The Endogeneity of Business Cycle Synchronisation in SADC: A GMM Approach

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Abstract: Studies often conclude that in SADC would be disastrous and not optimal for all member countries. This is because of the observed low, and even negative correlation amongst member countries. However, Frankel and Rose (1998) demonstrate that the degree of synchronisation is not irrevocably fixed and is endogenous to other factors. Hence, this study is set out to investigate factors influencing business cycle synchronisation in the SADC region. More precisely, we use a generalised method of moments (GMM) to investigate the influence of trade integration, financial integration, fiscal policy convergence, monetary policy similarity and oil prices (a proxy for global common shocks) on the degree of business cycle synchronisation. To conduct our analysis, we data covering the period of 1980-2014, we use bilateral data due to unavailability of regional aggragates. We find trade, fiscal policy convergence and monetary policy similarity to have a sanguine impact on the degree of synchronisation. Moreover, owing to their procyclical behavior, financial flows lead to diverging business cycles. In addition, we find oil prices to exert a negative impact on business cycle comovement in the SADC region. Our results have far-reaching policy implications for the proposed SADC monetary union- by stimulating trade, ensuring coherence in macroeconomic policies SADC could move closer to becoming an optimal currency area.

Keywords: SADC monetary union; financial integration; fiscal policy convergence; monetary policy

JEL Classification: E00

1. Introduction

Region-wide fixed exchange rate regime, or monetary union entails a loss monetary policy tools to deal with economic disturbances at a country-level. Therefore, for countries whose business cycles are significantly driven by idiosyncratic factors, using a common monetary policy or establishing a monetary union will be costly and not optimal for all member countries. Hence, to alleviate costs associated with the loss of monetary policy tools, the theory of optimal currency areas (OCA), amongst

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other things, put business cycle synchronicity as a necessary requirement. As a consequence, in a monetary union environment business cycle synchronisation has been extensively studied. In addition, business cycle synchronicity has been applied as an instrument to gauge the suitability of a monetary union in the Euro Area, East Asia, Eastern and Western parts of Africa, and most importantly, in Southern Africa.

Relying on historical data, enormous amount of studies suggests that adoption of a common monetary policy in SADC would disastrous, and would lead to macroeconomic instabilities across the region. This is because historical data uncover insufficient degree of business cycle comovement in SADC, and alternative adjustment mechanisms suggested by the OCA such as labour mobility, nominal flexibilities are absent.

Drawing from the famous Lucas critique, Frankel & Rose (1998) critique the view that business cycle synchronization is a precondition for adopting a common monetary policy. They argue that historical data may be misleading and business cycle synchronicity is not irrevocably fixed, and is not exogenous. If this thesis holds, business cycle synchronisation could be an *ex post* rather than an *ex ante* phenomena. This notion is owing to the view that introducing a single currency reduces transaction costs, and exchange rate uncertainty and therefore, stimulate trade which in turn reinforces business cycle comovement (Gouveia & Correia, 2013). Consistent with this view, Rose (2000) demonstrate that countries sharing a single currency tend to trade more with each other, and are more synchronized vis-à-vis countries not sharing the same currency. Likewise, Barro & Tenreyro (2007) reveals that adopting a single currency tend to fuel trade. Moreover, Rose & Van Wincoop (2001) argue that indeed, using a single currency tend to boost trade; therefore, international currencies (*multiple currencies*) appear to be a significant impediment for trade.

As mentioned earlier, that the literature on the degree of business cycle synchronisation in SADC often concludes that based on weaker business cycle alignment common monetary policy in SADC would not be optimal[1]. However, neither of these studies attempts to uncover factors which could explain the underlying levels of synchronisation, nor they suggest solutions to the observed low levels of synchronisation. Therefore, in this study we set out to investigate factors influencing business cycle comovement in SADC. Identification of factors explaining comovement in SADC is essential for a number of reasons. Firstly, it equip policy makers with crucial knowledge to develop structural policies that will improve efficiency, and allow the application of a common monetary policy. Secondly, if business cycles are driven by peripheral factors such as trade, internal policies intended to stabilize the economy would have negligible impact on output

[1] See (Kabundi & Loots, 2007; Tipoy, 2015, Zerihun & Breitenbach, 2014; Nzimande & Ngalawa, 2016)

growth, thus necessitating for economic policy coordination. Therefore, deeper knowledge about factors through which business cycles are transmitted is warranted, and has far-reaching policy implications. Moreover, knowledge of the factors influencing business cycle comovement would assist SADC monetary union aspirants trying to determine the best timing to adopt a single currency, and whether such move would fast-track their convergence process (Vieira & Vieira, 2012).

