Is South Africa's current account deficit sustainable? – An analysis using intertemporal solvency framework

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Abstract

The study examines the sustainability of the deficit in the current account using an intertemporal solvency framework. The study covers the period 1990Q1 to 2018Q4. An intertemporal solvency approach requires that NO "Bubble Financing" condition has to be met. This framework allows us to test the cointegration between exports and imports. The lack of co-movement between these two variables indicates the unsustainability of the deficit in the current account. The cointegration test is conducted through the Johansen and the Gregory and Hansen cointegration tests. The Gregory and Hansen cointegration procedure allows us to account for structural breaks. The findings show that South Africa is faced with an unsustainable current account deficit and these results were found not to be surprising given numerous macroeconomic shortcomings that have a bearing on the stance of the current account. The paper highlights that the country's financing method of the current account might be characterised as "Bubble Financing" (dependence on further borrowing to repay the existing debt). Based on the results from this study it is clear that the composition of the current account financing is critical for sustainability. Thus, further research on financing methods is necessary.

1. Introduction

It is well known that South Africa has been running a persistent current account deficit since 2003 and that is not unique, as emerging markets such as Brazil and Mexico as well as developed countries such as Australia, Canada and United States, have been running large deficits for decades (Tastan and Aric, 2016, Belkar *et al*, 2007, Edwards, 2005, Hakkio, 1995, Howard 1989, Blanchard, 1983). It is clear from the economic literature that running a

current account deficit is not a problem if it can be sustained (Ghosh and Uma, 2018, Binatli and Sohrabji, 2008, Obstfeld and Rogoff, 2007, Bosworth *et al*, 1999, Milesi-Ferretti and Razin 1996). However, in determining whether the current account deficit is (un)sustainable, it depends on the reasons why the country is running a negative balance. Theoretically, there are two reasons involved for a country to run a deficit; first, a country can run a current account deficit for investment purposes and the other for consumption purposes. The danger with the latter is that there is no hope of future returns to repay creditors and thus, poses more threats on the sustainability of the current account. However, even if a country runs a deficit for investment purposes, there is no guarantee that the investment will yield positive returns. Fruitless investment can also pose risks to the sustainability of the current account, especially in developing economies (Calvo *et al*, 1996 and Bosworth *et al*, 1999). In other cases it maybe a combination of both, poor investment and consumption (Edwards, 2001). It would be interesting to know which side of the coin South Africa holds. In addition to reasons of running a current account deficit, the method of financing such deficit could also raise a question of sustainability (Ok, 2008 and Edwards, 2001).

The current study is particularly concerned with the method of financing South Africa's current account deficit, as South Africa has largely relied on portfolio inflows to finance its persistent current account deficit. Portfolio inflows increased drastically from an average of R26.7 billion over the period 1998-2007 to R120.7 billion on average over the period 2009-2018. Further, these portfolio inflows have been dominated by debt inflows which take on added significance given the recent deterioration in investor and business confidence. Large reliance on portfolio inflows (which are volatile in nature) to sustain a persistent current account deficit, raises concerns about sustainability of deficit (Freund 2005, Clarida 2006 and Debelle and Galati, 2007). More recent data, shows that EMEs have continued to attract Portfolio flows from non-residents in particular, which could explain widening current deficit in countries like south Africa through the income component of the current account, infact interest payments from government and parastatals debt sold to non-residents account for about 50% of current account deficit or 1.6% of GDP of this deficit. During August 2019 emerging markets excluding China experienced significant amount of equity outflows since November 2016, pulling out about USD13.8 billion (Institute of International Finance, 2019). The reversal in net capital flows was mainly driven by trade conflict and increased fears of global recession (Institute of International Financial, 2019). The Institute of International Finance forecast South Africa to experience capital ouflows, amounting to USD14.6 billion

in 2019. Any significant capital reversals will have significant impact on South Africa's current account deficit that relies on these inflows to remain afloat (IMF Article IV, 2018).

In addition, South Africa's rising public debt, rising debt-service costs, declining foreign direct investment and low potential growth all have a bearing on the current account stance and these macroeconomic shortcomings suggest that it would be difficult to sustain prolonged and large external deficits without eventually suffering negative economic and financial consequences (SARB, 2019). The vulnerability of the South African economy is compounded further by the ratio of foreign debt to GDP that has more than doubled since the global financial, reaching 50% of GDP in 2017, compared to an average of just 24% for the period from 1990 to 2008. In such economic environment it would be important to know if the country is running a sustainable current deficit given the serious economic repercussions an unsustainable deficit possess. .

Sustaining persistent deficits may be costly, as domestic interest rates would have to increase to levels above world interest rate to attract foreign capital and accumulation of external debt to finance deficit implies increasing interest payments, thereby imposing an excess burden to future generations and consequently, adversely affect standard of living (Guerin, 2012 and Wu, 2000). On the other hand, an unsustainable current account deficit is even more concerning, as it could drain economic activity (Baharumshah *et al*, 2003). An unsustainable current account deficit could discourage investment into the domestic economy, as existing investors could sell-off their assets including government bonds (Tastan and Aric, 2016). This could translate to a rise in yields and significant depreciation of the country's currency.

From a macroeconomic perspective, the outflow of capital would result in a decline of investment, thereby constraining productivity, leading to a decline in economic growth. An unsustainable current account deficit could also elevate credit risks for the country (IIF, 2019). The ability of the country to service its debt by relying on further borrowing is also likely to be questioned once the deficit becomes persistent ((Freund 2005, Clarida 2006 and Debelle and Galati, 2007). Capital Flow reversals can be highly disruptive because private consumption, investment, and government expenditure must be curtailed abruptly when foreign financing dries up and, indeed, a country is forced to run large surpluses to repay amount borrowed from international markets (Ghosh and Ramakrishnan, 2018). (Ghosh and Ramakrishnan, 2018) further posit that regardless of why a country has a current account

deficit (and even if the deficit reflects desirable underlying trends)—large and persistent deficits call for caution, to avoid an abrupt and painful reversal of financing.

In this study current account sustainability can be defined in the form of solvency, that is, the country's ability to generate sufficient trade surpluses in the future to repay existing foreign debt, assuming that in infinity debt limit converges to zero. In other words, the country's current account is sustainable if it satisfies the intertemporal solvency framework which requires a no-Bubble Financing condition. Bubble financing is when the country's present value of future current account balance is below the present value of existing debt. According to this approach, there has to be a long-run relationship between exports and imports for sustainability to be achieved.

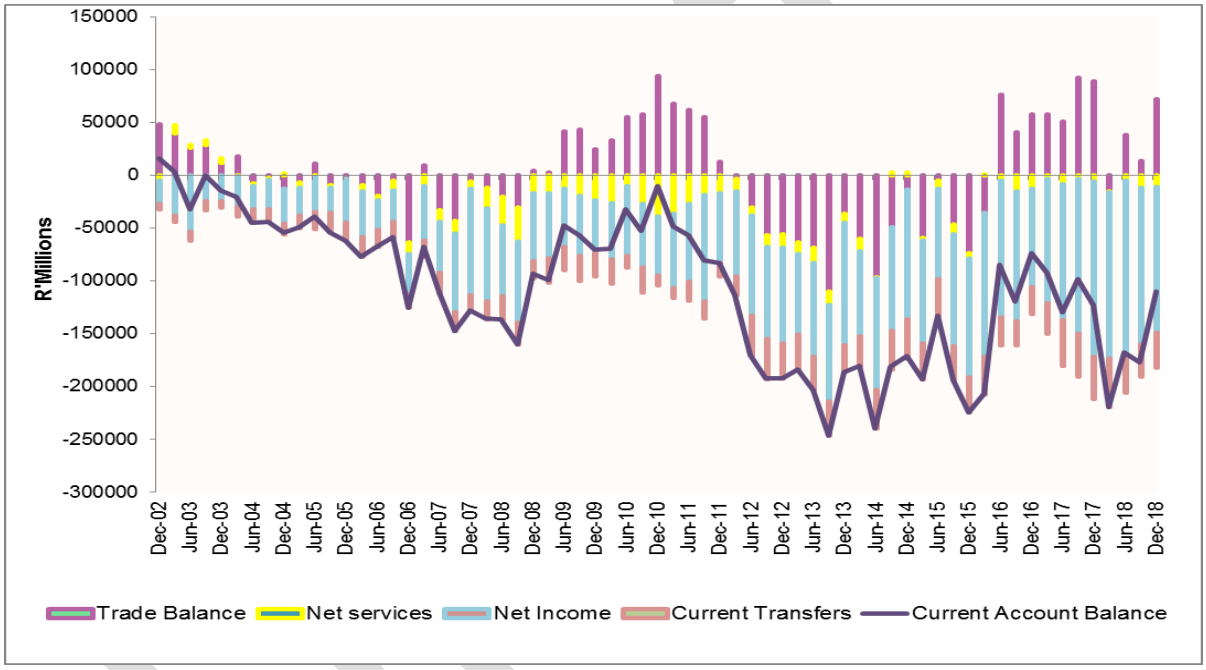
2. South Africa's Current Account – Stylized Facts

South Africa has experienced a persistent current account deficit, which peaked at R246.5 billion (6.9 % of GDP) in the third quarter of 2013 before declining drastically to R110.2 billion (2.2% of GDP) in the fourth quarter of 2018. The improvement is largely due to the trade balance, which has fallen from -R109.9 billion (-3.1% of GDP) in 3Q2013 to R71.8 billion (1.4% of GDP) in 4Q2018. However, in contrast, the services, income and transfer (SIT) account remains in deficit close to 4% of GDP. Over the period 1Q1990-4Q2018, the SIT account has been the leading driver of the deficit in the current account. On an annual basis the current account deficit widened to R172.9 billion in 2018, compared to R118.2 billion in 2017.

