Determinants of tax revenue performance in the Southern African Development Community (SADC)

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Abstract

This paper investigates the determinants of tax revenue performance in all 15 Southern African Development Community countries during 1990-2010, using panel data. The investigation makes use of two estimation techniques in testing for country specificity. These are the least squares dummy variables fixed effects and the feasible generalised least squares by Park (1967) and Kmenta (1986). The extreme-bound analysis technique is also used in delineating the various causal relationships (including a sensitivity analysis). Prior to the estimation process, the study tested and controlled for applicable errors in the panel such as endogeneity, serial correlation, cross-sectional dependence of the error term, group-wise heteroscedasticity and contemporaneous correlation. The process addressed some major critique of panel data estimations involving large and small economies in a regional grouping like the SADC. The paper also introduces a value added tax harmonisation variable (and additionally made use of the corporate income tax harmonisation variables) through a tax policy harmonisation measure in investigating the impact of foreign direct investment and taxation on tax revenue collected. The results generally highlight the robust role of taxation (tax rates and tax policy harmonisation variables) (alongside other important determinants)

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in improving tax revenue in the region, providing empirical support for extant anecdotal evidence. The final empirical findings also confirm the importance of FDI inflows towards tax revenue collected in the SADC and the existence of reverse causality (that is, a causal relationship between FDI and taxation or vice versa). Policy considerations include the need for SADC countries to carry out extensive pro-regional (coordinated) tax reforms, create a regional tax forum and promote initiatives aimed at improving FDI and ultimately tax revenue (as per existing regional protocols).

JEL Classification: E60; F15; H11 H20; H71

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1 Introduction

Taxation has been a topic of discussion for decades in the global arena as countries strive to maximise tax revenue collection in order to raise the revenue needed for economic development without eroding the tax base. Anecdotal evidence from different countries globally (including African countries) shows that most countries rely on FDI and taxation (effective tax rates and tax policy) to boost tax revenue collection (Deloitte and Touché, 2013). However, anecdotal evidence also indicates that half or more of the taxes that could be collected remain uncollected and/or unaccounted for, due to a combination of tax incentives, tax inversion, tax evasion and avoidance, tax exemptions and corruption in general (Fuest and Riedel 2009). Consequently African countries (including Southern African Development Community (SADC[1]) countries) have been considering additional robust means of mobilising tax revenue[2] (as part of a broader Domestic Resource Mobilisation (DRM) initiative[3]) in order to collectively meet revenue targets. This is

[1]The SADC consists of Angola, Botswana, DR Congo, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe (SADC, 2011).

[2]Tax revenues in Africa have been positively trending (2001-2013), strongly complementing total external flows as an additional source of finance. However, there's still a need to improve on revenue especially as most Sub-Saharan African (SSA) countries (including some SADC countries), collect tax revenues at levels below 20% of GDP (AEO, 2013; 2015). The recommendation is that the SADC countries raise their tax-to-GDP ratios by roughly four percentage points if they intend to meet the UN's development goals and other developmental imperatives by 2030 (UN, 2012).

[3]This includes increasing and enhancing domestic savings (both private domestic and public savings), improving financial sector performance, and also enhancing public sector revenue collection and expenditure (including tax reforms) (UN, 2012).

in line with the general agenda of enhanced fiscal policy coordination on the continent (African Economic Outlook (AEO) 2013).

Efficient means of taxation could help improve the governments' revenue positions, reduce public sector borrowing requirement (PSBR), reduce dependency on aid, reduce over-reliance on commodity exports and increase countries' ownership of their development agenda (AEO, 2013). Moreover, better tax management and revenue mobilisation could improve on tax revenue performance and reinforce the relationship amongst state-citizenry, including the private sector and civil society. Also, there is increased confidence in the government's ability to use tax revenue sparingly to provide basic services, providing a strong basis for trust in the government, leading to more tax compliance. This is often referred to as the fiscal exchange proposition or the *quid pro quo* (that is, in return for paying taxes, a citizen expects quality service delivery) (Fjeldstad, Schulz-Herzenberg and Sjursen, 2012).

The objective of this paper is to investigate empirically the determinants of tax revenue performance in the SADC using panel data for the period 1990 to 2010. The paper represents a first attempt at investigating the impact of FDI flows (including bi-directional causal effect or reverse causality[4]), tax rates, tax policy harmonisation measure (TPHM) and other variables on tax revenue collection for all 15 member countries. The investigation builds on a previous study by Sudsawasd and Mongsawad (2011) who confirmed the existence of a causal relationship between taxation and FDI in regional groupings globally. In addition, the paper tests the robustness and sensitivity levels of tax revenue collected to changes in capital flows and taxation (tax rates and tax policy harmonisation) on revenue positions in the SADC. The empirical findings could generally assist in providing more policy options for tax administrators and policy makers aimed at maximising tax revenue in regional groupings.

The rest of the study is organised as follows: Section 2 entails a brief literature review. Sections 3 and 4 present the data, study methodology and empirical results. Section 5 presents the robustness and sensitivity analyses. Section 6 concludes the study.

2 Review of literature

The Heller (1975) and Leuthold (1991) applied tax models generally offer a framework which accounts for the effects of economic policies (including

[4]Reverse causality occurs when a dependent variable can cause a change in one (or more) explanatory variable and vice versa (Ramcharan, 2006).

policies on FDI), corruption and elements of the tax base on tax revenue collection (including tax performance). The Leuthold (1991) model specifically assumed that the actual tax revenue-GDP ratio is a function of the desired tax revenue-GDP ratio and the availability of certain tax bases (including FDI, tax rates and tax policy); as well as the status of economic policies and the tax level of corruption. That is:

$$T/Y = f\{(T/Y)^*, B, E, C\} \quad (1)$$

Where T/Y is the actual tax revenue-GDP ratio, T/Y^* the desired tax revenue-GDP ratio, B refers to tax bases, E is economic policies and C is the tax level of corruption.

Effectively, increased FDI inflows expand the tax base (B), contribute to growth and provide additional channels (together with the tax rates and tax policy) for improved tax revenue.

The main offerings of the applied tax models have been complemented by relative theories in support of this strand of tax literature. See for instance studies by Gropp and Kostial (2001), Montiel (2003), Garikai (2009), Hines and Summers (2009) and Mankiw, Weinzieri and Yagan (2009). The theories highlight the importance of choosing appropriate revenue instruments or tax handles (tax bases) aimed at influencing tax performance.