This paper is organize as follows. The next section reviews the literature on factors explaining business cycle comovement. Section 3 describes data and empirical framework applied to conduct the analysis. Results and discussion are presented in section 4, whereas final section concludes and identifies scope for further research.

2. Literature Review

Why some countries are synchronized, and others are not? What could possible explain the observed low levels of business cycle synchronisation in SADC? The ability to answer these questions will contribute toward the development of structural policies that mitigate the adverse impact associated with the use of a single monetary policy. This section therefore, concisely reviews literature on the determinants of business cycle comovement.

A number of potential determinants of business cycle synchronisation, such as trade, currency union membership and industrial similarity, amongst others, have been identified[1]. However, industrial similarity and currency union membership are generally found not to be robust estimators of synchronisation, thus they are excluded from our analysis (Furceri & Karras, 2008; De Haan et al., 2008; Clark & Van Wincoop, 2001; Cerqueira & martins, 2009; Baxter & Kouparitsas, 2005 amongst others). In addition, required data to compute industrial similarity is hardly available in SADC, therefore, one extra reasons not exclude it from our analysis.

Trade is argued to play an integral role in explaining business cycle similarity; it ensures quick propagation of shocks across countries (Frankel & Rose, 1998; Faia, 2007; Gouveia & Correia, 2013; Barro & Tenreyro, 2007, amongst others). However, both empirical theoretical models and empirical evidence suggests an ambiguous link between trade and business cycle synchronicity.

There is a belief that trade intensification could results to asynchronous business cycles. Classical models of trade demonstrates that intensification of trade would result to specialisation as countries attempt to exploit comparative advantage (Krugman, 1993; Kenen, 1969). Since countries are specialized sector specific shocks will be translated to country-specific shocks, thus resulting to diverging

[1] See (Artis & Zhang, 1999).

business cycles. Consistent with this prediction, Crosby (2003) find that trade have adverse impact on business cycle synchronicity in Asia-Pacific countries.

On one hand, Backus *et al.*, (1993) argue that trade will result to strengthened business cycle comovement. A shock hitting a particular economy will be transmitted, through demand linkages, to its trading partners. Hence, countries which trade more with each other tend to be more synchronized that countries that trade less with each other (Di Giovanni & Levchenko, 2010). In line with this view, Frankel & Rose (1998) find that trade has a sanguine impact on business cycle synchronisation. In addition, they conclude that the theory of OCA is not exogenous, and business cycle synchronisation should not deter countries from establishing a monetary union. This is because, establishing a monetary union would result to a reduction in transaction costs etc. thus stimulating trade. Rose & Angel (2000) accord with this view, they demonstrate that countries using in a currency union tend to trade more with each other, than countries which are not in a union. There is a large strand of the literature showing a positive relationship between trade, and business cycle comovement, (Clark & Van Wincoop, 2001; Furceri & Karras, 2008, amongst others).

Contrast to both views about the impact of trade on business cycle synchronisation, Otto *et al.*, (2001) questions the importance of trade in explaining business cycle comovement. They argue that Australia trades more with Japan than with United States; yet, it business cycle is strongly correlated with that of United States vis-à-vis Japanese business cycle. This is consistent with Dellas (1986) he demonstrate that trade linkages plays little role in explaining business cycle comovement, and he argues that interdependencies are rather explained by common shocks.