The persistent net income deficit could be attributed largely to substantial interest payments and dividends payments (Figure 2b). Although, a general decline in FDIs could have resulted to a slight drop in net dividend payments in recent years (Figure 1 and 2b). High interest payments reflect increasing portfolio flows into the country since the global financial crisis and the inclusion of South Africa in the World Government Bond Index (WGBI), where non-residents holdings of government debt are close to 40%. South Africa's debt to GDP ratio has risen from around 30% in 2010 to over 50% in 2018, while interest payments to foreigners have tripled from 0.4% of GDP in 2010 to over 1.0% end 2018.

A further breakdown of the income balances shows that portfolio flows and interest payments are the main driver of the income deficit (Figure 2a and 2b). Firstly, income credits towards South Africa are small relative to income debits, which represent the outflow of income payments. Therefore, it can be argued that in South Africa's case, the vulnerability lies on the large reliance on portfolio inflows to finance the current account deficit. In the event of a sudden stop of capital inflows or a reversal, this would result in non-residents selling off their local currency denominated debt causing severe pressure on the rand exchange rate and a rise in borrowing costs, eventually lead to instability in the domestic economy.

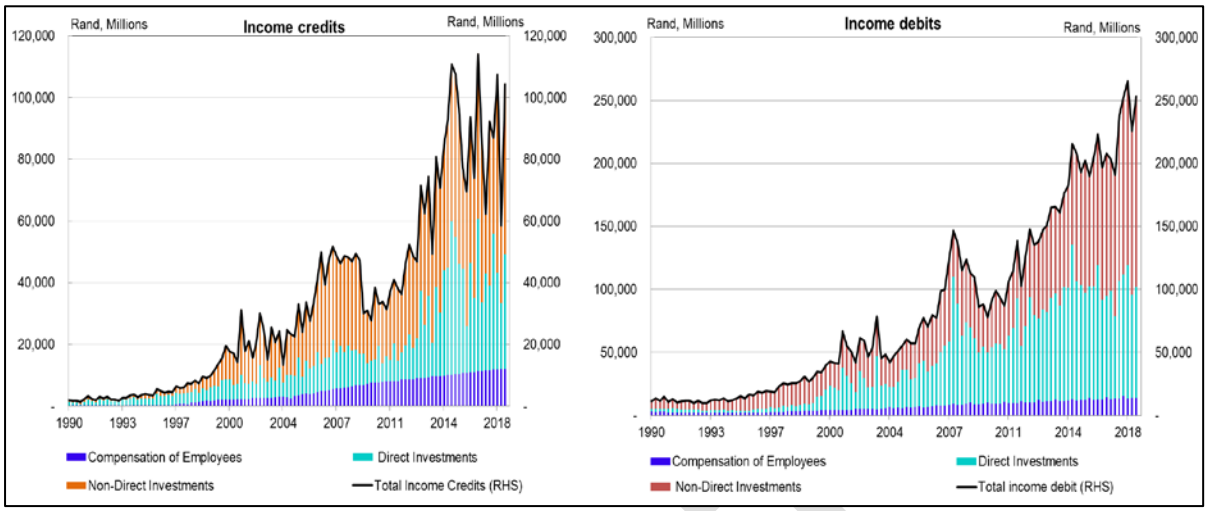
Figure 1 Net income is a leading driver of South Africa's current account deficit[1]



Source: SARB

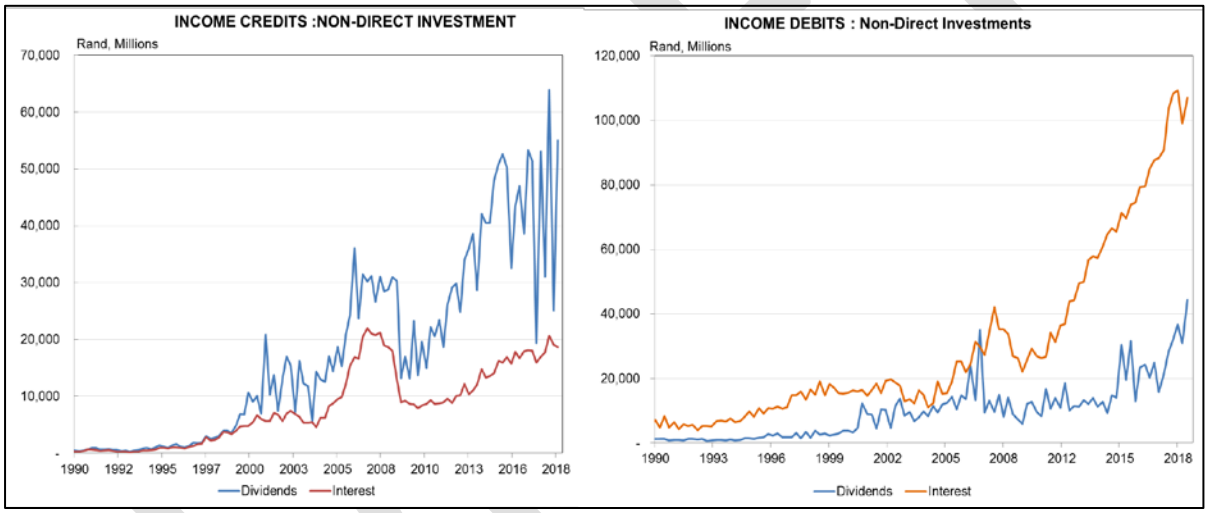
[1] **Trade Balance** = Merchandise exports + Net gold exports – Merchandise imports; **Net Income** = total Income receipts – total income payments. Total Income consists of compensation of employees, dividends and interest on direct and non-direct investment. **Net Services** = Service receipts – Service income. Total services consist of transportation, travel and other services. **Total current transfers** consist of central government and other sectors. In South Africa's case current transfers are dominated by SACU payments.

Figure 2a Portfolio flows of income debits far outweigh income credits



Source: Bloomberg

Figure 2b Interest payments to foreigners is a major driver of the income deficit



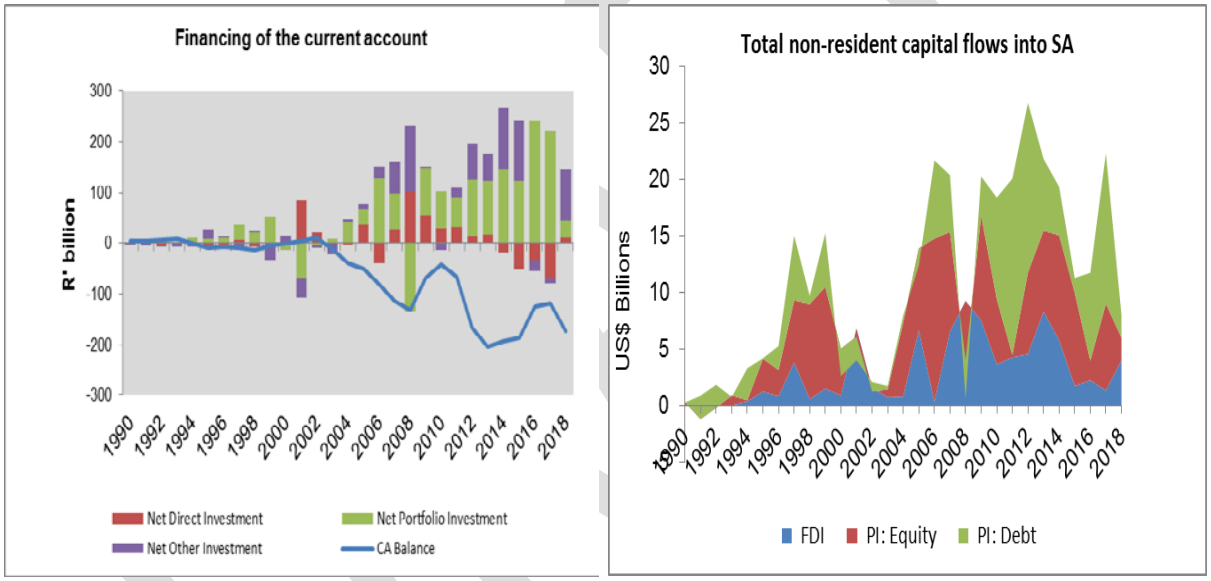
Source: Bloomberg

2.1 Financing of the current account deficit for South Africa

It is evident from the figure 3 below that since its advent in 2003; South Africa's current account deficit has been largely financed by portfolio flows. Following the global financial crisis, portfolio flows flocked into the country to levels above pre-crisis, while FDIs have been declining since 2014. The net portfolio investment declined drastically from R73.4 billion in 2007 to -R134.9 billion in 2008 and the current account deficit was partly sustained by an increase in net direct investment from R25.2 billion in 2007 to R102.0 billion in 2008.

