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Fiscal Deficit, National Saving and Sustainability of Economic Growth in Emerging Economies: A Dynamic GMM Panel Data Approach

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ABSTRACT: The neoclassical growth models argued that the movement to steady states; technology, exogenous rate of savings, population growth and technical progress stimulate higher growth levels (Solow, 1956). Contrary to the neoclassical argument, endogenous growth model argues that, in the theory of endogenous growth, government play a significant role in promoting accumulation of knowledge, research and development, public investment, human capital development, law and order can generate growth both in the short and long run. Moreover, they assumed technical progress as endogenous variable for growth (Barro, 1995). This study analyze the effects of fiscal deficit on sustainability of economic growth and provided new empirical evidence on the effects of fiscal deficit on saving and sustainability of economic growth based on the assumption of endogenous growth model. We estimated using the reduced form of GMM method for dynamic panels covers 1990-2009 for three emerging countries that includes China, India and South Africa.

Keywords: Fiscal deficit; National saving; Sustainability; Growth
JEL Classifications: C33; C 61; E62; O16; O47

1. Introduction

The welfare of successive generations is determined by the sustainable economic growth and sound macroeconomic policy. A sustainable economic growth is sole and most important factor to change the living standard of peoples. Government especially in developing countries put economic growth as a fundamental objective and is striving to change the life of their people employing different developmental policies. Some countries that achieved high level of economic growth serve as models for other developing nations seeking to follow them, and increase their prosperity and role in the comity of nations.

The way government finances its expenditures also matter to economic growth. If the economy financed intensively on taxes, it distorts incentive for productive investment and consequently can hamper growth. Financing deficit through borrowing is also affect the size of private firms and the interest rate in the economy.

Though economists have different conclusion on the effects fiscal deficit, a lot of empirical results and the real world do not falter from evidencing the negative consequences.

Studies made by Fischer (1993), Easterly and Rebelo (1993), Easterly et al., (1994), Bleaney et al., (2001) supported the adverse effects of fiscal deficit on economic growth.

The objective of this study is to provide new empirical results with respect to the effects of fiscal deficit on sustainability of economic growth in three emerging economies, which are China, India and South Africa. The study employed GMM method in order to estimate the reduced-form of the model using the dynamic panels for the period 1990-2009. The study has seven sections including the introduction part.

The second part discusses the correlation of fiscal variables and economic growth and the different types of growth model. Moreover the second section also analyzed the different paradigms on the effects of fiscal deficit on the economic growth.

The third section included the discussion of theoretical model that link with the methodology of the study. The data used for study described in the fourth section. The methodology of the study explained in section five. The empirical findings and conclusion of the study presented in section six and seven respectively.

2. Review of Literature

2.1 Fiscal policy, saving and economic growth

Generally growth models can be classified into two main forms, neoclassical (Solow, 1956; Swan, 1956) and endogenous (Romer, 1986; Lucas, 1988). But the two different models have the same argument on the effects of fiscal policy on the level of GDP; where as they are not the same on the effects of fiscal policy on economic growth.

According to the theory of endogenous growth model, government play a significant role in promoting accumulation of knowledge, research and development, productive public investment, human capital development, law and order can generate growth both in the short- and long-run. Basically, the theory of endogenous growth model has two distinct approaches. The first one, there are endogenous growth model in which government may influence economic growth by promoting private activities with positive external effects[1]. In these endogenous growth model in which government spending patterns determine the long-run growth rate as per argument of Barro (1990). Endogenous growth model by Barro (1990) investigated that an increase in productive government spending financed by non-distortionary taxation will increase growth while the effect is ambiguous if distortionary taxation is used. Also, an increase in non-productive government expenditure financed by non-distortional taxes will have neutral effect on growth but if distortional taxes are used, the impact on growth will be negative.

The second class of endogenous growth models assumed the government supplies productive services which increase the marginal product of private capital and thus positively influence economic growth (i.e. considering the aggregate production function shows constant returns in private and public capital jointly and making the government spending endogenous then immediately yields an endogenous rate of growth)[2].

Unlike endogenous growth model, in the standard neoclassical growth model, growth of output in the long-run determined by increase in labor supply, accumulation of physical and human capital, and technological change.

Moreover, if saving and investment increased as a result of the effective fiscal policy, the equilibrium capital-output ratio will be altered and then the growth rate will increases the economy move to a new higher level of output per capita, but in the long-run come back to the initial level.