The other channel which in the literature is argued to have positive impact on business cycle comovement is monetary policy[1]. Although number of studies found monetary policy similarity to have positive impact on business cycle synchronicity; its impact on business cycles is still unsettled. Otto et al., (2001) find that great volatility in interest rate differential has a negative impact on business cycle synchronicity. Whereas, Clark and Van Wincoop (1999) find that monetary policy similarity has no significant impact on business cycle comovement. Schiavo (2008) find that monetary policy similarity has an indirect impact on business cycle comovement. Thus, the endogeneity of business cycle synchronisation does not suggest that by joining a monetary union countries will become more synchronized, but rather, the prospective increase in trade and financial linkages induced by the use of a common currency will have a positive influence on business cycle comovement.

Following the establishment of the European Union, the impact of financial integration received enormous interest from both scholars, and policy makers around

[1] See (Frankel & Rose, 1998 for discussion).

the globe. However, regarding financial integration Southern Africa has been neglected as an area of study. Financial integration is expected to promptly increase in Southern Africa due to the envisaged economic integration, and the proposed introduction of Southern Africa single currency in 2018. Hence, understanding economic consequences of deeper financial integration is warranted.

Given that country-specific shocks can no longer be dealt with by maneuvering monetary policy tools, since monetary policy tools are dedicated to addressing union wide disturbances. Given the lack of independent monetary policy response, asymmetric disturbances may induce welfare loses, and threatens the stability of a monetary union, unless, risk sharing mechanisms are in place, and one of the mechanism through which risk are shared is financial integration.

Financial integration is integral for the functioning of a monetary union because it allows agents to exploit "risk sharing" mechanisms thus resulting to synchronisation of business cycles (Cerqueira & martins, 2009). For example, Balli *et al.*, (2011) argue that monetary policy in a monetary union may fail to deal with asymmetric disturbances, so financial integration permit consumers to borrow from countries experiencing booms, and therefore synchronizing cycles. Kose *et al*., (2003) also argue that stronger financial linkages could reinforce business cycle synchronisation through demand linkages. Similar conclusions are reached by Imbs (2001; 2006). Consistent with these studies, Jansen and Stockman (2004) demonstrate that financial integration results to stronger business cycle comovement across countries. Moreover, Kose *et al*., (2008a; 2008b) show that financial linkages stimulate business cycle synchronisation.

On the other hand risk sharing encourages industrial specialisation, thus resulting to asymmetric shocks which in turn result to asynchronous business cycle. This has been demonstrated, amongst others, by Kalemli-Ozcan (2003) and Obstfeld (1994). Moreover, Backus *et al*., (1992) argue that the behavior of financial flows is procyclical. For example, assume that there two countries in the world, X and Y, and X experiences a positive technological shocks; agents will pull their capital from country Y to country X where marginal product of capital and labour has increased. Therefore, the procyclicality behavior of financial flows will results to diverging business cycles. In line with these studies Garcia-Herrero and Ruiz (2008) show that intensified financial integration leads to asymmetric business cycles. Heathcote and Perri (2004) reach similar conclusions that financial integration leads to diverging business cycles.

Fiscal policy discipline or convergence is identified as another important channel through which business cycles are synchronized. However, a plethora of economists treat fiscal policy convergence with cynicism, because it has little or nothing to do with the traditional theory of optimal currency areas. In addition, there is no existing theory linking fiscal policy convergence with business cycle comovements (Darvas

et al., 2005). Despite the lack of theoretical connection between business cycle comovement and fiscal policy convergence, it is relatively easier to build an instinctive link between the two. Countries which are ill-disciplined in their fiscal policy conduct i.e. countries that run high budget deficits, generate individual fiscal policy shocks thus resulting to diverging business cycles. Thus, in envisaged, and or already established unions, fiscal policy should be counter-cyclical as opposed to procyclical (Gavin & Perrott, 1997; Brender & Drazen, 2004). Simply put, in the absence of idiosyncratic shocks which would otherwise lead to divergent business cycles, the use of fiscal policy would be irresponsible. Consistent with this, Fatás and Mihov (2003) argue that aggressive use of fiscal policy is associated with macroeconomic instabilities, and impede economic growth. Similarly, Badinger (2009) show that discretional use of fiscal policy results to significant and ample output volatility. Rodden and Wibbels (2010) accord with the view that fiscal policy should rather be counter-cyclical. In addition, fiscal policy in a monetary union should be centralized, and centralized fiscal policy provides insurance (in terms of fiscal transfers) against adverse shocks hitting a particular economy in a union[1]. Furthermore, Fatás and Mihov (2003) argue that fiscal policy restrictions would lower macroeconomic volatilities. However, on the other hand fiscal policy restrictions are argued to limit fiscal policy action when it is needed the most (i.e. in the presence of shocks which would otherwise lead to diverging business cycles). In addition, fiscal policy restrictions may exacerbate economic fluctuations since they disregard cyclical conditions (Levinson, 1998). For example, in the case of Europe they argue that rules will worsen recessions, since countries will be tempted to apply procyclical fiscal policy when cyclical downturns increase deficits towards the Stability and Growth Pact (SGP) cap (Lane, 2003 and Alt and Lowry, 1994).