Thereafter, net portfolio inflows surged to R220.4 billion in 2017 and sustained the current account deficit while net direct investment declined severely to an amount of -R80.5 billion. There other concerning factor is the large share of debt flows through bonds from non-residents and there has been surge of these flows since the global financial crisis (Figure 3). Non-residents hold about 41% of local currency government bonds. The empirical literature is fairly conclusive that debt flows are more pro-cyclical, volatile and generate greater financial stability risks than equity flows (Cardarelli *et al*, 2010 and Forbes and Warnock , 2012). South Africa seems to be dependent on debt flows to keep the ship sailing and in 2018 the IMF noted that gross external financing needs are relatively large for South Africa. Therefore it is worth examining the sustainability of the current account.

Figure 3: Financing of the current account and total non-resident capital flows into SA



Source: South African Reserve Bank Database

Although foreign debt of South Africa is largely rand-denominated (56% of total foreign debt in 2017) which somewhat curbs risk, the rapid increase of gross external debt is a concern. Gross external debt has more than tripled from an average of US$40.3 billion over the period 1990 to 2008, to US$134.8 billion from 2009 to 2018. While the ratio of foreign debt to gross domestic product has more than doubled since the crisis, reaching 50% in 2017, compared to an average of 24% in 1990 to 2008 (see Figure 4 and 5 in annexure A). In terms of short-term external debt to total external debt, South Africa's vulnerability comes from the private sector that held about 15% end- 2018, while public sector (public corporations and government) held about 52% of long-term foreign debt (see Table 1 in annexure B).

3. Literature Review

In assessing the sustainability of the current account, there are four distinct approaches that have been discussed in the literature. These include the accounting approach, practical criteria, present value model of current account (PVMCA) and intertemporal budget constraint (IBC). While the study will briefly review different approaches, the attention will be on studies that have used the intertemporal solvency approach (used interchangeable with intertemporal budget constraint).

On the accounting approach, Opoku-Afari (2007) depicts the current account sustainability as follows:

$$\Delta b_t = \left[\frac{1+i_t}{1+g_t}\right] b_{t-1} - (x-m)_t = 0$$

Where b_t is the foreign debt as percent of GDP, i denotes interest rate, g_t indicates GDP growth rate and $(x-m)_t$ is the trade balance as percent of GDP. The equation shows that if the stock of foreign debt is unchanging, the foreign debt-to-GDP also remains unchanged, and then the trade balance and the current account are sustainable. However, this situation assumes equality between interest rate and growth rate, which is unlikely in the real world given endogenous factors that influence interest rate (Searle and Mama, 2010). Thus, this approach is mainly criticised for making an assumption that debt grows at the same rate as GDP in order to keep the foreign debt-to-GDP ratio constant (Searle and Mama, 2010). The other shortcoming is that this approach assumes liabilities can continue to grow at the interest rate-to-GDP growth rate differential, ignoring the role investors ultimately play in determining the evolution of an economy's liabilities (Hudson and Stennett, 2003).

A fair number of studies have used this approach to analyse the sustainability of the current account deficit. These include Liu and Taner (2001), Holmes (2004), Chortareas *et al*. (2004), Dugler and Ozdemir (2005), Ismail and Baharumshah (2008), Kim *et al*. (2009), Christopoulos and Leon-Ledesma (2010), Chen (2011) and Cigdem (2017). Trehan and Walsh (1991) employ the accounting approach to assess the sustainability of the current account for the United States and find that the country is running a sustainable deficit. Opoku-Afari (2007) also uses this approach and find that the Ghanian current account deficit is excessive and fragile.

The use of PVMCA to assess the current account sustainability allows us to compute the optimal current account and compare this optimal level of the current account with the actual current account balance (Hudson and Stennett, 2003). Hudson and Stennett (2003) refer to this approach as Intertemporal Benchmark Model (IBM), but it is an approach pioneered by Obstfeld and Rogoff (1994). With this approach the condition is that if the actual current account deficit is significantly higher than the optimal level it implies unsustainability of the current account deficit. Policy makers must therefore seek to narrow the gap between the actual and optimal current account levels. Some studies have also used the PVMCA approach. These include, Cashin and McDermott (1998), Makrydakis (1999), Hudson and Stennet (2003), Khundrakpam and Rajiv (2008), Kim, *et al*. (2009), Karunaratne (2010) and Mukhtar and Khan (2016). Adedeji *et al.* (2008), uses this approach and finds the current account deficit to be unsustainable for Nigeria.

On the other hand the practical criterion has been the least used approach. The advantage of using the practical criteria approach is that it provides a wider view about the sustainability of the current account, compared to accounting and IBC approaches (Binatli and Sohrabji, 2012). The practical approach considers various ratios, such as current account deficit-to-GDP, foreign currency reserves and the composition of the current account. According to Searle and Mama (2010) a current account deficit-to-GDP above five percent should be a concern. The foreign currency reserves indicate the country's ability to finance its imports (Jakšić et al, 2018). The composition of the current account is of central importance, as trade balance and net income have implications for sustainability (Searle and Mama, 2010). Although it can be argued that trade deficit poses more threat to sustainability as a result of structural competitiveness problems, if large capital flow induces the deficit in the current account, then the composition of those flows can have a significant impact on current account sustainability (Searle and Mama, 2010).

The approaches above have advantages, but given the objectives and methodology of this study, the author will consider the fourth approach, that is, the intertemporal solvency approach. Thus, the empirical literature below focuses on the studies that use this approach. A detailed intertemporal solvency framework is provided in the next section.

The testing of the sustainability of the current account deficit has been widely conducted in advanced and emerging markets using the intertemporal budget constraint. One of the early studies by Husted (1992) finds the United States current account deficit to be sustainable. On

the contrary, Fountas *et al*. (1998) employs various econometric tests that included standard Engle-Granger cointegration tests and other two tests that account for presence of structural breaks in the cointegration relation between exports and imports for the United States and conclude that the country's current account deficit is not sustainable. These findings are supported by Hatzinikolaou and Simos (2013), using a new methodology that considers the undiscounted value of the debt and the authors find the current account deficit to be unsustainable.

Dulger (2016) tests for sustainability of the current account in 18 developed and 10 emerging and developing countries. For developed economies, the list includes Australia, Austria, Canada, Denmark, Finland, France, Germany, Israel, Italy, Japan, South Korea, Netherlands, New Zealand, Norway, Spain, Sweden, United Kingdom and United States. The list for emerging and developing countries includes Argentina, Brazil, Chile, Indonesia, Mexico, Peru, Philippines, South Africa, Thailand and Turkey. The author uses a cointegration test and Gregory and Hansen cointegration methodology. The main finding of this paper supports a weak form of sustainability for all countries in the long-run, whereas 20 of 28 countries have shown a relatively strong form of sustainability especially post-2000 era. Eight countries (Canada, New Zealand, Spain, Brazil, Mexico, South Africa, Thailand, and Turkey) results reflect weak form of sustainability and the author posit that these findings may be perceived as a warning to creditors and policymakers unless there are policy distortions or permanent productivity shocks to the domestic economies.

Callamand *et al*. (2018) studies current account sustainability in four major Latin America countries (i.e Brazil, Chile, Colombia and Mexico) using an empirical model that allows for the presence of several regimes. The authors find that there is a long-run relationship between the income and expenditure of the current account for all four countries, this implies that the current account deficit is sustainable for these countries. Donoso *et al.* (2014) applies a different approach (linear and nonlinear unit root tests) to examine the sustainability of the current account deficit in 18 Latin American countries, and the results show a sustainable current account deficit for the majority of the sample with the exception of Argentina, Brazil, Chile and Paraguay.

A range of studies have analysed the sustainability of the current account for Turkey and these studies reflect increasing concerns about sustainability post the 2008 global financial crisis amid rising share of debt flows to the country. Kalyoncu (2005) finds evidence of

sustainable current account in the long-run for Turkey. Insel and Kayikci (2012) show that the trade deficit was the main driver of the negative balance in the current account. The authors, however, were concerned about the increasing share of debt instruments used to finance the deficit in the current account relative to foreign direct investment. Based on this, the authors indicated that Turkey's current account deficit has become increasingly difficult to sustain.

Binatli and Sohrabji (2012) present evidence of current account sustainability for Turkey, using the standard Johansen Cointegration test and the Gregory and Hansen Cointegration test. However, the authors do support the previous study's concerns that the current account may not be sustainable in the long-run. Hudson and Stennett (2003) find Jamaica's current account to be sustainable, but the authors indicated that despite the positive results, increasing net external liabilities poses risks to the country's long-run sustainability of the current account deficit. In an African context, Yol (2009), tested for sustainability of the current account in Egypt, Morocco and Tunisia for the period 1972-2005. The author finds evidence of sustainability only for one country (Tunisia), while Egypt and Morocco are found running unsustainable deficits.

In addition to the international literature discussed above, few studies have researched the sustainability of the deficit in the current account from a South African perspective. Smit (2007) assesses whether the increasing current account deficit represent a problem that warrants attention from macroeconomic policymakers in South Africa. Using an intertemporal approach, the author finds that the level of current account deficit is very high and noted that it might be unsustainable in the long-run and concluded that the deficit is at a level that is worthy of macroeconomic policy attention.