Anecdotal and theoretical evidence support the rationale for using tax rates and tax administrative reforms to increase the amount of tax revenue collected. However, a general increase in tax rates may have an adverse effect on revenue collection while a reduction in tax rates (coupled with expansion of the tax base) may help improve tax revenue. This is further explained by the Laffer curve (Slavin, 2008; Trabandt, and Uhlig, 2011; Kazman, 2014)[5]. Policy makers are therefore encouraged to explore other means of tax revenue maximisation apart from increasing tax rates. For example, revenue generating potential for VAT can be maximised by instead expanding the bases (through both tax policy changes and improving compliance) rather than increasing standard VAT rates (IMF, 2009). This is consistent with the main offering of the revenue mobilisation model. The model highlights the importance of two policy choice variables (namely, the definition of the tax base or B and the tax ratio or TR) and three administrative related variables (explicitly the size of the coverage ratio or CVR, the valuation ratio

[5]The Laffer curve generally shows that at a tax rate of 0%, the government would collect no tax revenue, just as it would collect no tax revenue (TR) at a tax rate of 100% because of workers' unwillingness to work for an after-tax wage of zero. Slavin (2008), Trabandt and Uhlig (2011), and Kazman (2014) all argue that there is more than one Laffer curve with various revenue and growth maximising points, thereby modifying the main premise of the original Laffer curve showing tax rate peaking at 50%.

or VR, and the collection ratio or CLR) in maximising tax revenue (Kelly, 2000; IMF, 2009). The main proposition of the revenue mobilisation model is applicable to tax policy in Africa (including the SADC). Given that in Africa, " tax policy is tax administration[6] ", the revenue mobilisation model also provides a useful framework for tax administration to complement tax policy in improving tax revenue collection (IMF, OECD, UN and WB, 2011).

Theoretical models (including the neo-classical trade theory) focusing on the effect that FDI has on a host country's general welfare and tax revenue showed that FDI could increase national welfare, particularly through increased tax revenue (Faeth, 2011). Welfare and revenue from FDI can also be improved by introducing an optimal tax on foreign-owned capital. Countries could lose out on tax revenue when incentives are paid to multi-national enterprise (MNEs) or when transfer pricing (including other strategies to minimise taxes) is an issue (Faeth, 2011). The MNEs could set unreasonably high transfer prices to avoid high taxes in the host country, thereby minimising the host country's welfare by worsening potential tax revenue and balance of payments position.

Ahmed and Muhammad (2010) investigate the determinants of tax buoyancy (total response of tax revenue to changes in national income and discretionary tax policy) in a number of developing countries. The authors used panel data for 25 countries inclusive of seven African countries (Zimbabwe was the only SADC country included) for 11 years (1998-2008), and employed the pooled least square method for result analysis. The findings showed that import, manufacturing sector, services sector, monetisation[7] and budget deficit influence positively the tax buoyancy, while growth in grants impact negatively on tax buoyancy.

Palil and Mustapha (2011) examine the determinants of tax compliance in Malaysia, aimed at improving tax revenue collection. The results suggested that tax knowledge has a significant impact on tax compliance and, ultimately, on revenue collection, even though the level of tax knowledge varies significantly among respondents. The results also indicated that tax compliance is influenced specifically by probability of being audited, perceptions of government spending, penalties, personal financial constraints, and the influence of referent groups. The findings generally align with Fjeldstad et al. (2012) who examined the key determinants of taxpayer compliance in Africa, leading to improved tax revenue.

[6] That is, tax policy sets the framework within which the revenue administration must operate. In practice, the distinction between administration and policy is especially hard to make in developing countries (IMF, OECD, UN and WB, 2011:18).

[7] Also see arguments made by Montiel, (2003) and Musgrave (1969 and 1984) on the effect of monitisation on tax performance and the choice of revenue instruments.

Gupta (2007) investigates the principal determinants of tax revenue performance across developing countries, including SSA, by using a broad dataset for 120 countries. The results confirm that factors such as per capita GDP, trade openness and foreign aid significantly affect revenue performance of an economy. Other factors include corruption, political stability and share of direct and indirect taxes (specifically VAT). The paper also employs the findings of a revenue performance index to argue that, with the current levels of tax rates and increasing tax competition in Africa, further increases in tax rates (particularly on mobile production factors) are neither feasible nor desirable[8]. Increase in tax rates result in tax avoidance and evasion, tax inversion and higher tax administrative and compliance costs for the revenue administrations and businesses. Instead, broadening the tax base (and bringing the informal sector into the tax net) is a more effective way of generating domestic revenue and improving the perceived equity of the tax system[9]. This argument is consistent with both ActionAid and Eurodad (2011) and ATAF (2012) who later proposed an element of regional co-operation or harmonisation in SSA countries, aimed at broadening the tax base and collected tax revenue (ActionAid and Eurodad, 2011:5).

Garikai (2009) examines the determinants of tax buoyancy in the SADC. Using panel data for fourteen[10] SADC countries during 1994-2005, the study found that monetisation, external aid growth and the growth of fiscal deficit (that is, increased government expenditure in relation to tax revenue collected) negatively affect annual tax buoyancy and tax performance in the SADC. The fiscal deficit increase can be reduced by limiting government expenditure or raising tax revenues. Variables such as growth in the agricultural and industrial (mining and manufacturing) sectors and government expenditure contributed positively to tax buoyancy; while trade openness (XM) and economic development (ECON) are found to be insignificant.

Chaudhry and Munir (2010) and Muibi and Sinbo (2013) have also investigated the determinants of tax revenue performance and tax efforts. Most previous theories and empirical studies on tax revenue performance and tax efforts have focused on regional groupings in the rest of the world (ROW), with limited attention on Africa. The closest attempts made on the African

[8] Also, African countries like Burundi, Ethiopia, Guinea-Bissau and Zimbabwe did not rely much on raising tax rates on existing tax bases in order to improve tax revenue but instead on broadening indirect tax bases (by taxing the shadow economy activities and effectively collecting VAT).

[9] The recommendations generally align with that of both Robinson (2004) who investigated commodity tax reform in southern Africa and Mendoza (1998) who delineated the international ramifications of tax reforms

[10] Madagascar is excluded due to lack of comprehensive country data for variables used.

continent were by Gupta (2007) and Garikai (2009), who scarcely employed FDI and tax variables in their investigations. Given the importance of FDI to Africa[11], there is need to understand how variations in FDI inflows, coupled with tax rates and tax policy, influence the amount of tax revenue raised. Considering that the majority of African countries are increasingly using these orthodox means to raise revenue in order to improve on the budgetary positions (and developmental requirements), the need to understand their effectiveness becomes even more necessary.