3. Methodology and Data

3.1. Econometric Framework

Longitudinal data methods have become increasingly popular in the past few decades and are now the most used tools in contemporary econometrics, both in microeconomics and macroeconomics (Hsiao, 2005). The increasing popularity of panel data techniques is owing to a number of factors, predominantly because they allow practitioners to exploit two dimensions of the data: a cross-sectional dimension and a time series dimension (Hsiao, 2005).

Consider the following simple linear dynamic panel model:

$$y_{it} = y_{it-1} + X_{it}\beta + \mu_i + \epsilon_{it} \qquad (1)$$

[1] See (Spahn, 1997).

$$\epsilon_{it} = \mu_i + \varepsilon_{it} \quad (2)$$

Where $i = 1,2 \dots \dots, N$, $t = 1,2 \dots \dots, T$, X' is a $(1 \times K)$ vector of regressors, β is a $(K \times 1)$ vector of coefficients to be estimated, μ_i represents an individual fixed effects, capturing individual differences, andε_{it} denote individual error term. We assume $\mu_i$and $\varepsilon_{it}$to be i. i. d. with $(0, \sigma^2)$. Moreover, we assume that are exogenous to each other. Therefore,

$$E[\omega_{it}] = [\tau_{it}] = [\omega_{it}, \tau_{it}] = 0 \quad (3)$$

The introduction of the lagged endogenous variable introduces a *dynamic panel bias* because μ_i and y_{it-1} are correlated. Because y_{it} is a function of μ_i which is time-invariant, it must also be true that y_{it-1} is a function of μ_i. Therefore, one of the regressors is correlated with one component of the error term, thus giving rise to the problem of endogeneity.

Hence, application of the ordinary least squares (OLS) in equation (1) will yield inconsistent and upward biased estimates, because $E[y_{it-1}, \epsilon_{it}] > 0$, therefore, β_1 will be overestimated (Blundell & Bond, 2000). To tackle endogeneity bias the literature suggests two remedies which could be applied simultaneously or successively. First, one can eliminate time-invariant effect by through data transformation such as first differencing. Secondly, by searching for valid instruments of the lagged endogenous variable (Mairesse & Hall, 1996).

For simplicity we reduce equation one to only include one explanatory variable,

$$y_{it} = \beta_1 y_{it-1} + \epsilon_{it} \quad (4)$$

To remove the time-invariant component of the error term which is correlated with the explanatory variable, equation (4) is subtracted from equation (3);

$$y_{it-1} = \beta_1 y_{it-2} + \epsilon_{it-1} \quad (5)$$

Resulting to equation (5)

$$\Delta y_{it} = \beta_1 \Delta y_{it-1} + \Delta \varepsilon_{it} \quad (6)$$

Where $\Delta = (1 - L)$ is a first difference operator. In other words, we get the transformation by multiplying equation (2) by $I_N \otimes D$, where I_N is an identity matrix of dimension N snd D is a $T - 1) \times T$ matrix[1];

$$\begin{pmatrix} -1 & 1 & 0 & \dots & 0 & 0 \\ 0 & -1 & 1 & \dots & 0 & 0 \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ 0 & 0 & 0 & 0 & -1 & 0 \end{pmatrix} \quad (7)$$

[1] See Arellano (2003) for more discussion.