Draper and Freytag (2008) analyse trade deficit and the sustainability of the deficit in the current account. The authors find South Africa's current account deficit to be sustainable and noted that capital inflows are mainly used to finance investments. On the other hand, Searle and Mama (2010) use the IBC approach to test the sustainability of the current account deficit and the results suggest that the deficit is sustainable only when allowance is made for structural breaks. However, from all the studies above, the authors raise strong concerns of increasing portfolio flows that might threaten the sustainability. Furthermore, Tastan and Aric (2016) use a nonlinear framework and find the sustainability hypothesis is valid for South Africa. In addition, Strauss (2015) investigates the role of FDI income on the current account

deficit and finds that on average 37% of South Africa's current account deficit from 2004 to 2013 was due to net payments made to foreign direct investors. However, this has changed drastically; now most net payments are made to portfolio investors (Figure 2a and 2b).

Therefore considering the sustainability concerns a volatile method of financing of the current account deficit for South Africa justifies conducting the current study. In addition, although a number of studies have employed the intertemporal solvency approach, very few have used the Gregory and Hansen Cointegration procedure and none of the studies in local literature have used this procedure as far as the author knows. To be specific, the motivation for this research comes from, increased inflows of portfolio capital, methodological sphere and the importance of analysis of repercussions that current account unsustainability can trigger. This research could not have been timelier, given the deteriorating domestic economic outlook, which may trigger capital reversals, even sudden stops, thereby threatening sustainability.

4. Intertemporal Solvency Framework to assess the sustainability of the current account

This paper follows a well-documented theoretical model used by Hakkio and Rush (1991) and Husted (1992). The intertemporal solvency framework takes analogy of an individual seeking to smoothen consumption overtime, and assumes that an open economy faces a similar budget constraint:

$$C_t = Y_t + B_t - I_t - (1 + r_t)B_{t-1} \qquad (1)$$

Where C_t denotes consumption, Y_t indicates income, B_t represents net borrowing, I_t symbolises investment, r_t is interest rate, all at time *t* (*t* means current period). The term B_{t-1} is net debt from previous period. Equation (1) must hold in every period and that means the present value of your future earnings or assets must be sufficient to cover today's debt. This intuition gives us the following:

$$B_t = \sum_{i=1}^{\infty} \vartheta_t [Y_{t+i} - C_{t+i} - I_{t+i}] + \lim_{n\to\infty} \vartheta_n B_{t+n} \qquad (2)$$

Where $\vartheta_i = \prod_{j-1}^{i} \frac{1}{1+r_{t+j}}$

Equation (2) implies that the amount a country borrows or lends in international markets equals the present value of the future trade surpluses or deficits, assuming the last term is equal to zero. If this term $\lim_{n\to\infty} \vartheta_n B_{t+n}$ (limit term) is not equal to zero and net borrowing (B_t) is positive, this implies "bubble financing" or "Ponzi-scheme". In other words, the country is dependent on future borrowings in order to repay the existing debt. This situation is completely against the intertemporal solvency approach and if this condition is not satisfied, the country's current account is unsustainable. While a negative B_t suggests the country could improve welfare by lending less.

Since trade balance is the difference between exports $(X)$and imports(M), equation (1) can be rewritten as follows;

$$X_t - M_t = Y_t - C_t - I_t = -B_t + (1 + r_t)B_{t-1} \quad (3)$$

Ogus and Sohrabji (2008), assumes that if the world interest rate is stationary with unconditional mean of r we can add and subtract rB_{t-1} and rewrite the equation (3) to obtain,

$$M_t + (1 + r_t)B_{t-1} + rB_{t-1} - rB_{t-1} = X_t + B_t \quad (4)$$

Thus, equation (1) can be rewritten as the following:

$$Z_t + (1 + r)B_{t-1} = X_t + B_t \quad (5)$$

Where $Z_t = M_t + (r_t - r)B_{t-1}$

Hakkio and Rush (1991) and Husted (1992) solve equation (5) by forward substitution and obtain the following:

$$M_t + r_t B_{t-1} = X_t + \sum_{j=0}^{\infty} \vartheta^{j-1} \left(\Delta X_{t+j} - \Delta Z_{t+j}\right) + \lim_{t\to\infty} \vartheta^{t+j} B_{t+j} \quad (6)$$

Where $\vartheta = \frac{1}{(1+r)}$ and Δ is the first difference operator. Note that the current account can be obtained from equation (6) by subtracting X_t and multiply by (-1) from both sides of the equation. This gives, $X_t - M_t - r_t B_{t-1} = CA_t$. To add, the left hand side of equation (6) represent payments on M_t and interest payments on net foreign debt from the previous period $(r_t B_{t-1})$. Konya (2009) also provides a more comprehensive discussion of the model.

Following Husted (1992), we can assume that X_t and Z_t are non-stationary processes with a drift such that, $X_t = a_1 + X_{t-1} + v_{1t}$ and $Z_t = a_2 + Z_{t-1} + v_{2t}$, therefore equation (6) can be expressed as

$$M_t + r_t B_{t-1} = X_t + \frac{(1+r)^2(a_1-a_2)}{r} + \sum_{j=0}^{\infty} \vartheta^{j-1}(v_{1t} - v_{2t}) + \lim_{t\to\infty} \vartheta^{t+j} B_{t+j} \quad (7)$$

According to Ogus and Sohrabji (2008), equation (7) can be rewritten as

$$X_t = a + MM_t - \lim_{t\to\infty} \vartheta^{t+j} B_{t+j} + v_t \quad (8)$$

Where $a = \frac{(1+r)^2(a_2-a_1)}{r}$, $MM_t = M_t + r_t B_{t-1}$ and $v_t = \sum_{j=0}^{\infty} \vartheta^{j-1}(v_{2t} - v_{1t})$.

Assuming the limit term in equation (8) is equal to zero and adding the error term, the following regression equation is obtained:

$$X_t = a + \beta_t MM_t + \varepsilon_t \quad (9)$$

The symbols a and ε_t represent a constant and an error term, respectively. The intertemporal budget constraint condition will be satisfied if X_t (i.e exports) and MM_t (i.e imports plus interest payments plus net current transfers) are integrated of order one, i.e I*(1)* and cointegrated. Intuitively, failure to detect the co-movements between the exports and imports implies that the economy does not satisfy the IBC condition, resulting in default of its debt. Again, for a null hypothesis that a country is satisfying its intertemporal budget constraint, β would be expected to be greater or equal to 1. In addition, to satisfy the IBC condition the error term will also have to be stationary, i.e I*(0)* process. This would mean that the current account deficit is sustainable. In this paper the intertemporal solvency framework above is used to test for the sustainability of current account for South Africa. The intertemporal solvency approach and intertemporal budget constraint are used interchangeable.

5. Econometric Methodology

In this section, equation (9) above is used to test for a long-run relationship between exports (X_t) and imports (MM_t). Firstly, the order of integration is determined through testing of the unit root using three standard tests, namely; the Augmented Dickey Fuller (ADF), Phillips-

Perron (PP) and Kwiatkowski–Phillips–Schmidt–Shin (KPSS) tests. It is believed in this study that using more than one test would limit biasness.

5.1 Test for Cointegration

5.1.1 Johansen cointegrating test

Once the order of integration for the two series is found to be $I(1)$, the study will test for cointegration using the standard Johansen test. The Johansen cointegration test is a multivariate framework proposed by Johansen (1998) and Johansen and Juselius (1990), which is shown to possess several advantages compared to the residual based Engle-Granger 2-step approach. In conducting the Johansen test, consider the following Vector Autoregressie (VAR) model:

$$Y_t = \partial + \sum_{i=1}^{p} \prod Y_{t-i} + \omega_t \qquad (10)$$

Where $Y_t = [X_t, MM_t]'$, ∂ is a 2 x 1 vector of deterministic variables, $\prod is\ a$ 2 x 2 coefficient matrix and ω is a 2 x 1 vector of disturbances with normal properties. If there exists a long-run relationship between real exports and real imports, then equation (10) may be reparameterized into the follwoing Vector Error Correction Model (VECM):

$$\Delta Y_t = \partial + \sum_{i=1}^{p-1} \theta_i \Delta Y_{t-i} + \prod Y_{t-1} + \omega_t \qquad (11)$$

Where Δ is the first difference operator and θ is a 2 x 2 coefficient matrix. The rank, r, of $\prod$ determines the number of cointegrating relationships. If the $\prod$ matrix is of full rank or zero, the VAR model is estimated in levels or in first differences, respectively, since the variables are not cointegrated. However, if the rank of $\prod$ is less than n then there exists 2 x r matrices, β indicating cointegration parameters and α (the adjustment matrix, which describes the weights with which each variable enters the equation) such that $\prod = \alpha\beta'$, and equation (11) provides the more appropriate framework. The $\prod$ matrix is estimated as an unrestricted VAR and tested to see whether the restriction implied by the reduced rank of $\prod$ matrix can be rejected.