The concise survey of existing literature conducted thus far, highlights the effectiveness of some factors (or determinants) affecting tax revenue performance and tax efforts globally and in Africa (including the SADC). However, no study has taken a keen interest in exploring the impact (and sensitivity levels) of FDI flows (including bi-directional causal effect), tax rates and tax policy harmonisation variables on tax revenue collection in the SADC[12]. This paper intends to fill this gap in the tax literature. The analyses further build on both Mesa and Para-Pena (2008); and Sudsawasd and Mongsawad (2011) (in particularly highlighting a seemingly one-way causal relationship between taxation and FDI); by further investigating a possible reverse causality.

3 Data source and methodology

All data series are obtained from the World Bank Development Indicators, the SADC online databases and the United Nations Conference on Trade and Development (UNCTAD), complemented with data from the International Monetary Fund (IMF).[13] In the panel estimation process the investigation produces two models; contrasts the empirical findings and provides insights into which set of variables (that is, FDI and existing tax rates or FDI and TPHM), are better in improving tax revenue in the SADC. The TPHM as motivated by Sudsawasd and Mongsawad (2011:665) is specified as follows:

$$TPH_{i,t} = \frac{\tau_{i,t} - \bar{\tau}_t}{\bar{\tau}_t} x100 \tag{2}$$

Where TPH_{it} is the tax policy harmonisation index for country i at time t, $\tau_{i,t}$ is the tax rate for country i at time t, $\bar{\tau}$ is the group average, t is the time.

[11] As discussed in detail by UNCTAD (2006), Mijiyawa (2012), AEO (2013), and World Bank (2013

[12] For further discussion see SADC (2002) and the African Economic Outlook (AEO) (2013).

[13] See Tables A.1 and A.2 of Appendix A, for the dataset (including data series measurement) and economic expectations.

The study employs panel data[14] estimation techniques, namely the LSDV fixed effects model (FEM) and the feasible generalised least squares (FGLS) by Park (1967) and Kmenta (1986) in testing for country specificity. The techniques are further complemented by Leamer's (1983) extreme-bound analysis (EBA) approach to perform a robustness test and sensitivity analysis.

3.1 Preliminary tests (full sample, 1990-2010)

Preliminary investigations (namely, unit root tests (URTs), Kao (1999) co-integration tests, descriptive statistics and cross-correlation analysis[15]) are conducted on the panel prior to the model specification, to test the relationships between the dependent variable (TREV) and explanatory variables. Selected UR tests which assume individual UR processes and accommodate CSD (spatial dependence) to some extent[16] (Baltagi, 2008) are applied. Specifically, the Im, Pesaran and Shin (IPS) (2003) test results (with better small sample properties and intuitive construction) for both models denote all variables to be stationary in first difference, that is $I(1)$, (implying a rejection of the null hypothesis). Other preliminary results illustrate the extent, nature and depth of the relationships and the existence of a long-run co-integrating equilibrium relationship.

3.1.1 Initial diagnostic tests results (IDTs) - (models 1 and 2, sample 1990-2010)

Initial Diagnostic Tests (IDTs) are also conducted on the data to ascertain the direction of the empirical modeling (see the entire tests results, including results for poolability, random effects, fixed effects, endogeneity and CSD in Table B.1 of Appendix B). The results reject the pool model and denote that individual or random effects are valid and time-specific effects are invalid in both models 1 and 2. Consequently, the error term (μ_{it}) takes a one-way error component form. The Breusch-Pagan (1980) LM test results suitable for large T (De Hoyos and Sarafidis, 2006:484) confirms the existence of CSD, groupwise heteroscedasticity and contemporaneous correlation in the error term of both models. The LM test for first-order serial correlation given

[14] See Baltagi (2008) for further exposition, including the merits of using panel data.

[15] Cross-correlation results between tax revenue collected (TREV) and all explanatory variables FDI(0.16***), CIT1(0.08), VAT1(-0.25***), CHAR(0.05), VHAR(-0.01), DCR(0.08), EXPO(0.14***), GOV(0.54***), INF(0.01) are significant at (*)10%, (**)5%, (***)1%.

[16] Namely, the IPS (2003) test and ADF-Fisher Chi-Square and PP-Fisher Chi-square (Fisher) (1932) tests.

fixed effects is complemented by a second test for serial correlation in both models - the Durbin-Watson statistics for panel data (despite large T). Both tests reject the null hypothesis that the model is void of first-order serial correlation. The Hausman (1978) specification test fails to reject the null of exogeneity. The IDTs results reveal no endogeneity between the regressors and the error term of both models 1 and 2. However, the FGLS estimator (which is also perfectly suited to data with individual effects, groupwise heteroscedasticity, contemporaneous correlation, serial correlation and interdependent cross-sections - CSD) is employed to control for limited (mild) form of endogeneity of the regressors (Park, 1967; Kmenta, 1986; Hicks, 1994; Gupta, 2007).

3.2 Model specification and estimation technique (models 1 and 2)

The investigation in this section of the study employs the LSDV model to account for country differences[17], with specification as follows:

$$TREV_{it} = X'_{it}\beta + \sum_{J=1}^{N-1} \delta_i D_{jit} + \mu_{it} \tag{3}$$

Where TREV_{it} = tax revenue share of GDP, X_{it} = the set of explanatory variables, β = the slope coefficient, D_{jit} = the set of country dummies, μ_{it} = idiosyncratic error term. In the above LSDV specification, each individual country dummy "absorbs" the individual fixed effects u_i that are hidden in the error term $u_{it} = u_i + v_{it}$. The LSDV model is complemented by the FGLS model.