Although first differencing $(T-1)$ takes care of the individual time-invariant effect, its results to the loss of the degrees of freedom, since its drops T initial observations which could have severe ramification for an unbalanced panel (Griliches & Mairesse, 1998). The transformation, the first difference estimator is the OLS estimator of the equation (6) that is

$$\hat{\beta} = \left\{\sum_{i=1}^{N}(DX_i)'DX_i\right\}^{-1}\sum_{i=1}^{N}(DX_i)'Dy_i \qquad (8)$$

Owing to the assumption that $\tau_{it}\sim$i. i. d. $(0,\sigma_\tau^2)$, the first difference estimator is inconsistent since the transformation (i.e. the first differencing) prompts a $MA(1)$ process for the $\Delta\tau_{it}$. This issue calls for a generalised least squares (GLS) (see, Arellano, 2003). Moreover, as shown in Arellano (2003) the optimal GLS estimator is the within-Group estimator which takes the following form;

$$\hat{\beta}_{WG} = \left(\sum_{i=1}^{N}X_i'D'(DD')^{-1}DX_i\right)^{-1}\left(\sum_{i=1}^{N}X_i'D'(DD')^{-1}Dy_i\right) \qquad (9)$$

In line with Arellano (2003) Q matrix is defined as the "*deviations-from-time-means*" because it alters y_{it} series into deviations from time averages $\bar{y}_i = Qy_i$, whose elements are $\bar{y}_{it} = y_{it} - \bar{y}_i$. Q Matrix is shown to be:

$$Q \equiv D'(DD')^{-1}D \qquad (10)$$

Again, the within group estimator successfully get rid of the individual fixed effect, however, it fails to fix the dynamic panel bias. Therefore, yields inconsistent estimates (Nickell, 1981).

Given their failure, pooled OLS, the first difference estimator and within group estimator, to resolve the issue of dynamic panel bias, an alternative tool to deal with the challenge is warranted.

Instrumental variable estimators are amongst alternative models used to deal with the issue of dynamic panel bias (Anderson & Hsiao, 1981; 1982 amongst others). The instrumental variable approach is usually preferred over the maximum likelihood of Hsiao (2003), on the grounds that maximum likelihood (ML) requires that assumptions about initial conditions be made, and that they must be correctly specified, otherwise, ML estimator would be inconsistent. Although the estimators of Anderson and Hsiao successfully identify the model, they are not necessarily efficient because they do not exploit all instruments available[1].

[1] See for a lengthy discussion.

The panel data generalised method of moments[1] (GMM) circumvent most, if not all issues faced by other estimators. Through exploitation of a set of meaningful set of instruments, for each instrument, GMM permits the use of all available instruments. Arellano and Bond (1991) suggest the use of all available lags each period in time as instruments for first-differenced lagged endogenous variable in equation (5)[2]. The Arellano & Bond (1991) estimator is known as the difference GMM estimator. The Arellano &Bond (1991) first difference estimator is given by:

$$\hat{\beta}_{GMM\,diff} = \left((\Delta \mathrm{y}'_{-1}\mathrm{Z_d})W_N(Z_d'\Delta y_{-1})^{-1}(\Delta y_{-1}Z_d)W_N(Z_d'\Delta y\right) \qquad (11)$$

Where $\Delta y_i = (\Delta y_{i3}, \Delta y_{i4}, \dots, \Delta y_{iT})'$, Δy_{-1} is vector which includes the first lag of Δy_i, $Z'\Delta y = \sum_{i=1}^{N} Z_{di}, y_i$, W_N is an optimal weighting matrix and Z_d is an instrument matrix for i^{th}individual which has $T-2$ rows with non-negative element and $(T-2)(T-1)/2$ columns. The difference GMM estimator of Arellano & Bond (1991) is consistent for $T \to \infty$, $N \to \infty$ and also for fixed T.

Although, the first difference GMM estimator performs better than other panel techniques[3], it is however not without hitches. More precisely, when the lags of dependent variable are weakly correlated with dependent first differences in the following period, first difference GMM (FDGMM) is argued to suffer from finite sample bias (Blundell & Bond, 1998).