2.2 Effects of fiscal deficit

The effect of fiscal policy on economic growth is a controversial and long-standing topic in economic theory, empirical research, and economic policymaking. Governments finance their deficit by issuance of bond or increasing tax rate or the tax base or through printing currency. Some rational economic agents may be aware that a higher deficit today implies higher taxation in the future, and they may increase their savings today to have the means to pay those higher taxes. However, some economic agents may be subject to fiscal illusion or simply not care about higher taxes in the future. Bernhein (1989) provided a brief summary on the effects of fiscal deficit made by of the three paradigms which are Neoclassical, Keynesian and Ricardian equivalence. According to the neoclassicals, individuals are planning their consumption over their entire life cycle. By shifting taxes to future generations, budget deficits increase current consumption. Moreover by assuming full employment of resources the increased consumption implies a decrease in saving and interest rates must rise to bring equilibrium in the capital markets. Higher interest rates, in turn, result in a decline in private investment. Whereas Keynesians provided an argument in favor of crowding-in effect by making reference to the expansionary effects of budget deficits. Keynesians believed that budget

[1] See for the detail Marshall Alfred (1996).

[2] The approach is similar to Arrow and Kurz (1970).

deficits result in an increase in domestic production, which makes private investors more optimistic about the future course of the economy resulting in them investing more (i.e. "crowding-in" effect).

The traditional Keynesian argument may be different from the standard Neoclassical views because of two main reasons. First resources may be unemployed. Second, it assumes the existence of a large number of liquidity constrained individuals. The second assumption guarantees that aggregate consumption is very sensitive to changes in disposable income. Therefore, many traditional Keynesians argue that deficits must not crowd out private investment.

According to neoclassical models, even if the fiscal deficit has an adverse effect on national savings, it does not reduce output growth in a lasting way, because in these models long-term economic growth is exclusively driven by technical progress, which is assumed to be exogenous. Lower savings will, however, result in a lower capital-to-labor ratio, which, due to the decreasing marginal productivity of capital will lead to a higher real interest rate. A lower capital-to-labor ratio will also lead to lower productivity of labor and thus eventually to a lower real wage rate.

In contrast to the argument of neoclassical model for the effects of fiscal deficit, endogenous growth model assumed technical progress as endogenous variable for growth (Barro and Sala-i-Martin, 1995). These models rely on a broader definition of capital, incorporating positive externalities of capital accumulation (for example, learning by doing or technical progress driven by technologies embodied in new capital). As result, in many endogenous growth models, the assumption of decreasing marginal productivity of capital is replaced by an assumption of constant marginal productivity. This enables changes in growth rates driven by changes in national savings to persist in the long run.

2.3 Review of previous empirical works

The effect of fiscal policy on economic growth is a controversial and long-standing topic in economic theory, empirical research, and economic policymaking. Traditional theory suggests that, *ceteris paribus*, a reduction in government saving causes interest rates to rise, investment to fall, and economic growth to slow down. There are several empirical evidences from panel and time series data that analyzed the effects of fiscal deficit on economic growth and saving. The harmful effects of fiscal deficits on economic growth has been empirically documented in several studies, such as Rubin et al., (2004), Gale and Orszag (2002), Fischer (1993), Easterly and Rebelo (1993), Easterly et al., (1994), Bleaney et al., (2001) and Borcherding et al., (2004). Roy and Berg (2009) have found ambiguous results.

Fischer (1993) concluded his investigation by saying that, large budget deficits and growth are negatively correlated. Because inflation and distorted foreign exchange markets, which occurred as a result of fiscal deficit, would affect the economy adversely. Gale and Orszag (2002) concluded that, fiscal deficits are still likely to slow economic growth because "the capital inflows represent a reduction in net national foreign investment and therefore a reduction in the capital owned by the country and a reduction in future national income".

Borcherding et al., (2004) have found a negative growth effect of government size for 20 OECD countries over the period 1970-1997. Easterly and Rebelo (1992) also find a consistent negative relationship between growth and budget deficits in their paper. Moreover, Rubin et al., (2004) provided additional investigation on negative growth effects of rising government budget deficits by buttress declining asset prices, reduced national wealth, fear of inflation, reduced fiscal flexibility for dealing with macroeconomic shocks, and declining investor confidence.

Ghosh and Hendrik (2009) have found to contrary results using the time series data from 1973-2004 on the U.S. economy. Their results indicate that, ceteris paribus, an increase in budget deficits slows growth. However, the "twin" current account deficits, which our model shows tend to accompany budget deficits, increase growth. Hence, the overall relationship between budget deficits and economic growth is ambiguous.