Empirical specifications:

The final one-way model motivated by Sudsawasd and Mongsawad (2011) and as directed by the IDTs results for models 1 and 2 are successively specified as follows:

$$\begin{aligned} TREV_{it} = \alpha_0 + \beta_1 FDI_{it} + \beta_2 CIT1_{it} + \beta_3 VAT1_{it} + \beta_4 GOV_{it} + \\ \beta_5 DCR_{it} + \beta_6 EXPO_{it} + \beta_7 INF_{it} + \mu_i + v_{it} \end{aligned} \tag{4}$$

[17] Given the wide divergences across countries in the SADC on most variables, generalised explanations (pooling) of findings are problematic. Cross-national variations therefore require a more detailed examination of country-specific factors (Fjeldstad et al. 2012).

$$TREV_{it} = \alpha_0 + \beta_1 FDI_{it} + \beta_2 CHAR_{it} + \beta_3 VHAR_{it} + \beta_4 GOV_{it} + \quad (5)$$
$$\beta_5 DCR_{it} + \beta_6 EXPO_{it} + \beta_7 INF_{it} + \mu_i +$$

Where i in both specifications is the index for cross-section of country, t is the time index, $TREV_{it}$ is tax revenue collected, α is a simple constant, $\beta_1, \beta_2 \ldots \beta_7$ are positive slope coefficients, FDI_{it} is the FDI share of GDP, GOV_{it} is government expenditure, DCR_{it} is the growth rate of domestic credit, $EXPO_{it}$ is export share of GDP, INF_{it} is inflation. In equation 3 $CIT1_{it}$ is the statutory CIT tax rate, $VAT1_{it}$ represents the standard VAT rates. In equation 4 $CHAR_{it}$ is the statutory CIT policy harmonisation indicator, $VHAR_{it}$ is the standard VAT policy harmonisation indicator. μ_i is the unobservable individual effect (country-specific effects) and v_{it} is the stochastic disturbance (idiosyncratic error term). The error term μ_{it} is the sum of the above two components (μ_i and v_{it}).

Corrective interventions are made for errors in the panel including serial correlation, heteroscedasticity and mild levels of endogeneity in tax models (Baltagi, 2008; Mesa and Para-Pena, 2008). In correcting for serial correlation the Prais-Winston transformation is used to transform correlated errors into serially uncorrelated classical errors. After correction, the model is absolved of serial correlation with better reconstructed Dp and improved DW statistics. The Swamy and Aurora estimator for component variances and the white diagonal standard errors and covariance (d.f. corrected) are used to correct for heteroscedasticity. Post the interventions; there is improvement in the standard errors and t-statistics. Having corrected for errors (and potential errors) in the panel, the respective estimated results are presented.

4 Empirical results (models 1 and 2)

Table 1 below presents the panel estimation results for models 1 and 2 derived by estimating equations 4 and 5 on the full sample. The coefficients of the REM estimations in both models (which assumes μ_i to be orthogonal to the independent variables, that is, $E(\mu_{it} \mid X_{it}) = 0)$) and the LSDV1 with fixed effects or 'within Q' estimations) are largely insignificant. The LSDV1 estimates have been corrected upwards, as captured by the improved coefficients of both the LSDV2[18] and FGLS estimation results.

[18]The LSDV2 model accounts for differences (in tax administration, political, institutional and economic policy systems) amongst the SADC countries, not explicitly included in the specification but accounted for, in the estimation. An initial estimation inclusive

The findings reveal that the coefficients of the LSDV2 estimates compare favourably with the FGLS results, highlighting the possibility of the coefficients being likely good estimates of the true parameters of the variables. Despite the absence of endogeneity (as revealed by the IDTs results), the FGLS estimator (which builds on the LSDV2) with the most robust estimators and the most representative estimates of the panel (as denoted by improved results) is the preferred model in this study. The estimation technique only becomes inefficient when the regressors are endogenous and the error process has a large number of parameters (Kmenta, 1986). Also due to exogeneity of the regressors, there is no need for instrumental variables (IV) in the panel data (Baltagi, 2008).

4.1 Discussion of the empirical results (models 1 and 2)

As per the adopted FGLS results for models 1 and 2, the coefficients of the FDI indicators are both positively signed and statistically significant at the 1% level. The results denote that increases in FDI flows to the SADC countries would expand the tax base and tax revenue positions. The findings align with Muibi and Sinbo (2013), who generally highlight the benefits of improved economic activities (including FDI) on collected tax revenue, confirming reverse causality. The results also align with the correlation analysis and the positively argued *a priori* expectations.

As expected, the coefficients of the corporate income tax rate (CIT1) and Value Added Tax (VAT) rate indicators in model 1 are negatively signed and statistically significant at the 1% level. The CIT coefficient has been corrected upward from the LSDV2 estimation after errors in the error term have been rectified. The results denote that during the period under consideration (1990-2010), CIT and VAT rates increased business costs leading to a reduction in tax revenue collected in the SADC. The evidence is consistent with findings from previous studies which generally highlight the negative effect (and perception) of uncoordinated levels of CIT and VAT rates by countries in a region on tax revenue. See for example Robinson (2004), Fjeldstad et al. (2012) and Tax Justice Network-Africa & ActionAid International (2012). The finding for CIT modifies the correlation analysis results while that of VAT is consistent with the results.

The coefficients of both the CIT policy harmonisation indicator (CHAR) and the VAT policy harmonisation indicator (VHAR) in model 2 are posi-

of a recession dummy produced insignificant and unimportant findings and was left out of the LSDV regression to mitigate the degrees of freedom problem.

tively signed and statistically significant at the 1% level (after rectifying errors in the panel). The findings suggest that increased harmonisation (more sychronisation) in CIT and VAT rates (including tax policy) in line with the SADC average would enhance tax revenue positions of governments. The evidence on CHAR is consistent with findings from previous studies (Sudsawasd and Mongsawad, 2011; Gupta, 2007; Chaudhry and Munir, 2010) which generally highlight the positive effect of improved coordination in CIT and direct taxes on tax revenue. The finding on VHAR modifies that of Gupta (2007) and Sudsawasd and Mongsawad (2011), but generally corroborates Fjeldstad et al. (2012). Both findings modify the results from the correlation analysis and are generally consistent with the economic specifications.

The coefficient result for domestic credit (DCR) in model 1 is surprisingly insignificant. However, as expected, it becomes statistically significant and positively signed at the 1% level in model 2. The results for both government expenditure (GOV) and export (EXPO) in both models are also positively signed and statistically significant at the 1% level as expected. Finally, as expected, the coefficient for the inflation variable (INF) is positively signed and statistically significant at the 5% level in model 1 and at the 1% level in model 2. All the significant findings are consistent with empirical studies in the field.

Adjudging from the empirical results, the tax rates and tax policy harmonisation indicators provide quite strong support for maintaining current tax rates and coordinating tax policy in the SADC in order to maximise tax revenue. However, the entire estimation results in model 2 reveal the combination of FDI and tax policy harmonisation (CHAR, VHAR) to be slightly better in influencing tax revenue than the combination of FDI and tax rates (CIT1, VAT1). The end results significantly highlight the impact of enhanced harmonisation of regional tax policy (as opposed to countries having individual tax rates) in the SADC, on tax revenue positions. On the basis of the estimation results, the study further investigates the responsive (sensitive) levels of TREV to changes in FDI, tax rates or tax policy harmonisation in the region, using the EBA technique.