Moreover, the trace and maximum eigenvalue test statistics are used to determine the cointegrating rank of the $\prod$ matrix. The trace test statistic can is given by $Q_t = -T\sum_{i=T-1}^{k}\log(1-\lambda_i)$, for $r = 0,1,\dots,k-1$ and $\lambda_i =$ the i-th largest eigenvalue. While the maximum eigenvalue test statistics is given by $Q_t = -Tlog(1-\lambda_{T-1}) = Q_T - Q_{T+1}$.

5.1.2 Gregory and Hansen cointegrating procedure

The study further uses the Gregory and Hansen (1996) cointegrating procedure to account for structural breaks. There are periods such as 1994 (trade liberalisation), 2003 (start of current account deficit), 2008 (global financial crisis) and 2013 (taper tantrum) that could imply a structural change in the cointegrating relationship between exports and imports for the South African economy. Instead of setting an a priori structural break, the Gregory and Hansen (1996) cointegration test procedure determines the structural break endogenously. These authors consider three models, the first allowing for a level shift, modelled as;

$$X_t = \mu_1 + \mu_2 D_t + \beta_1 MM_t + \varepsilon_t \qquad t = 1 \dots \dots \dots, n, \qquad (12)$$

where μ_1 and μ_2, represent that intercept before and after the shift, respectively. While D_t is a dummy variable which takes the value of one for period following the structural break point and a value of zero for all other periods.

The second, a level shift and trend,

$$X_t = \mu_1 + \mu_2 D_t + \theta_1 t + \beta_1 MM_t + \varepsilon_t \qquad t = 1 \dots \dots \dots, n, \qquad (13)$$

and the third, a level and slope shift, also referred to as the “regime shift”,

$$X_t = \mu_1 + \mu_2 D_t + \beta_1 MM_t + \beta_2 MM_t D_t + \varepsilon_t \qquad t = 1 \dots \dots \dots, n. \qquad (14)$$

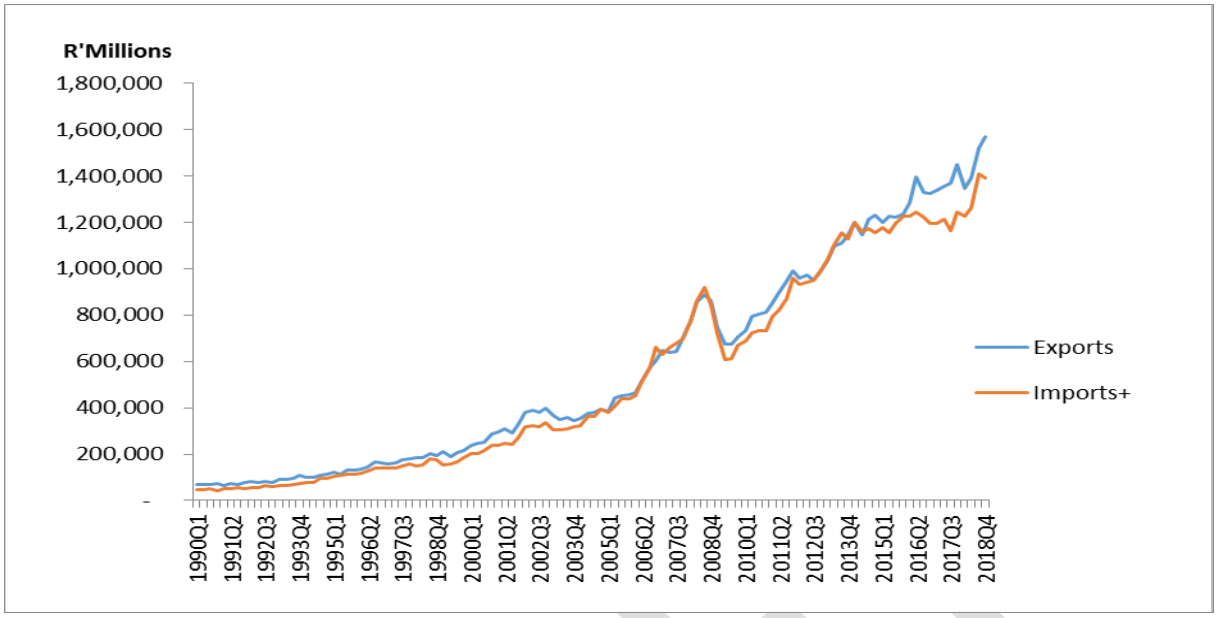
Where β_2 , represents shift in slope after the structural beak. In this paper we will look at all three models for more comprehensive analysis.

The Gregory and Hansen (1996) method uses a grid search procedure, which considers breakpoints in the central 70% of the sample (between 0.15N to 0.85N, where N is the number of observations). The ADF and Phillips test statistics, Z_t and Z_a are estimated for each possible breakpoint. If there is a cointegration with a structural break, the Gregory and Hansen (1996) procedure allows us to estimate and observe the value of the cointegration coefficient (β_1). This coefficient is of particular interest as (β=1) is the condition for a country to satisfy the intertemporal solvency approach.

6. Data

This paper uses quarterly time series data spanning the period 1990Q1 to 2018Q4. Data on total exports and imports has been sourced from the South African Reserve Bank (SARB). This data further expressed in natural logarithms. Consistent with the theoretical framework, nominal exports include exports of goods and services, while nominal imports include import of goods and services plus net interest payments plus net current transfers. Despite most studies considering real values of exports and imports, in this study it would only make sense to use nominal values as the extended definition of total imports includes nominal variables (net interest payments and net transfers). Besides, these variables (exports and imports plus net interest payments and net transfers) are proxies for a current account balance that in its actual fact is in nominal terms. Moreover, using nominal values is consistent with an early study by Husted (1992), the author uses nominal values to test current account sustainability for the United States. In the figure below we see a close co-movement of the two series and based on this visual inspection, we would expect to find cointegration, suggesting that the country has the ability to meet its debt obligations, thereby implying that the current account deficit is sustainable. Although from 2015 to 2018 we see some drift between exports and imports.

Figure 5: The evolution of total exports and total imports



Source: South African Reserve Bank and own calculations

7. Empirical Results

7.1 Results for Unit Root Test

Table 1: Unit Root Test Results

	ADF Test		PP Test		KPSS		
Variables	Level	First Difference	Level	First Difference	Level	First Difference	Decision
LNX							
t-statistics	-1.9708	-12.0813	-3.9622	N/A	0.1951	0.1156	
p-value	0.6106	0.0000	0.0183	N/A			I(1)
test critical value (5%)	-3.4494	-3.4497	-3.5266	N/A	0.1460	0.1460	
LNM							
t-statistics	-1.3209	-11.3439	-2.8640	-4.2054	0.1827	0.1254	
p-value	0.8778	0.0000	0.1845	0.0100			I(1)
test critical value (5%)	-3.1499	-3.4497	-3.5266	-3.5266	0.1460	0.1460	

Source: Author's Calculations

Table 1 presents all three unit root test results; that is ADF, PP and KPSS tests. All the tests, except for exports using PP, are in agreement that both exports (LNM) and imports (LNM) are non-stationary in levels, meaning series LNX and LNM are *I*(1) and stationary in their

first differences, at the 5% level of significance. Since both series are *I*(1) we can proceed to testing if the long-run relationship does exist between the two variables exports and imports.

7.2 The Cointegration test results

(i) Johansen Cointegrating analysis

Table 2: Johansen Cointegration Test Results

Variables	Hypothesised No. of CE	Trace Statistic	5% Critical Value	Maximum Eigenvalue Statistic	5% Critical Value
LNX and LNM	None	12.45693	15.4947	9.631719	14.2646
	At most 1	2.825207	3.8415	2.825207	3.8415

Source: Author's estimations

The Johansen cointegration analysis gives us initial results that do not account for structural breaks. This is a necessary test, so that we can know the importance of considering the structural breaks, should there be evidence of significant change in results once structural breaks are accounted for later in the Gregory and Hansen cointegration test. In conducting the Johansen Cointegration test, the unrestricted VAR model was estimated. The Schwarz information criterion (SIC) and Hannan-Quinn information criterion (HQ) suggested one lag. Table 2 reports both maximum eigenvalue and trace statistic, which are compared with their critical values at 5% level of significance. Given that the statistical values for both tests are less than the critical values in absolute terms, we fail to reject the null hypothesis of "no cointegration" (Table 2). This result is consistent with the normalised cointegration coefficient that is less than one (β=0.9242). According to the solvency theory used in this paper, the absence of the long-run relationship between the exports and imports and the value of beta below one imply that South Africa's current account is not sustainable.

Given the changes in the South African economy since 1990, there is a possibility that if we allow for structural breaks in the cointegrating relationship, and estimate the long-run relationship between exports and imports based on this assumption, we might reach a different conclusion. To account for structural breaks, further tests were undertaken using the Gregory and Hansen Cointegration procedure.