The drawbacks of the Arellano & Bond (1991) estimator gave birth to the systems GMM of Blundell & Bond (1998). The systems GMM formulate supplementary orthogonality conditions that make more valid instruments accessible and efficiency gains. In addition to the use of lagged levels of y_{it} as instruments for the first differences equations, system GMM estimator (SGMM) uses the lagged first-difference Δy_{it-1} of y_{it} as instruments for equation (1) in levels. Therefore, the resulting SGMM estimator is given:

$$\hat{\beta}_{iGMM\,s} = \left(q'_{-1}Z_{sW_N}z'_{sq_{-1}}\right)^{-1}(q'_{-1}Z_sW_NZ_sq_i) \qquad (12)$$

Where $q_i = (\Delta y_i', y_i')$ and Z_s is full instrument matrix. The SGMM is proved to be more efficient relative to FDGMM estimator, especially as $\beta \to 1$.

In light of the issues associated with dynamic panel data and other dynamic panel data estimators such as FD and the within group, this study employs systems GMM to estimate factors influencing business cycle comovement in SADC. A plethora of studies have used similar equation to estimate factors influencing business cycle synchronisation and thus variables employed in the study are adopted from various

[1] Initially developed by Hansen (1982); Hansen and Singleton (1982).
[2] Holtz-Eakin, Newey & Rosen (1988) also suggest the same thing.
[3] See (Bond, Hoeffler & Temple, 2001; Blundell & Bond, 1998).

studies (Lee & Azali, 2010; Cerqueira & Martins, 2009; Clark & Wincoop, 2001; Darvas et al., 2005 amongst others).

$$Y_{ikt,t} = \alpha_0 + \alpha_1 Y_{ik,t-1} + \alpha_3 TI_{ik,t} + \alpha_4 FI_{ik,t} + \alpha_5 FP_{ik,t} + \alpha_6 MPS_{ik,t} + \alpha_7 OP_{ik,t} + e_{ik,t} \quad (13)$$

Where $Y_{it,t}$ is business cycle correlation index between country i and k, $TI_{ik,t}$ denotes trade intensity, $FI_{ik,t}$ is the degree of financial integration, $FP_{ik,t}$ represents fiscal policy convergence, $MPS_{ik,t}$ is monetary policy similarity, $OP_{ik,t}$ is are oil prices which represent exogenous common shocks, and $e_{ik,t}$ is the error term.

3.2. Data Sources

We use a panel data covering the period of 1980-2014 which is collected from various sources. Nominal oil prices are collected from IMF world economic indicators, and converted into real oil prices using world GDP deflator collected from IMF world economic indicators database. Data on financial flows, inflation rates, and government deficit/surplus were collected from World Development Indicators, and data on bilateral trade is collected from CEPPII database.

3.3. Construction of Variables

Real Oil Prices: in line with existing studies, we use real oil prices as measure for global exogenous shocks[1].

Business cycle synchronisation index:

To construct business cycle index we follow Kalemli-Ozcan (2009) and Gionnone et al., (2009), they construct the index of business cycle comovement as negative absolute differences in real GDP between country i and j. Thus, we have a total of $N(N-1)/2$, bilateral correlations.

$$BS_{ijt} = -\left|(lnGDP_{it} - lnGDP_{it-1}) - (lnGDP_{jt} - lnGDP_{jt-1})\right| \quad (14)$$

Fiscal Policy Convergence:

$$FC_{ijt} = \left|\frac{Govtspend_{it}}{GDP_{it}} - \frac{Govtspend_{jt}}{GDP_{jt}}\right| \quad (15)$$

[1] See (Moneta & Ruffer, 2009; Kutu & Ngalawa, 2016, amongst others)

To measure fiscal policy convergence, we follow Darvas *et al*., (2005), they measure convergence as absolute differences in government budget deficit/surplus between the two countries in question as a share of GDP.

Monetary Policy Similarity:

$$MPS_{ijt} = \left|\pi_{it} - \pi_{jt}\right| \quad (16)$$

Monetary policy similarity is measured as absolute differences in inflation rate between country i and j.