5 EBA - robustness and sensitivity check (FDI, tax rates and TPHM)

In applying the EBA model of Leamer (1983) to a panel data regression explaining tax revenue collected (TREV) sensitivity levels, the model takes the form:

$$Y_{it} = \alpha_i + \sum_{j=1}^{n} \delta_j X_{jit} + \beta M_{it} + \sum_{j=1}^{m} \gamma_j Z_{jit} + \varepsilon_{it} \tag{6}$$

Where Y_{it} is collected tax revenue in country i at time t, X_{jit} is the jth explanatory variable of country i at time t that is included in every regression (usually an important explanatory variable, for example export), M_{it} is the variable of interest for country i at time t whose robustness is under investigation (for example, FDI or a tax variable), Z_{jit} is the jth potentially important explanatory variable in country i at time t and ε_{it} is the error term.

Based on equation 6, an EBA equation for the first set (tax rates and FDI) and second set (TPHM and FDI) of variables of interest are consecutively specified as:

Tax rates:

$$TREV_{it} = \alpha_i + \delta_i EXPO_{it} + \beta VAT1_{it} + \sum_{j=1}^{k} \gamma_i Z_{jit} + \varepsilon_{it} \tag{7}$$

$$TREV_{it} = \alpha_i + \delta_i EXPO_{it} + \beta CIT1_{it} + \sum_{j=1}^{k} \gamma_i Z_{jit} + \varepsilon_{it} \tag{8}$$

$$TREV_{it} = \alpha_i + \delta_i EXPO_{it} + \beta FDI1_{it} + \sum_{j=1}^{k} \gamma_i Z_{jit} + \varepsilon_{it} \tag{9}$$

TPHM:

$$TREV_{it} = \alpha_i + \delta_i EXPO_{it} + \beta VHAR_{it} + \sum_{j=1}^{k} \gamma_i Z_{jit} + \varepsilon_{it} \tag{10}$$

$$TREV_{it} = \alpha_i + \delta_i EXPO_{it} + \beta CHAR_{it} + \sum_{j=1}^{k} \gamma_i Z_{jit} + \varepsilon_{it} \tag{11}$$

$$TREV_{it} = \alpha_i + \delta_i EXPO_{it} + \beta FDI_{it} + \sum_{j=1}^{k} \gamma_i Z_{jit} + \varepsilon_{it} \tag{12}$$

Where $TREV_{it}$ is tax revenue collected in country i at time t, $EXPO_{it}$ is the export variable, $VAT1$ and $CIT1_{it}$ are the VAT and CIT rates respectively, FDI_{it} is inward FDI flows, $VHAR_{it}$ and $CHAR_{it}$ are the VAT

and CIT harmonisation indicators respectively, Z_{jit} is the set of optional explanatory variables (such as domestic credit, inflation rate) and ε_{it} is the error term.

Subsequently two EBA models are estimated based on equations 7 to 12, yielding varying results on the sensitive levels of tax revenue collected to changes in FDI, tax rates and TPHM[19]. The EBA results are displayed in Tables C.1 and C.2 of Appendix C.

In model 1 the estimated coefficients of the VAT rate are shown to have a significant positive robust correlation with TREV at the 1% level. The coefficient results indicate that tax revenue collected is very sensitive to changes in VAT rates during the period under investigation. This is generally consistent with the findings of Sudsawasd and Mongsawad (2011) and the earlier economic expectation. The estimated coefficients results of CIT rate are shown to have a significant negative but robust correlation with TREV at the 1% level. The coefficient results indicate the extent to which tax revenue collection is sensitive to changes in CIT rates during the period under investigation. The finding is also consistent with Sudsawasd and Mongsawad (2011) and the *a priori* expectation.

In model 2 the estimated coefficients of the VAT harmonisation indicator (VHAR) are shown to have a significant negative robust correlation with TREV at the 5% level. The results show that tax revenue collected is very sensitive to VAT policy harmonisation during the period under investigation. The finding is generally in accordance with the economic expectation. The estimated coefficients of the CIT harmonisation indicator (CHAR) are shown to have a significant positive robust correlation with TREV at the 1% level. The coefficient results indicate the extent to which tax revenue collected is sensitive to CIT policy harmonisation during the period under investigation. The finding is consistent with the *a priori* expectation and the FGLS result. Jointly, the results of both tax harmonisation variables (VHAR and CHAR) in model 2 generally corroborate that of Sudsawasd and Mongsawad (2011).

In both models, the estimated coefficients of FDI are found to be statistically insignificant and fragile, surprisingly indicating that changes in FDI inflows do not relate to the level of tax revenue collected in the SADC. The result is contrary to the FGLS and correlation analysis results which points towards reverse causality. The insignificant findings provide impetus to the arguments in the literature against using excessive tax incentives to attract

[19] In interpreting the EBA results, if the extreme values of the variable of interest remain significant, of the same predicted economic sign and within a narrow band, one can infer that the result (and tax variable of interest) is robust. Otherwise, the variable is described as being "fragile" (Gujarati, 1995; Sudsawasd and Mongsawad, 2011).

FDI, as this could adversely affect tax revenue collected[20]. Collectively, it can be observed from the EBA results that tax revenue collected (TREV) is sensitive (very responsive) to all the tax variables (VAT, CIT, VHAR and CHAR) within the time-frame 1990 to 2010, as captured by the robust findings. Despite TREV not being sensitive to the FDI variable, there is a significant causal relationship between TREV and FDI as captured by the FGLS empirical results.

