold effects) and aggregates the positive and negative shocks to the real exchange rate. Therefore, how we know which kind of misalignment will have more adverse effect on the external account.

In conclusion, the above question is answered by examining the specific effects of export concentration given that the observed episodes of undervaluation (*underval\_miscons*) and overvaluation (*overval\_miscons*), respectively. The robust estimated coefficients for concentration given undervaluation is statistically insignificant, meaning that the impact of export concentration during undervaluation episodes is zero, thus, does not affect current account balances. On the other hand, export concentration given overvaluation is non-zero and positive, signifying that overvaluation of real currency given export concentration is favourable towards external account balance for BRICS. This result is consistent with earlier findings, which contrary to other papers, reinforces that real currency overvaluation is favourable to BRICS countries. In summary, the exchange rate misalignments are favourable to the external current balance for BRICS and during episodes of real currency overvaluation, the external position benefits are amplified. However, the current account runs the risk of deterioration during times of high export concentration and concurrent phases of exchange rate undervaluation.

## **5. Conclusion and Closing Remarks**

This paper set out to study the influence of exchange rate misalignments on the current account balances in BRICS countries covering the period from 1990 to 2016 and make inferences on the empirical relations as well as macroeconomic policy implications of the observed empirical associations. The BEER model was deployed to forecast equilibrium exchange rate using the fundamental factors prescribed by literature. The Bayesian model selection technique was used to find optimal and significant fundamental factors to include in the BEER equation to derive the equilibrium exchange rate forecasts, from which currency misalignments vectors were derived by subtracting the observed real effective exchange rate. The currency misalignments were used as inputs into the dynamic current account model using the LSDVC framework to estimate the econometric relationships and found strong evidence of real currency misalignment episodes over this period. The dynamic



empirical model also concluded that the relationship is not only positive but also asymmetric in nature, signifying the prevalence of threshold effects of misalignments on trade account. Any type of exchange rate misalignments is found to be generally favourable for the external trade account in the BRICS community and the observed relationship is positive and asymmetrical, exhibiting positive threshold effect.

Last but surely not least, the interaction between misalignments and export concentration reveal current account is at risk of deterioration given high export concentration and a concurrent phase of exchange rate undervaluation. On the contrary, this paper found that episodes of real currency overvaluation are associated with significant advancements in the external account position for BRICS countries, thus signifying the critical standing of the study of currency misalignments in BRICS countries and prevalence of misalignment dividends. The empirical findings of this study advocate for the use of real effective exchange rate as an effective macroeconomic policy instrument to enhance relative export competitiveness and these findings confirm the propositions from theoretical and empirical literature on currency misalignments. Therefore, it is implied that BRICS countries can deploy a policy that ensures relative overvaluation of the currency to relish overvaluation dividends on the current account and this dividend increases given the export concentration levels. Further studies in this area should examine the impact of marginal propensity to import and how each country's propensity to import affects the current balance given episodes of overvaluation and undervaluation

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