3. Theoretical Model of Fiscal Deficit, Saving and Economic Growth

As we discussed above in endogenous growth theory, fiscal policy has significant effect both the level and growth rate of per capita output. In order to link the theoretical frame work with the empirical methodology of the study, here below we analyzed how the unbalanced budget that is deficit affect the domestic saving and in effect the economic growth of the economy. We use the most

common and convenient example of production function, Cobb Douglas as Barro (1990) and Barro and Sala-i-Martin (1992, 1995) discussed in their papers.

They assumed that government provides goods and services *(g)* as an input to show the positive effect of productive government spending and the adverse effects associated with distortionary taxes. The production function, in per capita terms, can be given as:

$$y = Ak^{1-\alpha}g^{\alpha} \quad (1)$$

where $\alpha \in [0,1]$ and y is output per capita, A is measure of productivity, k is private capital per capita and g is goods and services provided by government. Now we can have two assumptions in order to relate the above production function to our study. First, government budget is balanced as a result of imposing non-distortionary tax on output at a given rate (τ) and a lump sum taxes (L) then the budget constrain would become:

$$g + C = L + \tau ny \quad (2)$$

Where the number of producers in the economy given by n while C is government consumption, which is assumed unproductive. Though theoretically an output linked tax affect private incentive to invest, a lump sum tax does not (Barro, 1990). According to Barro (1990) and Barro and Sala-i-Martin (1992) derive a long-run growth rate(ψ) based on a specified utility function and the model is expressed as:

$$\psi = \lambda(1-\tau)(1-\alpha)A^{1/(1-\alpha)}(g/y)^{\alpha/(1-\alpha)} - \mu \quad (3)$$

where λ and μ represent parameters that we assumed in the utility function. Equation (3) evidenced that the growth rate*(ψ)* is a decreasing function of distortionary tax rate (τ) and an increasing function of the productive government expenditure for goods and services(g). In the above equation (3) unproductive government expenditures (C) and non-distortionary taxes(L) are assumed and have no role.

Second, relaxing the assumption of balanced budget in the constraint in order to include the fiscal deficit and analyze its effect on economic growth. Equation (4) generated from equation (2) including the budget deficit following the empirical work of Kneller et al (1999) and Bleaney *et al.,* (2000) and becomes:

$$g + C + d = L + \tau ny \quad (4)$$

Where d stands for budget deficit. Both Amanja and Morrisey (2005) and Matthew (2009) made growth estimation in their papers following the work of Kneller *et al* (1999) and the equation expressed as:

$$y_i = \alpha + \sum_{i=1}^{k}\beta_i Z_{it} + \sum_{j=1}^{m-1}\gamma_j X_{jt} + \varepsilon_{it} \quad (5)$$

where, y_t is the growth rate of output, X is a vector of fiscal variables, Z, vector of non-fiscal variables and ε_{jt} white noise error terms. In theory, if the budget constraint is fully specified and all elements are included, in that case we have a balanced budget and the vector of fiscal variable equals to zero.

$$\sum_{jt}^{m} X_{jt} = 0 \quad (6)$$

But, if one element of X omitted (for example x_m), then perfect collinearity (see Kneller *et al*, 1999) will not exist and as a result expenditure will not balance with revenue. After omitting element equation (5) would become:

$$y_i = \alpha + \sum_{i=1}^{k} \beta_i Z_{it} + \sum_{j=1}^{m-1} (\gamma_j - \gamma_m) X_{jt} + \varepsilon_{it} \quad (7)$$

Both Amanja and Morrisey (2005) and Matthew (2009) have tested the null hypothesis that the term $(\gamma_j-\gamma_m)=0$ instead of the conventional null hypothesis that is $\gamma_j=0$. Accordingly, the coefficient of the fiscal variable interpreted as "the effect of a unit change in the relevant variable offset by a unit change in the element omitted from the regression" (see Kneller et al, 1999: 175).

4. Data Description

The data used for regression part commenced from 1990-2008 where as for descriptive part we have used from 1988 till 2008. Here below we have described the variables used in the study a long with their source. Except some of the variables, the majority of the variables taken from the world economic outlook data base. The description is as follows:

GR: It is growth rate of GDP per capita and used as a proxy of Economic growth. Annual percentage growth rate of GDP per capita compute by dividing GDP by midyear population. The source is World Bank.

FD: It represents Deficit (surplus) which is the difference between total government revenue and expenditure.

TAX: Tax revenue as a % of GDP used in order to evaluate the effects of deficit financing on economic growth as well as domestic saving. It has taken from the World Bank economic outlook.

FDEV: Financial Development and Credit to private sector as share of GDP used as proxy.

