An assessment of co-movement between foreign direct investment (FDI) and South African construction sector (SACS) output

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AN ASSESSMENT OF COMOVEMENT BETWEEN FOREIGN DIRECT INVESTMENT (FDI) AND SOUTH AFRICAN CONSTRUCTION SECTOR (SACS) OUTPUT

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Proponents of open account contend that Foreign Direct Investment (FDI) promotes the growth of infrastructure through positive externalities. However empirical evidence on whether FDI promote growth in developing countries remains inconclusive. This paper investigates the comovement between FDI, the South African Construction Sector (SACS) output and the Gross Domestic Product (GDP). The data on FDI, SACS and GDP were extracted from the UNCTAD data base for the years 1970 through 2008. The study used econometric methodology including unit root test, Johansen cointegration and Granger causality tests to analyse the data. The result indicates that FDI, SACS, and GDP are stationary after first difference. Johansen cointegration test finds a long term contemporaneous relationship between FDI and SACS. Though FDI does not Granger cause SACS. However, FDG (FDI/GDP ratio) Granger causes SACG (SACS/GDP ratio) after a considerable lags. The paper concludes that the lack of causality between FDI and SACS is because South Africa was only recently readmitted into the global economy and that there are potentials for increase FDI impact on SACS.

Keywords: econometrics, foreign direct investment, gross domestic product, South Africa.

INTRODUCTION

The proponents of globalization, emphasis the opportunities and benefits of the opening the economies even as disillusionment is growing among many policymakers and economists about the costs and risks involved in the globalization of national economies as well as its possible impact on growth (Loots, 2002). Economic globalization manifests itself in various forms such as an increase in international trade and International Capital Flow (ICF) particularly Foreign Direct Investment (FDI) flows. FDI has recently assumed increased importance in developmental strategy of developing countries. This may have been informed by the perceived success of fast growing Asian countries (Ngowi, 2001, Moolman, *et al.* 2006). However, Empirical literature remains inconclusive on the true impact of FDI on growth in Africa (Edwards, 2001, Eichengreen, 2001). Szentes (1976) argues that FDI reinforces social and economic dualism, as well as exacerbates income inequality between different regions and groups in a country. Biersteker (1981) also contends that Multinational Corporations (MNCs) have displaced small-scale indigenous entrepreneurs and contributed to a net outflow of capital from developing countries as

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well as. Furthermore FDI flows are very volatile and subject to emerging market crises, as has been seen in the Mexican peso crisis, the East Asian meltdown, and to a lesser extent the Russian, Turkish and Argentinean defaults (AIMR 2005).

Africa's FDI inflows have been very poor in the last decades. This correlates with the low level of GDP per capita in most African countries. The investment / GDP ratios have been lower in comparison to other regions (Rodrik, 1999). But African countries continue to reform their economies and liberalize their FDI policies (Moolman, *et al.* 2006). This has helped to improve the situation in recent years. The inflows of FDI in 1997 were more than twice as high as in 1990(UNCTAD, 1998 and Basu and Srinivasan, 2002). South Africa re-entered the international economic arena in the early 1990s when the forces of globalization became more prominent. A general analysis indicates that the expansion in the South African economy only started to take off in 1994. Investment performance improved in almost all sectors in South Africa in 2001 with faster growth in private investment (UNECA, 2002).Financial flows in the form of FDI, portfolio and other investment made a dramatic turn-around from dominantly negative flows to mostly positive inflows from the third quarter in 1994. But Approximately 98% of the current economic growth performance in South African can be explained by the forces of globalization. The investment flows are however still very volatile (Loots, 2002). South Africa has since become the third largest foreign investor in Africa after the UK and the US. However, 90% of South African FDI within Africa goes to Southern African countries where it is the top foreign investor. In 2003, 25% of SADC FDI was from South Africa (African Development Bank, 2003). Some South African MNCs are represented among top 50 developing country companies (UNCTAD 2004, Page and te Velde 2004).

FDI and Construction

In the past neoclassical theories of economic growth of Solow (1956) and others predicted that the growth impact of any infrastructure expansion would be temporary and subject to the same diminishing returns as other factors of production. FDI was therefore not considered seriously as a growth driver by mainstream economics in the past. However, recent endogenous growth models developed by Barro (1990), King and Rebelo (1990), and Barro and Sala-i-Martin (1995) etc. have finally lent credence to FDI growth enhancing qualities (Bengoa and Sanchez-Robles 2003). Barro and Sala-i-Martin, (1995) highlights the importance of improvements in technology, efficiency and productivity in stimulating growth. Theoretically FDI increases the rate of technical progress in the host country through a "contagion" effect from the more advanced technology and management practices used by MNCs which may lead to improvements in productivity and efficiency in local firms and hence economic growth (Findlay 1978, McCulloch, 1991, Bashir, 1999, Zhang 2001, Durham, 2004, Ramirez, 2006 and Türkcan *et al.* 2008).