(ii) Gregory and Hansen Cointegration test results

Table 3: The Gregory and Hansen Cointegration test

The Gregory - Hansen Cointegration Test

	ADF Procedure		Phillips Procedure				
Model	t-statistics	Break Date	Zt statistic	Break Date	Za statistic	Break Date	Cointegration Coefficient
C	-3.3710	2014Q1	-6.0571	2014Q1	-53.1560	1994Q1	0.8930
C/T	-4.2915	1999Q2	-7.1944	1999Q1	-55.4819	1999Q1	0.6663
C/S	-3.4729	2004Q1	-6.2820	2003Q4	-53.7313	2003Q4	0.8928

Source: Author's estimations

In the Gregory and Hansen cointegration approach the test statistic of interest are the smallest values of the ADF and Phillips test statistics (Gregory and Hansen, 1996). The Gregory and Hansen approach examines the smallest values since smallest values of the test statistics constitute evidence against the null hypothesis. The ADF procedure shows three break points (1999Q2, 2004Q1, 2014Q1) for the three models estimated in Table 3 above. The Phillips procedure also reveals three break points (1994Q1, 1999Q1 and 2003Q1). Whether the choice of the model and the "procedure" influence the break date, is a question that is beyond the scope of this study. According to the ADF procedure on all three models, C (level shift), C/T (level shift with trend) and C/S (regime shift) we fail to reject the null hypothesis of no cointegration, as the critical values (Appendix A) are greater than the t-statistic values in absolute terms at the 5% level of significance.

On the contrary, model 1 and 2 Zt-statistic and model 1 Za statistic from Phillips procedure reject the null hypothesis of no cointegration in favour of the alternative, to say there is a long run relationship between exports and imports. However, Gregory and Hansen (1996) make a strong case that the ADF test accounting for structural breaks is more powerful and is it the most common in the literature (Jaksic *et al*, 2018).

Table 3 further shows that all three models have a coefficient below one, at 0.89, 0.65 and 0.89, respectively. These coefficients suggest that South Africa's current account is not sustainable. The coefficients are consistent with the ADF procedure results, as per the intertemporal solvency framework this evidence suggest that South Africa's present value of

future current account balances is below the present value of existing debt. This indicates a potential bubble financing in the long-run that may have adverse macroeconomic impact.

8. Results and Discussion

The overall finding is that South Africa's current account deficit is unsustainable. Failure to satisfy the intertemporal solvency approach reflects an unfavourable situation at which the present value of the amount the country borrows from international markets is more than the present value of the future current account surpluses. This is certainly not a desirable position for a country to hold, as it means that the country depends on future borrowings rather than earnings to repay the existing debt.

There has been a significant rise in external debt service to export earnings ratio, which stood at 15.2% in 2018 compared to 10% in 2010 (annexure D), and net interest payments and net current transfers have been growing faster than the value of exports, indicating a rise in debt burden (see annexure E). Over the period 1990Q1 to 2018Q4, the average annual growth rate for net interest payments is roughly at 11%, 6% for net transfer payments and only 1% for exports. These average annual growth rates are shedding a light about the long term trends of the three variables and should provide the policymakers with an idea about the direction wherein the current account balance is headed. Over the review period South Africa's current account balance has resembled an iceberg. There is a small positive trade balance above the surface, with a much larger Services, Income and Transfers (SIT) deficit below. The danger with an iceberg is that it can make one underestimate the danger underneath. The point is, a narrowing deficit as a result of the improvement in the trade balance could make policymakers pay less attention to the question of sustainability.

Some papers have found that the longer the country delays to adjust its current account deficit, the larger the required adjustment would be because the deficit that will need to be serviced will be larger (Freund 2005, Clarida 2006 and Debelle and Galati, 2007). Moreover, there are studies that have found that based on the size of the current account deficit and the composition of its financing, South Africa could expect its current account deficit to become more unsustainable in the future (Makanza and Dunne, 2017, Searle and Mama, 2010 and Smit 2007). Therefore, it will be important that the persistent current account deficit is seen as one of the country's weak fundamentals, given protracted low growth despite a rise in

capital inflows. Investors could view it as a sign of poor investments driven by reckless fiscal policy, and therefore less attractive as an investment destination (Ghosh and Ramakrishnan, 2018). Therefore, this study attempts to emphasis the fragility of South Africa's current account balance and that it will be recommended for policymakers to pay attention to the nature of the financing of the current account deficit and take action now, rather than later.

In the main the results of unsustainability are not surprising given that production heavily relies on raw materials, slowing potential GDP growth, structurally low domestic savings, shortage of skilled labour, structurally low investment, lack of fiscal discipline, unproductive previous investment and rising import of consumption goods (Binatli and Sorjahbji (2008), Tastan and Aric (2016), Matthee (2016), Purifield et al, 2014, Jaksic *et al*, 2018, SARB Monetary Policy Review, 2019). With regard to raw materials, commodities in particular reflect that there is a lack of export diversification, which then limits exports earning opportunities. A less concentrated pool of export earnings could reduce large reliance on foreign financing. Briefly, the IMF gives two definitions of export diversification; extensive diversification, which refers to an increase in number of products or increase in number of trading partners. On the other hand, intensive diversification involves increased export volumes of the same products to the same partners. Matthee (2016) finds that most export growth in South Africa occurs along the intensive margin. This intensiveness reflects country's dependence on commodity-based exports. Meanwhile, desired growth in manufacturing sector has been constrained by a low capital investment and short supply of highly-skilled labour (Purifield *et al*, 2014). Clearly, for South Africa export diversification cannot be disentangled from structural transformation of the economy. This points to the need for South Africa's trade policies and strategies to enhance export diversification in order to improve the current account balance.

On the other hand, since early 1990s import of capital goods has been dominant until 2013 when input of consumption goods emerged as a dominant import product share (see annexure F). Based on this, South Africa is running a risk of losing foreign investors' "trust" that capital flows would continue being largely used to finance unsustainable spending or "bubbles". The structurally low growth would also weigh on investor sentiments with regard to the potential growth of the country. For South Africa, potential GDP growth is estimated to have slowed more in recent years, and generally more volatile than in other countries that

have been running large and persistent current account deficits (Australia, Canada and New Zealand) (SARB, 2019).

Furthermore, running a current account deficit could be beneficial if fiscal discipline is maintained (Jaksic *et al*, 2018). However, in terms of fiscal discipline South Africa holds a different story, the country has suffered fiscal deficit since early 1990s except for the period 2005/6 to 2007/8 and continued fiscal deterioration has a bearing on the stance of the current account (Jaksic *et al*, 2018). Based on the recent announcement of financial support to Eskom further fiscal deterioration is expected. In this case, the Institute of International Finance expects fiscal deficit to widen from 4.3% of GDP in 2018/19 to 6.3% in 2019/20 and 6.2% in 2020/21, while government debt is expected to exceed government's projection of 57.4% of GDP to 61% in 2020/21 (Institute of International Finance, 2019). This suggests that it would indeed be difficult for South Africa to sustain its persistent current account deficit given deteriorating fiscal outlook. This outlook could elevate the risk of a credit rating downgrade to non-investment grade, thereby resulting to net outflows of non-resident portfolio debt and equity from investors with holdings subject to investment grade credit rating requirements. Against the backdrop of South Africa's relatively large current account deficit and external financing needs, any significant net outflows could lead to a substantial depreciation of the rand and worsen the current account deficit (Institute of International Finance, 2019).

The "twin deficit" problem South Africa is facing reflects that foreign capital largely finances public spending rather than private investment. In other words, fiscal deficit crowds-out private investment. South Africa's investment to gross domestic product (GDP) ratio is lower than the world and emerging market norms, yet the proportion of national investment derived from the state and parastatals was unusually high in the post-crisis period (around 37% of total investment, up from 25% or so before the crisis) (SARB Monetary Policy Review, 2019). It appears that a substantial portion of this investment spending was not actually used for productive investment. If public sector investment was partly captured for consumption purposes, it becomes clearer why it did not crowd in private investment. This shows that private sector has been crowded out as fiscal metrics deteriorated.

Consequently, the current account deficit worsened, as a large portion of government and parastatals debt has been sold to non-resident investors at relatively higher risk premium (SARB Monetary Policy Review, 2019). These higher payments go through the income account, which is a component of the current account balance. More precisely, interest

payments to foreigners for government and parastatal debt account for about 50% of total current account deficit, approximately 1.6% of GDP of this deficit. This has partly contributed to the weakening of the current account position and the private sector had to cut back so that unsustainability does not expedite (SARB Monetary Policy Review, 2019).

The unsustainability of the current account can also be attributed to the persistency of the investment-savings gap. Since the advent of the current account deficit in 2003, South Africa's gross fixed capital formation as a percent of GDP has been consistently greater than the ratio of gross savings to GDP. Sluggish growth in per-capita income, slow growth in productivity and high unemployment has been major constraints to savings growth (Eyraud, 2009). While, the increase in investment can be related to large foreign capital inflows and these inflows have a bearing on the current account balance through the income component (Annexure G).

Contrary to a much similar study by Searle and Mama (2010), the current study finds that even in the presence of structural breaks there is a strong case of no cointegration between exports and imports. In other words, the existence of structural breaks does not reverse the initial findings of the current study that South Africa's current account deficit is unsustainable. Searle and Mama (2010) posit that their initial finding of an unsustainable current account is reversed once the structural break are controlled for in the cointegration equation, to conclude that South Africa's current account deficit is sustainable.

9. Policy Implications and Recommendations

Thinking about policy implications for the unsustainability of the current account deficit requires paying special attention not only to the current account but other macroeconomic variables that can trigger the stance of the current account deficit. Therefore, South Africa has to identify, observe and resolve all the issues related to solvency of the external position. It has been pointed out that persistent current account deficit is not a concern if it can be sustained. This paper has made it clear that the country's current account is not sustainable and the issue is with the composition and financing method of this deficit. These issues call for a special monitoring and precautionary measures in the case of the sustainability of the current deficit.