6 Conclusion

This paper investigates the determinants of tax revenue performance in the SADC for the period 1990-2010, using panel data estimation techniques. Specifically, the aim is to ascertain the level of causality of FDI and taxation (CIT rates, VAT rates, tax policy harmonisation variables) amongst other variables on collected tax revenue in the region. The broad question posed is which combination of variables (FDI and tax rates or FDI and TPHM) amongst other variables, has a better effect on the amount of tax revenue collected. Accordingly this paper first established a theoretical base, conducted detailed empirical analyses and tested for robust sensitive levels of FDI and taxation on tax revenue in the SADC. The empirical results generally support using a combination of TPHM variables (CHAR and VHAR), as opposed to using a combination of tax rates (standard VAT and statutory CIT) (including FDI and macro-economic variables) towards improved tax revenue performance. Specifically the TPHM variables are found to have a significantly positive effect on revenue performance across all specifications (that is, inclusive of all other explanatory variables), while the tax rates variables are found to affect revenue performance only across certain specifications. Also, the EBA results show that tax revenue collected in the SADC is sensitive to tax rates (VAT and CIT rates) and tax policy harmonisation variables (CHAR and VHAR), but insensitive to FDI inflows. The results generally provide empirical support for anecdotal evidence that tax rates and tax policy harmonisation ultimately determine the amount of tax revenue collected in countries and regional groupings.

In terms of country specificity (as captured by the cross-sectional SUR results), the study found individual effects to be valid in model 1 (using FDI, tax rates) for all SADC countries except for Lesotho and SA towards

[20] Additionally, unnecessary tax exemptions, tax credits, deductions, deferrals and refunds to taxpayers (including tax evasion and avoidance), do negatively affect tax revenue collected; eventually adding to tax expenditure (Tax Justice Network-Africa & ActionAid International, 2012).

improved regional tax revenue performance. This is perhaps due to the SACU effect where tax revenue is mainly boosted by the share of SACU revenue distributed to members based on an agreed formula (SADC, 2011; AEO, 2013). Individual effects are also found to be valid in model 2 (using FDI, TPHM) for all SADC countries, except for Seychelles, towards improved regional tax revenue performance. This is perhaps due to the lower level of tax policy coordination in Seychelles (including having no Personal Income Tax) *vis-a-vis* other SADC countries (Deloitte and Touché, 2013).

Three policy implications emanate. First, a deliberate policy should be geared towards broadening tax reforms (including better synchronisation of tax rates and policy) and strengthening FDI regimes in the SADC, in order to boost tax revenue. This is given that differences in tax rates and tax policy could negatively affect investing decisions (including policies on FDI), and impact negatively on tax revenue (Heller, 1975).

Second, SADC countries need to carry out extensive pro-regional tax reforms and create a regional forum (inclusive of all member countries) in tax related matters if they are to be successful in pursuing tax harmonisation towards increased FDI and revenue (as per the objectives of the 2006 FIP and 2002 MOU on taxation). The SADC forum could assist members in coordinating taxable activities (including collectively setting revenue targets), overseeing tax administration, effectively managing tax systems (while still remaining as part of the African Tax Administration Forum (ATAF) and introducing a regional revenue statistics report (as is currently done in the EAC, to collectively improve tax revenue positions and consolidate the respective domestic budgetary situations).

Third, in pursuing tax policy harmonisation, policy makers must continue to monitor the SADC regional tax dynamics (including the trends), consult broadly on the way forward and develop a progressive systematic agenda based on timelines. For the countries that have large economies, good infrastructure, natural resources and attractive non-tax related FDI determinants, the case for tax harmonisation does not appear to be overwhelming. However for countries that have small economies, poor infrastructure, relatively low level of natural resources and less attractive non-tax related FDI determinants, the merits for tax policy harmonisation may be more appealing.

Two research issues not addressed in this paper need further investigation. First, the need exists to periodically monitor tax reforms (including new tax rates and regional tax policy initiatives) (at the aggregate level), and make use of recent available information. Second, the current methodology and research design could also be used to assess the robustness and impact of tax policy harmonisation on tax revenue collected in other regional groupings in

Africa.

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Table 1: Models 1 and 2: Empirical results - country-specific results (sample: 1990-2010). Dependent Variables:TREV

	Model 1: FDI and tax rates				Model 2: FDI and TPHM			
Variables	**REM**	**LSDV1**	**LSDV2[1]**	**FGLS**	**REM**	**LSDV1**	**LSDV2**	**FGLS**
	(Random effects model)	(Least squares dummy variables-Fixed-effects)	(Least square dummy variables-Fixed-effects CS SUR)	(Feasible generalised least squares)	(Random effects model)	(Least squares dummy variables-Fixed-effects)	(Least square dummy variables-Fixed-effects CS SUR)	(Feasible generalised least squares)
FDI	0.076	0.075	0.062	0.152	0.096	0.093	0.079	0.180
	(0.282)	(0.290)	(0.000) ***	(0.000) ***	(0.174)	(0.189)	(0.000) ***	(0.000) ***
CIT1	-0.165	-0.239	-0.197	-0.072				
	(0.470)	(0.390)	(0.024) **	(0.000) ***				
VAT1	-0.316	3.030	2.906	-0.559				
	(0.720)	(0.171)	(0.000) ***	(0.000) ***				
CHAR					0.057	0.060	0.050	0.033
					(0.033) **	(0.027) **	(0.000) ***	(0.000) ***
VHAR					0.005	0.003	0.004	0.023
					(0.704)	(0.818)	(0.023) **	(0.000) ***
DCR	-0.029	-0.033	-0.027	0.001	0.0271	-0.033	-0.027	0.000
	(0.120)	(0.100)	(0.000) ***	(0.969)	(0.150)	(0.104)	(0.000) ***	(0.000) ***
GOV	0.501	0.498	0.419	0.617	0.496	0.487	0.412	0.649
	(0.000) ***	(0.000) ***	(0.000) ***	(0.000) ***	(0.000) ***	(0.000) ***	(0.000) ***	(0.000) ***
EXPO	-0.019	-0.023	-0.015	0.029	0.012	0.007	0.010	0.009
	(0.593)	(0.539)	(0.000) ***	(0.000) ***	(0.750)	(0.848)	(0.028) **	(0.000) ***
INF	1.94e-08	1.93e-08	4.34e-09	1.80e-08	1.94e-08	1.86e-08	8.29e-09	2.12e-08
	(0.463)	(0.466)	(0.526)	(0.027) **	(-0.463)	(0.481)	(0.183)	(0.006) ***
Adjusted R^2	0.148	0.696	0.938		0.163	0.698	0.925	
Observations	315	315	315	315	315	315	315	315
RSS	10668.94	10267.17	289.397		10552.85	10162.73	293.382	

Source: Derived using Eviews 8 and statistical analysis software (STATA) 13
P-values are in parentheses. Significance levels are 10% (*), 5% (**) and 1% (***). Models 1 and 2 reflect the results using FDI and tax rates; and FDI and the TPHM variables respectively.