Generally FDI enables domestic investment to deviate from domestic savings levels (Durham, 2004). This is because FDI provides additional capital to developing countries which may improve savings and disposable income in the local economy. The increase in savings may lead to more construction investment. FDI could be of utmost benefit to the development of constructed infrastructure in Africa, given the savings-investment gap of the region. Thus neo-classical researchers regard FDI as closing the savings-investment gap in developing countries (Chenery and Bruno, 1962). FDI is therefore an important development in the financing of constructed infrastructure in developing countries (Sader, 2000). The IFC (2002) acknowledge the

potential for profitable FDI in developing countries. Furthermore FDI may ease the exploitation and distribution of raw materials that are produced in the host country, by means of helping improve the network of transport and communication. A classic example is the construction of a road or a port by a foreign firm either single handedly or through partnership (Durham, 2004). FDI may also generate tax which helps host country to built facilities.

Recently there has been a growing shift in construction from public to private sector investment in public construction works (Tindiwensi, 2000, Chege, 2002, World Bank, 2004). One of the factors responsible is the increasing levels of demand for infrastructure services which have outstripped supply because of declining public funding (Milford, *et al.* 2000). Experience from Asia shows that private financing is considered resourceful and efficient (Raftery *et al.*, 1998). Construction is by far the single largest contributor to infrastructure or fixed capital. Over 50% of DFC is related to the output of the construction sector (Hillebrandt, 2000). With the rapid expansion of FDI in the global economy, the effect of FDI on the host economy, particularly on constructed infrastructure improvement has lately been of interest (Liu and Wang, 2003). However, the mixed findings reached by studies on the effect of FDI and host country suggest that these relationships should be examined closely. The paper aims at assessing the effect of FDI on the growth of the SACS output.

THE SOUTH AFRICAN CONSTRUCTION SECTOR (SACS)

The South African Construction Sector (SACS) plays a critical role in fostering economic development in the formal and informal economy. The sector contributed 35% to the Gross Domestic Fixed Capital Formation (GDFCF) and employed approximately 230 000 employees. the Gross capital formation of the construction (civil engineering) was R53.5 billion (16.7%) of the total capital formation in 2006 to this is added a further R35.8 billion for residential building and R33.4 billion for non residential buildings. thus the total value of the sector was R122 345 billion (38.2%) of the total gross capital formation in 2006(Thwala and Monese, 2008).The SACS is undoubtedly one the largest and most advance on the continent with a clear dominance of the South Africa Construction Contractors (SACCs) in Southern Africa Development Company /Common Market of East and Southern Africa (COMESA) region. The SACS has notable competitive advantages, particularly in providing basic infrastructure on the African continent. However, the SACS or has been on downward growth, threatening the survival of those advantages (Teljeur, and Stern, 2002).

The SACS has experience a couple of cyclical movement in recent times. The decline of construction in the later 1980s and early 1990s can be linked to a series 'Kuznets' and 'Kondratieff' cycles which relate to construction investment (Langenhoven 1993, 1994). Snyman (1989) shows that since 1946, the country has experienced a real growth rate in GDP of between 4% and 5% per annum (constant 1980 prices). While the long-term investment in building has exhibited a growth rate of 4% per annum, the building industry has experienced absolute decline much more frequently and with much greater variations than the trend for GDP (Snyman, 1989).

The periods of absolute decline in private investment in buildings are cyclical and seem to exceed and last longer than those for the public sector. These variations are partly to a medium term "Kuznets Cycle" Snyman (1991). Unlike the trends for private investment, public investment in buildings does not conform to the Kuznets cycle. Public residential investment experienced a sharp rise in the 1960s and 1970s and then declined dramatically in the early 1980s as a result of the change in

government housing policy. Likewise, public non-residential investment rose rapidly through to the mid-1970s, and has declined considerably since then, although there was a modest revival in the mid-1980s and late 1980s. In recent time in response to decreasing investment by government, SACCs have adopted more flexible production strategies (Merrifield, 1994, 1999). The SACS has taken a shift in the form of a "distorted reliance" on labour-only subcontracting (LOSC) (DPW, 1997). This has negatively affected the high unemployment rate and low skill levels in South Africa, consideing the importance of the SACS as an employer of labour with relatively elementary skills (Goldman, 2003).