TO: Trade Openness which is [(Export + Imports)/GDP] used as a proxy for trade-openness and taken from World Bank.

D: Represents total national debt and obtained from International Monetary Fund, World Economic Outlook.

INV: Gross Fixed Capital Formation (Domestic) and obtained from World Bank.

EXP Government Expenditure. Taken from International Monetary Fund, World Economic Outlook.

INF: Inflation: it is consumer price index and obtained from World Bank.

RIR: Real interest rate is the lending interest rate adjusted for inflation as measured by the GDP deflator. Taken from the World Bank.

SAV: Domestic Saving: It includes government saving, corporate saving and household saving and it is as a percentage of GDP. It obtained from World Bank.

5. Methodology

In order to analyze the effects of final deficit on the growth, we used the model described below which similar to Kneller *et al* (1999). We included both fiscal and non-fiscal variables. The fiscal deficit, inflation, interest rate and tax are our main variables and the remaining fiscal and non-fiscal variables are considered as control variables which include trade openness, financial development, foreign direct investment, Government expenditure (Investment) and Domestic saving.

$$y_{it} = \gamma + \sum_{i=1}^{k} \alpha_i X_{it} + \sum_{j=1}^{m-1} \lambda_j Z_{jt} + \varepsilon_{it} \quad (8)$$

Where, GR_t represents the growth rate of output per capita, X_{jt} is a vector of fiscal variables, Z_{jt} of non-fiscal variables and ε_{jt} is an error term.

$$GR_{it} = \gamma + \alpha_1 GR(-1)_{it} + \alpha_2 FD_{it} + \alpha_3 RIR_{it} + \alpha_4 INF_{it} + \alpha_5 TAX_{it} + \alpha_6 TO_{it} + \alpha_7 D_{it} + \alpha_8 FDEV_{it} + \alpha_9 TAX_{it} + \alpha_{10} SAV_{it} + \pi_i + \nu_i + \varepsilon_{it} \quad (9)$$

Where γ, α_1, α_2, α_3, α_4, α_5, α_6, α_7, α_8 and α_9 are the coefficients to be estimated and π_i is countries heterogeneity term, which may include all the unobserved factors constant in time which has impact on growth. The term v_i, is the time specific effect. The effects of fiscal variable on domestic saving analyzed using the model below.

$$SAV_{it} = \phi + \beta_1 SAV(-1)_{it} + \beta_2 FD_{it} + \beta_3 RIR_{it} + \beta_4 INF_{it} + \beta_5 TAX_{it} + \beta_6 FDEV_{it} + \beta_7 GR_{it} + \beta_8 D_{it} + \beta_9 TO_{it} + \sigma_i + \lambda_i + \varepsilon_{it} \quad (10)$$

Where SAV_{it} is domestic saving to GDP ratio. We estimated the coefficients using the dynamic form of GMM method for panels covers 1990-2008 for three emerging countries that includes China, India and South Africa.

6. Empirical Results

6.1 Description and Correlation Analysis

One of the surprise results obtained in the table below, shows that all of the three countries are in deficit for more than two decade. Moreover, Indian economy accompanied with highest fiscal deficit than China and South Africa. The average data of per capita growth rate of GDP for China paramount than the other two countries. China's per capita growth rate of GDP revealed 6.97 percent in a period 1988-1992 and increased to 10.25 and 11.02 in a period 1993-1997 and 2003-2007 respectively. However, the growth in period 1998-2002 decreased by 2.87 from the previous five year period. This decline can be associated with increase average fiscal deficit by 60% from the previous period. Though the growth for India in the first three periods (i.e. 1988/92, 1993/97 and 1998/02) not remarkable like China, in the last period that is 2003-2007 showed dramatic growth by 101% from the previous. South African showed relatively stable growth from 1993-2002. But in the period 2003/2007 scored 6.89 times than the growth reported in 1998/2002. On the domestic saving side, China showed stable incremental except in a period growth declined (i.e. 1998/2002). Similarly India also reported more or less stable incremental in domestic saving. South Africa reveled continuous decline each period in domestic saving.