[1] The result of the LSDV fixed-effects (with better adjusted R^2) is preferred to that of the REM, as the FEM allows μ to be expressed freely. The LSDV2 result is better than LSDV1 result as it corrects for errors in the panel and there is no LSDV bias due to a large *T*. The LSDV2 result therefore involves fixed-effect with cross-sections (CS) SUR, which was applied to the model to account for heteroscedasticity, contemporaneous correlation and also for mild levels of CSD in the errors across equations. Applying the CS SUR improves the overall explanatory power of the model (See the adjusted R^2 and RSS from LSDV1 to LSDV2).

Appendix A

Table A.1: Sources and definition of variables

Applicable abbreviation	Variable	Sources	Definition of variables
TREV	Tax revenue	SADC (2011), IMF (2014).	Collected corporate tax on profits, income, and capital gains (CIT2) and also from value added tax as a percentage of GDP and (VAT2).
FDI	Foreign direct investment net inflows to the SADC	World Bank (2013); UNCTAD, 2015	Foreign direct investment net inflows share of GDP. Measured as the net foreign inflow into the SADC (% of GDP).
CIT1	Corporate Income Tax (maximum statutory rate)	SADC (2011)	Maximum statutory corporate tax rate, calculated on profit before tax
VAT1	Value Added Tax (standard rate). (Also a proxy for general sales tax, GST)	SADC (2011)	Applicable standard VAT rate or GST on goods and services as a percentage of value-added of industry and services.
GOV	Government expenditure	World Bank (2013).	Share of government expenditure in GDP (GOV)
DCR	Domestic credit	World Bank (2013).	Growth rate of (net) domestic credit at constant prices
EXPO	Export	World Ban (2013)	Total trade exports of SADC countries to the developed world, share of GDP
INF	Inflation	World Bank (2013); IMF (2014).	Rate of inflation for SADC countries

Source: Compiled from various sources
Note: CIT1 and VAT1 are used to calculate the CHAR and VHAR variables. Model 1 employs *TREV,FDI and tax rates; while Model 2 employs TREV,FDI and TPHM*.

Table A.2: *A priori* expectations

Variable	Expected signs	Deduction made
TREV	Dependent variable	Dependent variable
FDI	Positive	A general growth in FDI will expand the tax base, improve tax efforts and tax revenue collection. Hence an increase in FDI would improve tax revenue collection in the SADC (*ceteris paribus*) (positive relationship).
CIT1	Negative/ Positive	The CIT rates applied in the SADC during the period under investigation increased business costs and significantly affected the amount of tax revenue collected (negative sign). Alternatively, CIT rates applied during the period under investigation did not increase business costs and have instead improved on tax revenue collection (positive sign).
VAT1	Negative/ Positive	The VAT rates applied by the SADC countries during the period under investigation increased business costs and significantly affected the amount of tax revenue collected (negative sign). Alternatively, the VAT rates applied by the SADC countries during the period under investigation did not negatively affect businesses, instead improving tax revenue collection (positive sign).
CHAR	Negative/ Positive	More variation upward (more deviation) in a country's statutory CIT rate from that of the SADC group average would lead to tax avoidance, ax evasion and net FDI outflows, subsequently reducing total tax revenue collected (negative relationship). More harmonisation (less deviation) in a country's statutory CIT rate in accordance with that of the SADC group average would improve investors' confidence and overall investment, leading to increased tax revenue collection (positive relationship).
VHAR	Negative/ Positive	More variation upward (more deviation) in a country's standard VAT rate from that of the SADC group average would lead to increased business administrative costs, regulatory requirements burden, cost of doing business and the potential for VAT fraud, negatively affecting tax revenue (negative relationship). More sychronisation (less deviation) in VAT rates by a member country in accordance with that of the SADC group average would improve investors' confidence, general investment levels and tax revenue collection (positive sign).
Expo	Positive	An increase in exports from the SADC countries would increase the amount of tax revenue collected. Increased exports mean business is booming for local companies in the respective countries which will be taxed accordingly thereby improving revenue collection (positive relationship).
DCR	Positive	An unrestricted growth in domestic credit extended to foreign investors would create new businesses and improve business activities. The robust business climate would lead to increase taxable activities and better tax revenue collection (positively relationship).
Gov	Positive	A parsimonious increase in government expenditure on traded goods and services, infrastructure and other equally important sectors of the economy would boost the economy and income levels. These would (through the multiplier effect) boost businesses and subsequently tax revenue (*ceteris paribus*) (positive relationship).
INF	Negative/ positive	A consistent increase in inflation would erode business fundamentals and increase the cost of doing business especially if companies cannot easily pass the price increases onward to the consumers. This may increase tax evasion and tax avoidance or even result to tax resistance, leading to a reduction in overall tax revenue collected (negative relationship). Alternatively, provided inflation is fairly low and does not change too quickly, business profits will increase in line with increase in inflation in the economy. The effect is further enhanced when governments do not raise tax threshold levels for corporations. Resultantly high inflation could lead to increase in both corporate and personal tax revenue for tax administrations (positive relationship)

Source: Table motivated by various studies (including Gupta, 2007; Slavin, 2008, Sudsawasd and Mongsawad, 2011)
Note: In both models the standard deviation of inflation (STINF) and domestic credit growth (STDCR) are used exclusively in the EBA. These are traditionally used to increase the pool of variables employed in robustness tests (Sudsawasd and Mongsawad, 2011).

Appendix B

Table B.1: Initial Diagnostic Tests (IDTs) results (sample wide,1990-2010)