ECONOMETRIC METHODOLOGY

The measurement of comovement among economic variables is key in several areas of economics and financial time series. The most popular measure of comovement is the well-known correlation coefficient. However, being a synthetic measure it can be rather limited unfolding the relationship between economic variables (Rua, 2005). Cointegration analysis is a better method of assessing comovement. An advantage of cointegration analysis is that through building an error-correction model (ECM), the dynamic co-movement among variables and the adjustment process toward long-term equilibrium may be examined(Maysami and Koh, 2000). To assess comovement between FDI, SACS and GDP the study adopts the Johansen cointegration and Granger causality tests. However the test for unit root/stationarity is done first to know the order of integration of the series.

Stationarity Tests
Ohanian (1988) cautions against interpreting regression equation estimated with non-stationary data. Thus Augmented Dickey Fuller and Phillips Perron test are used to test for unit root of the series. Cointegrations require that the number of times that the series must be differenced to achieve stationarity is the same across all the data(Perman 1991). Following the works of Nelson and Plosser (1982) and Perron (1988) we analyse the logarithm of the series instead of the level to account for the fact that there is a tendency for the dispersion of the series to increase with the absolute level (Perron, 1988).

Cointegration
Granger, C.W.J., 1986. Developments in the study of cointegrated economic variables. Oxford Bulletin of Economics and Statistics 48, pp. 213–228.Granger (1986) proposed to verify long-term equilibrium through cointegration analysis. A set of time-series variables are said to be cointegrated if they are integrated of the same order and a linear combination of them is stationary. Such linear combinations would then point to the existence of a long-term relationship among the variables (Johansen and Julelius, 1990). To test for cointegration between the time series of FDI, SACS and GDP the study use Johansen's (1988) maximum likelihood method.

Granger Causality test
This is a technique for determining whether one time series is useful in forecasting another. The test was proposed by Granger (1969) and popularized by Sims (1972). A variable X Granger-causes Y if Y can be better predicted using the histories of both X and Y than by using the history of Y alone. Only past values of X can cause Y.

Data
Time series data on FDI, SACS and GDP was extracted from the United Nation Conference on Trade and Development (UNCTAD) handbook of statistics available at

http://stats.unctad.org/Handbook and United Nations Statistics Division (UNSD)http://unstats.un.org/unsd/economic. The Data cover a 39 year period from 1970 through 2008. The series includes; FDI (Foreign Direct Investment) GDP (Gross Domestic Product) SACS (South African Construction Sector) SACG (the SACS /GDP ratio) and FDG (the FDI /GDP ratio).

RESULT

Test for stationarity
For each time series, the ADF and the PP tests were run twice: first, a constant was included (this assumes that the series does not exhibit any trend and has a nonzero mean) and second, a constant and a trend were included (this assumes that the series contains a trend). Also, the number of lagged first difference terms (in case of the ADF test) and the number of periods of serial correlation to include in the test regression (in case of the PP test) was determined for each time series. A '1' in Table 1 indicates that the series is integrated at order one (i.e., has one unit root) a '0' denotes that the series is stationary at level. The initial result of the ADF and PP tests cannot therefore reject the null hypotheses of stationarity in the series. The series were then transformed into logarithm and all the unit roots test reran. The result suggests that the null hypotheses of stationarity were rejected using the first difference of the series. The series are therefore said to be I (1) series. However the test for unit root for SACG and FDG were done with the original data (No Log).the test show that SACG is I(1) while FDG is I(0)(see Table 1).

Table 1: Result of Unit Root Test

		ADF test at level		ADF test in 1st difference		PP test at level		PP test in 1st difference		
S/no.	Series	No trend	With trend	No trend	With trend	No trend	With trend	No trend	With trend	Conc
1	LSACS	-1.870 (0.342)	-3.584 (0.045)	-3.924 (0.005)	-3.875 (0.023)	-1.772 (0.388)	-2.664 (0.256)	-3.844 (0.006)	-3.798 (0.028)	(1)
2	LFDI	NA	NA	NA	NA	-1.821 (0.362)	-2.803 (0.210)	-6.147 (0.000)	-6.329 (0.000)	1(1)
3	LGDP	-1.360 (0.590)	-2.873 (0.183)	-3.592 (0.012)	-3.640 (0.042)	-1.585 (0.480)	-2.499 (0.327)	-4.247 (0.002)	-4.258 (0.009)	I(1)
4	SACG	-2.204 (0.209)	-3.658 (0.038)	-4.322 (0.002)	-4.571 (0.004)	-1.264 (0.636)	-3.393 (0.377)	-2.960 (0.048)	-2.698 (0.243)	I(1)
5	FDG	-1.384 (0.577)	-2.393 (0.373)	-3.557 (0.013)	-3.983 (0.020)	-4.546 (0.001)	-5.319 (0.001)	-16.130 (0.000)	-25.941 (0.000)	I(0)