Financial Integration:

- *De facto financial Integration*:

$$FI_{jkt} = \left[\left(\frac{CF_{jt}}{GDP_{jt}}\right) + \left(\frac{CF_{kt}}{GDP_{kt}}\right)\right] \quad (18)$$

De facto financial integration is measured as a sum of financial flows (outflows and inflows) between the countries of interest weighted by the sum of their GDP's.

Trade Integration:

$$Trade_{Intense} = \frac{\sum\left(\left(X_{ijt} + M_{ijt}\right) + \left(X_{jit} + M_{jit}\right)\right)}{\sum(Y_{it} + Y_{jt})} \quad (18)$$

Trade intensity is measured as a sum of exports and imports between the two countries in consideration weighted by the sum of their GDP's.

4. Results and Discussion

To address potential problems of endogeneity, we employ the Blundell and Bond (1998) generalized method of moments. This section therefore presents result from GMM regressions.

In line with Frankel and Rose (1998), Clark and Van Wincoop (2001), Imbs (2006) and Cerqueira and Martins (2009) our results suggest that trade countries with greater bilateral trade relations tend to have greater synchronisation of their business cycles. This implies that removal of trade restrictions will result to higher degree of

synchronisation since increased levels of trade will permit easy transmission of demand shocks across countries. Contrast to Kose et al., (2003) who find that the positive link between trade and business cycle comovement is limited only to industrial countries, we demonstrate that the relationship holds even in developing countries[1].

Table 1. Systems GMM: Factors Influencing Business Cycle Synchronisation

Lagged Dependent Var.	0.367***	0.324***	0.381***	0.377***	0.341***
	(0.013)	(0.013)	(0.011)	(0.009)	(0.027)
Trade intensity	0.224***	0.219***	0.160***	0.102*	0.079**
	(0.032)	(0.348)	(0.056)	(0.053)	(0.0 63)
De facto financial integration		-0.383***	-0.291***	-0.668***	-0.753***
		(0.058)	(0.071)	(0.135)	(0.098)
Mon. pol. Similarity			0.016	0.049***	0.055**
			(0.023)	(0.016)	(0.023)
Fisc. pol convergence				0.624***	0.455**
				(0.145)	(0.185)
Oil Prices					-0,506***
					(0.212)
Arellano-Bond test for AR(1)	-4.98	-4.38	-4.15	-4.32	-4.24
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Arellano-Bond test for AR(2)	1.26	1.38	1.56	1.88	1.60
	[0.206]	[0.168]	[0.118]	[0.601]	[0.109]
Hansen Test	65.83	59.98	54.95	56.54	54.76
	[1.000]	[1.000]	[1.000]	[1.000]	[1.000]

*, **, *** represents 1%, 5% & 10% levels of significance

In round brackets are standard errors, and in square brackets are p-values for corresponding tests

Our findings imply that SADC must strive to strengthen trade ties amongst member countries. Indeed, initiatives to reinforce trade relations in SADC are place. For example, SADC free trade area was established in 2000. However, countries like Democratic Republic of Congo and Seychelles are not part of the free trade area. If countries which remain outside the free trade area could join, the scope of intra-SADC trade could be expanded and thus reinforcing business cycle comovement.

[1] See also (Calderon et al., 2007).

In addition, our results have far reaching implications for the proposed SADC monetary union. As argued by Frankel and Rose (1998) and Shin and Wang (2003) if trade exerts positive influence on business cycle comovement, then even if a country that is not suitable *ex ante* to join a monetary union, it can be justified *ex post* due to the resulting business cycle coherence.

Contrary to Imbs (2004) and Kose *et al.*, (2003) who find that financial integrated countries tend to be highly synchronized. Our findings suggest that financial integration results to diverging business cycles in SADC. This is in line with the predictions of risk sharing theory, which suggests that financial integration results to higher production specialisation; and therefore, induce industry-specific shocks which translates to country-specific shocks thus asymmetric business cycles[1] (In addition, we argue that the behavior of financial flow is procyclical, such that agents tend to pull their investment from countries experiencing downturns, to countries experiencing booms. Simply put, better performing economies tend to attract more financial inflows; therefore, resulting to decoupling business cycles (Backus et al., 1992).