Tests and hypotheses	Model 1 (FDI and tax rates)	Model 2 (FDI and TPHM)	Basis for Inference and Inferences (Models 1 and 2)
	Test statistics and critical value		
Joint validity of cross-sectional individual effects (Pool or FEM) $H_0: \mu_1 = \mu_2 = \ldots = \mu_{N-I} = 0$ $H_A =$ not all equal to 0 -The critical value, F $crit$ is defined as $F_{(N-1)(NT-N-K)}$	FStat =27.720097 F $crit$ =F $(0.05,20,287)$ = 1.72565	FStat = 26.623146 F $crit$ =F $(0.05,14,293)$ = 1.72565	**Basis for Inference:** Reject H_0 if FStats > Fcrit, **Inference:** Cross-sections are heterogeneous.
Joint validity test for random effects (Pool versus REM) $H_0: \sigma_\mu^2 = 0$ $H_A: \sigma_\mu^2 \neq 0$	LM = 872.0526 $\chi^2(1)$ = 3.841459 (One-way ECM)	LM = 743.2290 $\chi^2(1)$ = 3.841459 (One-way ECM)	**Basis for Inference:** Reject H_0 if LM > $\chi^2(1)$ **Inference:** The random model individual effects are better (recognises heterogeneity).
Joint validity of time (period) fixed-effects (tests validity of specific time-effects) $H_0: \lambda_1 = \lambda_2 = \ldots = \lambda_{T-1} = 0$ $H_A =$ not all equal to 0	FStat = 0.293295 F $crit$ = F $(0.05,20,287)$ = 1.60727	F Stat = 0.274310 F $crit$ = F $(0.05,20,287)$ = 1.607275	**Basis for Inference:** Reject H_0 if F stat > F $crit$ **Inference:** We do not reject H_o. Time-specific effects are invalid. (Error term takes a one-way error component form).
LM test for serial correlation given fixed-effects (two-way model) $H_0: \rho =$ 0 (given μ_1 are fixed parameters) $H_A = : \rho >$	LM = 11.80747 Critical value: $N(0,1)$ = 1.64485 (for large T)	LM = 11.80747 Critical value: $N(0,1)$ =1.64485 (for large T)	**Basis for Inference:** Reject H_0 if LM > $crit$ value **Inference:** Positive first order serial correlation exists, given the existence of fixed-effects.
Heteroscedasticity $H_0: \sigma_i^2 = \sigma^2$ for all i $H_A =$ not all equal for all i (The variance of μ_i or V_{it} may be heteroscedastic).	LM = 115.0907352 $LM\ crit$ = χ^2 ($N-1$) = $\chi^2(14)$ = 23.68479	LM = 118.215224 $LM\ crit$ = χ^2 ($N-1$) = $\chi^2(14)$ = 23.684791	**Basis for Inference:** Reject H_0 if LM > $LMcrit$ **Inference:** Reject null hypotheses. Heteroscedasticity is present.
Hausman (1978) specification test $H_0: E(\mu_{i,t} / X_{i,t}) = 0$	m_3 = 4.465728	m_3 = 4.247405	**Basis for Inference:** Reject H_0 if m_3 > $\chi^2(7)$

$H_A: E(\mu_{i,t} / X_{i,t}) \neq 0$	$\chi^2(7) = 14.06714$	$\chi^2(7) = 14.06714$	**Inference:** Regressors are exogenous. There's no endogeneity.
Breusch-Pagan (1980) LM test 1 Cross-sectional dependence (CSD) (and contemporaneous correlation). $H_O: corr(\mu_{i,t}, \mu_{j,t}) = 0$ *for i≠j* $H_A: corr(\mu_{i,t}, \mu_{j,t}) \neq 0$ *for some i≠j*	Chi2(105)=277.927 Prob=0.0000	Chi2(105)=284.536 Prob=0.0000 (Breush-pagan LM test of independence).	**Basis for Inference:** Reject H_0 if LM values are greater than critical P-values. Also when p value is significant **Inference:** The null hypotheses are all decisively rejected. The errors exhibit contemporaneous correlation, groupwise heteroscedasticity and inter-dependent cross-sections (CSD)
Breusch-Pagan (1980) LM test 2 CSD (and groupwise heteroscedasticity). $H_O: sigma(i)\hat{}2 = sigma\hat{}2$ *for all i* $H_A: sigma(i)\hat{}2 \neq sigma\hat{}2$ *for all i*	Chi2(15)= 41345.07 Prob >chi2=0.0000	Chi2(15)=30704.86 Prob >chi2 = 0.0000 (Breush-pagan LM test of independence).	

Source: Derived using eviews 8 and STATA 13

10. Appendix C

Table C.1: Model 1-EBA sensitivity results (Dependent variable: TREV) for SADC (FDI and tax rates, 1990-2010)

Variables of interest	Description	Coefficient	t-stats	Standard error	z-variables/ Optional variables	Robust/ Fragile	Predicted Sign
VAT1	High	2.317256***	3.073563	0.753932	EXPO,STDINF,GOV	**Robust**	Negative/ Positive
	Base	2.186027***	3.787867	0.577113			
	Low	1.989424***	2.638011	0.754138	EXPO,DCR,STDCR,STDINF,INF		
CIT1	High	-0.433745***	-7.632435	0.056829	EXPO,STDINF,INF	**Robust**	Negative/ Positive
	Base	-0.438954***	-7.851979	0.055904			
	Low	-0.470677***	-9.290158	0.050664	EXPO,DCR,STDCR,STDINF,INF		
FDI	High	0.004592	1.236699	0.003713	EXPO,STDINF,DCR,INF,STDCR	Fragile	Positive
	Base	0.003140	0.955274	0.003287			
	Low	0.002579	0.738413	0.003492	EXPO,STDINF,STDCR		

Source: Derived using eviews 8

Table C.2: Model 2-EBA sensitivity results (Dependent variable: TREV) for SADC (FDI and TPHM, 1990-2010)

Variables of interest	Description	Coefficient	t-stats	Standard error	z-variables/ Optional variables	Robust/ Fragile	Predicted Sign
VHAR*	High	-0.001052**	-2.331863	0.000451	EXPO,INF	**Robust**	Negative/ Positive
	Base	-0.001039**	-2.307859	0.000450			
	Low	-0.001346**	-2.936116	0.000458	EXPO,INF,STDINF		
CHAR	High	0.068627***	14.02820	0.004892	EXPO,STDCR,INF	**Robust**	Negative/ Positive
	Base	0.065789***	10.60907	0.006201			
	Low	0.065435***	13.88563	0.004712	EXPO,DCR,STDCR		
FDI	High	0.004592	1.236699	0.003713	EXPO,STDINF,DCR,INF,STDCR	Fragile	Positive
	Base	0.003140	0.955274	0.003287			
	Low	0.002579	0.738413	0.003492	EXPO,STDINF,STDCR		

Source: Derived using eviews 8

Note: In Tables C.1 and C.2 ***, **, * denote 1%, 5%, 10% significant levels respectively. All results are based on the fixed-effects model estimator for 315 observations. The pool of variables used is TREV,FDI,CIT,VAT,CHAR,VHAR,EXPO,INF,DCR,GOV,STDINF and STDCR. In Table C.2, *VHAR has marginally robust coefficient results. Positive and significant coefficients suggest that the specific variables are drifting apart (less synchronisation);while negative and significant coefficients indicate that the variables are drifting closer (more synchronisation) (Sudsawasd and Mongsawad, 2011).