This paper seeks to emphasis the urgent need for the country to make structural changes in order to improve its current account position. The country might have to set ceiling on the deficit level in the current account. In this way, the country can respond promptly to the red flags and strengthen its macroeconomic fundamentals timely. A similar procedure is used by the European commission and it is called "macroeconomic imbalance procedure" introduced in 2011. The European Countries use this procedure to prevent and correct risky macroeconomic developments that could induce current account unsustainability. These procedures include Alert Mechanism Report based on a scoreboard of indicators, In-Depth Reviews and Excessive Imbalance Procedure (Jaksic *et al*, 2018).

While it might be unrealistic to find a tangible solution to reduce reliance on debt and equity flows in the short run, there is a need to start working on developing strategic approach towards more stable financing methods. For instance, increased investment towards economic sectors that will provide much needed exports earnings to finance the stubborn deficit in the current account. Put differently, increased investment on tradables (excluding mining sector) with highest export returns, especially those in the manufacturing and agricultural sector in order to enhance diversity.

In 2018 vehicles, machinery, fruits and nuts and Plastics and plastic articles accounted for 11.4%, 6.2%, 3.9% and 1.5% of total exports, respectively (SARS 2018). South Africa's exported vehicles and plastics including plastic item were amongst the fastest-growing top exports in 2018, growing by 10.4% and 10.6%, respectively (SARS, 2018). On the other hand services exports could be South Africa's new gold (McKinsey and Company, 2015). South Africa's trade in services has almost doubled over the review period, accounting for about 10% of GDP in 2017 compared to 5.7% in 1992. While, the services exports have increased to 15.2% of total exports in 2017 from 12% in 1992 (WITS, 2019). These are low figures given the highly developed service industries, with the right investments and policies, services businesses could ramp up exports (McKinsey and Company, 2015). In construction, the opportunity ranges from design to construction management to maintenance services (McKinsey and Company, 2015). While in financial services, promising growth areas include wholesale and retail banking and insurance (McKinsey and Company, 2015). While the current study rejects the sustainability of the deficit in the current account, there is potential for this to change in the coming years.

This underscores the need for policy reaction. There is a need for coherent, consistent and well-coordinated macroeconomic policies aimed at increasing and diversifying exports, boosting growth rate, increase savings rate, reduction in fiscal deficit and efficient debt management strategy to drive the current account deficit towards a sustainable path. In a broader macroeconomic context, spending should be redirected towards more productive investment, prioritise fiscal consolidation, enhance private-public cooperation, and implement structural reforms in product and labour market.

10. Conclusion

This study has paid attention to the stubborn current account deficit that South Africa has battled with since 2003. Well, this deficit is not a critical economic problem if it can be sustained. The study has tried to examine the sustainability of the persistent current account deficit for South Africa, using an intertemporal solvency approach which requires that No-Ponzi condition has to be met. This framework allows us to test the cointegration between total exports and total imports (plus net interest payments and net transfers). The lack of co-movement between these two variables indicates the unsustainability of the deficit in the current account. This paper has extended the contribution of previous papers by employing not only the standard cointegration test but also the Gregory and Hansen cointegration procedure to account for structural breaks. In addition, the period of analyses is extended and the first paper to use nominal values.

The paper highlights that the country's financing method of the current account might be characterised as "Bubble Financing" (dependence on further borrowing to repay the existing debt). This path reflects a weak external sector that raises uncertainty and that uncertainty has serious implications for the broader macroeconomic stability. This paper has provided a precise diagnosis of the problem from the macroeconomic point of view, and policy needs to be directed towards structural transformation of the economy with particular focus on export diversification to expand the pool of export earnings and reduce large reliance on capital inflows. Based on the results from this paper we can strongly support the economic literature that the composition of the current account financing is critical for sustainability. Thus, future research could investigate various methods to finance the current account deficit.

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Annexure A

Figure 4: Gross external debt

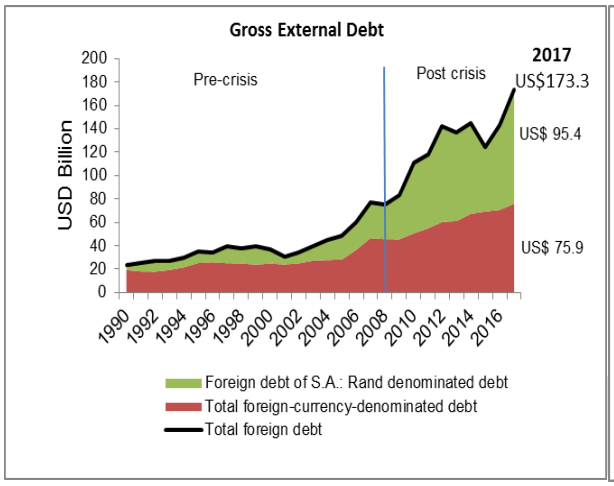
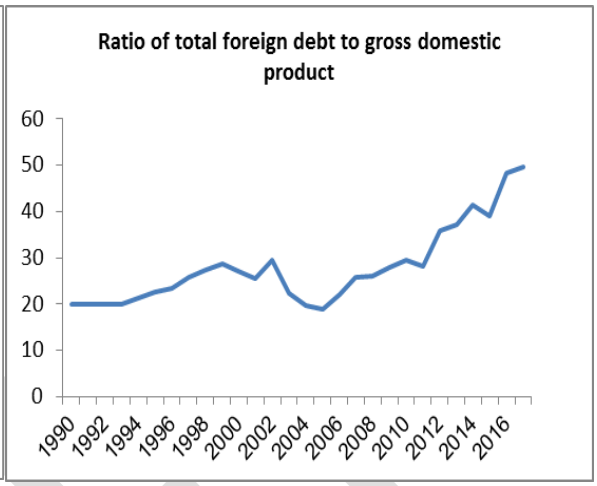


Figure 5: Ratio as percent of GDP



Source: South African Reserve Bank Database

Annexure B

Table 1: Composition of external debt stock

	Total-Debt (Billion Dollars)	Short-term Public (% of TD)	Short-term private (% of TD)	Long-Term Public (% of TD)	Long-Term Private (% of TD)
2002	34002	0.00	17.52	49.61	0.13
2003	39309	0.00	16.17	47.26	0.06
2004	45014	0.00	18.31	45.21	0.15
2005	48761	1.12	21.04	39.18	0.05
2006	60372	1.87	22.08	35.15	0.17
2007	77140	0.45	22.80	27.73	4.95
2008	74932	0.44	26.12	27.89	5.91
2009	82893	0.27	20.06	32.41	6.54
2010	111256	0.31	15.36	38.10	6.07
2011	118180	0.42	11.91	44.51	6.20
2012	141791	0.31	14.25	49.67	4.02
2013	136516	0.32	13.40	50.10	3.69

2014	145082	0.29	17.51	47.69	4.38
2015	124132	0.35	16.57	46.25	6.06
2016	142833	0.30	15.49	51.85	3.73
2017	173286	0.26	11.81	55.30	3.53
2018	172384	0.32	14.95	52.14	2.70

Source: South African Reserve Bank Database

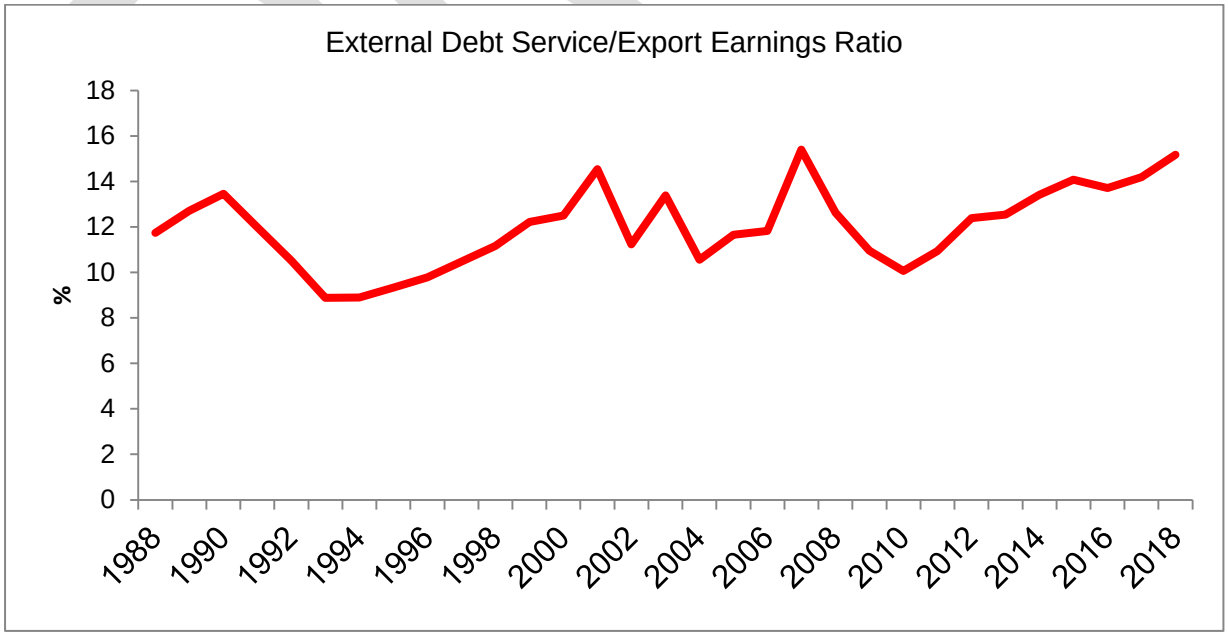
Annexure C

	ADF procedure	Phillips procedure	
Model	critical values	Zt critical values	Za critical values
C	-4.92	-4.92	-46.98
C/T	-5.57	-5.57	-59.76
C/S	-6.41	-6.41	-78.52