Contrary to Moneta and Ruffer (2009) we find that real oil prices have a decoupling effect on business cycles across the region. Simply put, our findings suggest that oil prices shocks lead to asynchronous business cycles. We argue that the desynchronizing effect of oil prices can be attributed to the fact that some countries in the SADC region are net oil exporters, and others are net oil importers. Real oil price shocks have different impact on business cycles across countries, depending on whether a country is a net oil exporter, or net oil importer. Indeed, studies examining the relationship between oil prices, and economic activity suggests that the response differs depending on whether a country imports or exports oil[2]. In addition, based on this finding, we argue that the view that global common shocks results to symmetric business cycle may not necessarily be the case. Common shocks will have coupling impact, if and only if, economies share a common economic structures.

Our findings suggest that monetary policy similarity has a positive and statistically significant impact on business cycle comovement. Our results are consistent with existing literature (see Frankel and Rose, 1998 and Otto *et al*., 2001 amongst others). These findings have far reaching policy implications for SADC region. They suggest that monetary policy coordination

Although there are no established theoretical linkages between business cycle comovement, and fiscal convergence, empirical studies have suggested a positive link between the two variables (Artis *et al.*, 2008). Indeed, our results suggest that

[1] See (Kalemli-Ozcan et al., 2001; Kalemli-Ozcan et al., 2004; Cerqueira & Martins, 2009).
[2] See (Jimenez-Rodriguez & Sanchez, 2005; Nzimande & Msomi, 2016; Hamilton, 1983; Cunado & de Gracia, 2005; Lardic & Mignon, 2008).

there is a positive association between fiscal policy convergence and business cycle synchronisation in SADC. These findings are consistent with those of Darvas *et al.*, (2005) and Artis *et al.*, (2008). This finding is in line with the view that in a monetary union fiscal policy must be countercyclical, rather than being 'procyclical' (see Fatás and Mihov, 2004). In addition, Carmignani and Laurenceson (2013) argue that coordination of fiscal policies could result to synchronized business cycles. Therefore, we suggest that fiscal policy restrictions be imposed across SADC member countries, and policies must be coordinated. Overall, our findings show that the SADC convergence criteria should give rise to further coupling effect because of convergent fiscal policies (Anoruo & Ahmad, 2013).

5. Concluding Remarks

We assessed the relationship between trade intensity, financial integration, fiscal policy convergence, monetary policy similarity, oil prices and business cycle synchronisation in SADC member countries, over the period of 1994-2014. In line with Frankel and Rose (1998) we confirm that business cycle comovement is endogenous, and thus the observed lower levels of synchronisation in SADC are not irrevocably fixed. Contrast to Krugman (1993) we find that intensifying trade results to more synchronous business cycles. In addition, all other variables, with exception of oil prices, and financial integration have positive impact on business cycle synchronisation. The adverse effect of financial integration on business cycles is in line with the predictions of 'risk sharing' theory. The risk sharing theory suggests that financial integration will induce industrial specialisation across the regions or countries and thus leading to asymmetric shocks- thus decoupling business cycle. Furthermore, the negative influence of financial integration on business cycle synchronisation could be explained by the procyclical behavior of financial movements. With regards to oil prices, we argue that their decoupling effect could be explained by the fact that some countries in the region are net oil exporters while others are net oil importers; thus oil price shocks have different impact- depending on whether a country is a net importer, or exporter of oil. Furthermore, we show that fiscal policy convergence and monetary policy similarity have a business impact on business cycle comovement. Thus, the SADC convergence criteria should give rise to increased synchronisation due to convergent fiscal policies, and similar monetary policies.

Overall, we conclude that indeed business cycle synchronisation is not irrevocably fixed, and is endogenous (De Grauwe and Mongelli, 2005). Thus, consistent with Flandreau and Maurel (2005) we recommend a fast establishment of SADC monetary union relatively independent of the attained degree of business cycle synchronicity. In addition, number of studies have shown that monetary union could

be established even if countries are not synchronized *ex ante* they can get more synchronized *ex post*[1].

6. References

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[1] See (Frankel & Rose, 1997; Artis & Zhang, 1997; Fatás, 1997, amongst others).

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