The first number in each cell represents the t-statistics while the one in bracket below is the p value

Test for Cointegration
Table 2 reports the results for the cointegration tests performed between LSACS, LFDI, LGDP, SACG and FDG. The Johansen cointegration test rejects the null hypotheses of no cointegration between LSACS andLFDI as well as between LSACS and LGDP. SACG and FDG are also significantly cointegrated at 5% level. The establishment of cointegration among these series rules out any possibilities of a spurious relationship between them and also suggests that a causal relationship must exist in at least one direction (Johansen and Juselius, 1990).

Table 2: Johansen Cointegration Tests

Series	Hypothesized No. of CE(s)	Eigenvalue	Trace Statistics	5 Percent Critical Value	P value **
LFDI and LSACS	None *	0.440513	21.38222	18.39771	0.0186
	At most 1 *	0.386377	9.767503	3.841466	0.0018
LGDPand LSACS	None *	0.329322	21.03148	18.39771	0.0209
	At most 1 *	0.155451	6.251223	3.841466	0.0124
FDG and SACG	None *	0.458712	31.87268	18.39771	0.0004
	At most 1 *	0.219344	9.161955	3.841466	0.0025

* denotes rejection of the hypothesis at the 5% level
**MacKinnon-Haug-Michelis(1999)p-values

Test for Granger Causality

The result of the Granger causality test including lag length, F-statistics and p-values is summarized in Table 3. The LSACS leads LFDI and LGDP by four and one year respectively. LGDP also leads LSACS by one year while LFDI does not lead the LSACS. The FDG leads SACS but after a considerable lag of 7 years, the SACG however, does not lead the FDG. The LSACS is significantly affected by the LGDP and not affected at all by the LFDI.

Table 3: Granger Causality test result

s/no.	Direction of causality	Lag length	F-statistics	P values
1	LSACS→ LFDI	4	10.131	0.013**
2	LSACS →LGDP	1	5.960	0.020**
3	LFDI →LSACS	NA		
4	LGDP → LSACS	1	4.632	0.038**
5	SACG→ FDG	NA		
6	FDG →SACG	7	2.166	0.092*

Figures marked with * and ** indicate significance at the 0.10 and 0.05 levels, respectively

DISCUSSION

The result has shown that FDI in South Africa have no significant effect on the output of the SACS output. This finding is not unexpected considering the fact that the republic of South Africa only joined the global economic community recently in 1994. Before 1994 South African has remained largely internationally isolated and globalizations hardly have impact on its domestic economy and FDI then was dominantly negative (Loots, 2002). Another possible reason for no relationship between LFDI and LSACS is the fact that in recent time the fortune of SACS has been on the decline (Teljeur, and Stern, 2002). However as Loots (2002) notes that globalization is now assuming greater role in the economy of South Africa with 98% of growth largely driven by globalization. This may explain the significant effect that FDG has on the SACG of South Africa after seven years lag. It is also noteworthy that since 1994, SACCs have been exploring the African continent and have dominated the SADC and COMESA region with relative ease (Teljeur, and Stern, 2002). The relationships may also have been affected by the cyclical movement in the SACS. The cycles which is caused by declining public spending on infrastructure has been a major cause for concern (Kilian 1980, Van Duijn, 1983, Snyman, 1989, 1991, Langenhoven, 1993, 1994 and Merrifield 2002). Quite interestingly the result shows that the fortune of the SACS and the GDP are inextricably interrelated with one year lag mutual causal relationship. This result agrees completely with Seeley, (1997) and Hillebrandt, (2000) that construction and the economy are inextricably related.

CONCLUSION

The study concludes that Foreign Direct Investment that started with the multiparty all race democracy in 1994 has yet to make significant impact on the SACS. However, with the marginal effect of FDG on SACG it is expected that the effect of FDI on SACS will improve with time as fortunes of FDI and the SACS improves and stabilizes. The paper suggests that the South Africa government should improve its capital control policy to attract more FDI into the South African economy particularly into the SACS. There must also be a policy of Liberalization of public infrastructure provision to attract foreign interests in physical infrastructure investment.. Improved and planned public infrastructure investment to reduce the negatives effect of the South African construction cycles.

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