Approximate asymptotic critlcal values at 5% level of significance

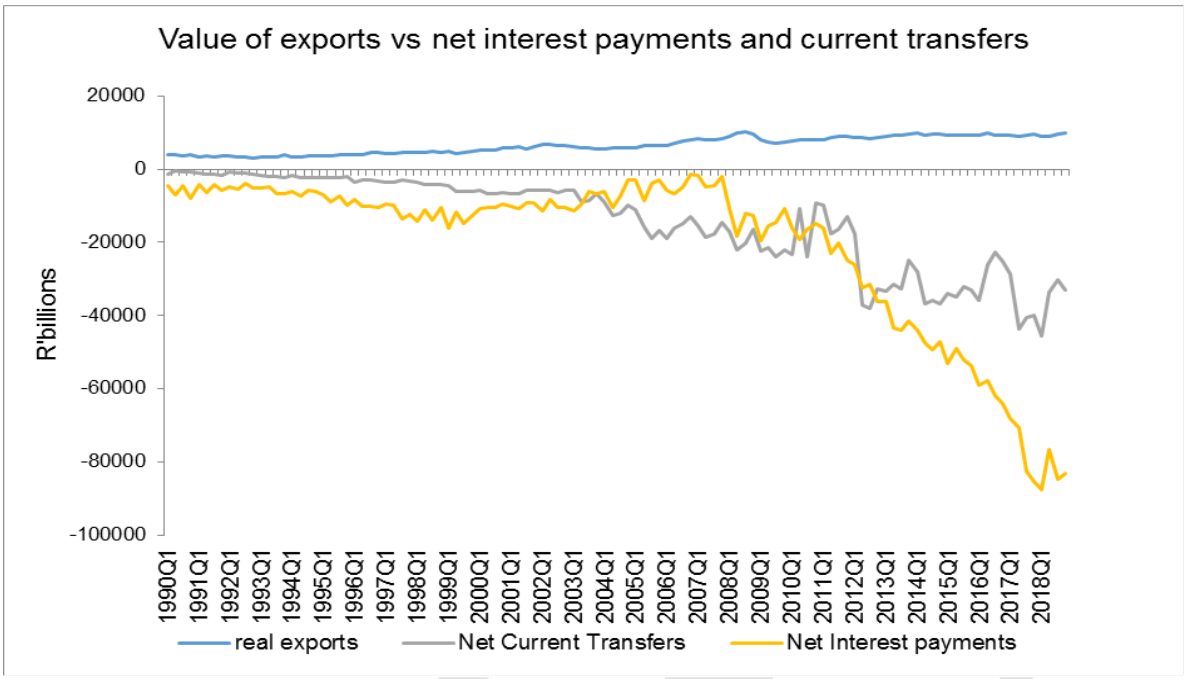
Source: Gregory and Jansen (1999)

Annexure D



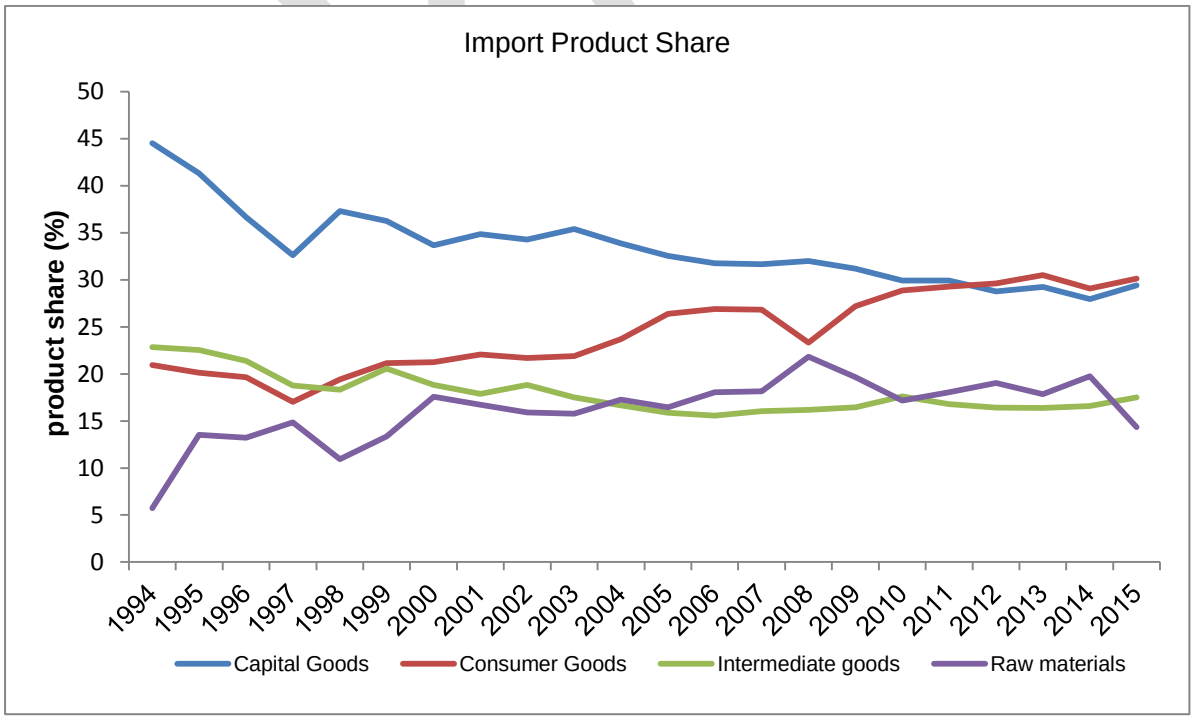
Source: South African Reserve Bank Database

Annexure E



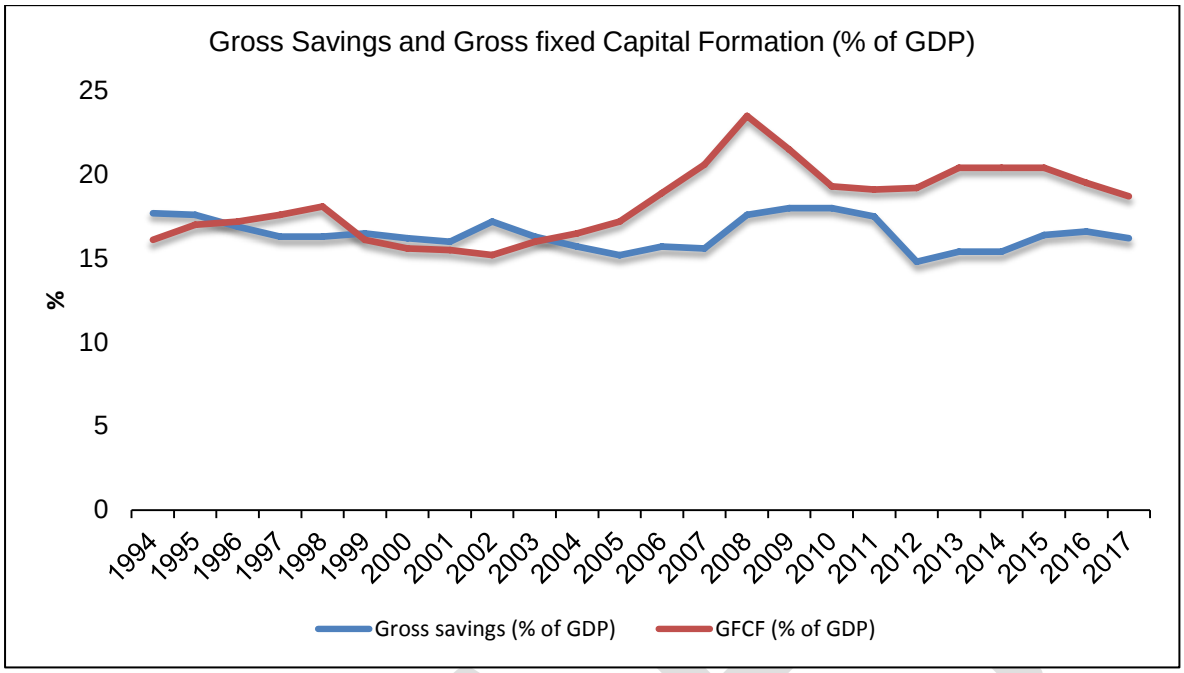
Source: South African Reserve Bank Database

Annexure F



Source: South African Reserve Bank Database

Annexure G



Source: South African Reserve Bank Database