Table 1. Data results

Period	Countries	FD	GR	SAV	D	EXP
1988-92	China	-2.17	6.97	37.87	6.06	19.83
	India	-7.60	3.44	22.50	73.37	24.30
	South Af.	-3.16	-1.53	19.66	34.40	26.56
1993-97	China	-1.94	10.25	42.76	6.47	13.57
	India	-6.74	4.24	22.69	68.29	23.47
	South Af.	-5.20	0.68	16.12	48.32	27.64
1998-02	China	-3.11	7.38	39.43	15.66	17.11
	India	-8.97	3.59	23.18	72.11	25.51
	South Af.	-1.74	0.52	15.70	45.06	25.34
2003-07	China	-1.02	11.02	47.61	18.24	18.63
	India	-6.30	7.49	31.04	78.00	25.21
	South Af.	-0.80	3.58	14.74	34.02	25.58

*Five years average of fiscal deficit, per capita annual real GDP growth, domestic saving, national debt and government expenditures.

Table 2. Summary of Statistics

	GR	GR(-1)	D	FD	FDEV	INF	RIR	SAV	TAX	TO
Panel A: Means, Standard deviation, Maximum and Minimum										
Mean	4.91	4.74	41.49	-3.90	86.03	97.51	4.80	28.19	13.14	42.94
Medians	4.42	4.40	39.45	-3.11	100.14	97.45	4.83	23.72	9.37	41.96
Stand. D	4.27	4.29	25.53	2.91	42.89	79.11	3.74	11.97	7.56	14.71
Max.	13.61	13.61	81.24	0.90	162.46	241.44	13.07	51.76	26.04	74.68
Min.	-4.16	-4.16	4.98	-9.48	22.77	3.68	-7.98	14.27	2.50	17.18

Panel B: Correlations										
	GR	**GR(-1)**	**D**	**FD**	**FDEV**	**INF**	**RIR**	**SAV**	**TAX**	**TO**
GR	1.00									
GR(-1)	0.87	1.00								
D	-0.43	-0.40	1.00							
FD	0.28	0.27	-0.80	1.00						
FDEV	0.02	0.00	-0.67	0.81	1.00					
INF	0.50	0.51	-0.89		0.80	0.74	1.00			
RIR	-0.58	-0.57	0.55	-0.40	-0.14	-0.44	1.00			
SAV	0.84	0.83	-0.54	0.28	0.00	0.59	-0.60	1.00		
TAX	-0.68	-0.64	0.14	0.27	0.51	-0.09	0.36	-0.77	1.00	
TO	0.20	0.23	-0.46	0.76	0.80	0.65	-0.23	0.15	0.46	1.00

It comes out that growth is positively correlated with the variables, such as FD, FDEV, INF, SAV and TO. The result with FD and INF did not expect under the standard growth theory. Because these two variables hinder the economic growth and they are the features of unhealthy economic growth when they passed the sustainable level. Whereas the variables RIR, TAX and D showed negative correlation with growth as expected. The second dependent variable which is saving has significantly and positively correlated with economic growth. Moreover, saving showed significantly and negatively correlated with D, RIR and TAX as expected.

6.2 Regression Analysis

6.2.1 Properties of data

Before commencing the regression part of our study, we need to test the stationary of our variables using the panel unit root test method, see Table 7 in appendix. For the variables which did not in stationary at level, first and second difference, we undertook the panel cointegration test in order to assure the existence of long term relation. We used Levin, Lin and Chu (LLC); Im, Pesaran and Shin (IPS); ADF-Fisher Chi-square and PP-Fisher Chi-square for a panel unit root test. Levin, Lin and Chu (2002) is one of the first unit root tests developed for panel data and suggests that individual unit root tests have limited power against alternative hypothesis, especially in small sample. Im, Pesaran and Shin (2003) use the likelihood framework which suggest a new more flexible and computationally simple unit root testing procedure for panels (which is referred as *t*-bar statistic), that allows for simultaneous stationary and non-stationary series.

6.2.1.1 Panel Unit root test

The table 7 below revealed the unit root test result obtained using Levin, Lin and Chu, Im, Pesaran and Shin, ADF-Fisher Chi-square and PP-Fisher Chi-square. The result showed that all variables are stationary at least in one testing method. All variables are at stationary in individual unit root test (i.e. Im, Pesaran and Shin W-stat; ADF - Fisher Chi-square and PP - Fisher Chi-square) and common unit root test (i.e. Levin, Lin and Chu) except FDEV and D, which are not at stationary in a common unit root test. When some of the variables were found non-stationary in level, we have tested them at first and second difference Therefore, the overall result suggest to continue to the next step which is estimation. However, in order to assure the long-term relation among the variables we did the cointegration test in table 3.

Table 3. Panel Cointegration tests[3]

Variables	Trend	Alternative hypothesis	Statistics		Probability
MODEL 1 GR ,FD, INF, RIR, TAX and D	Individual intercept and individual trend	Common AR Coefs	V	2.97	0.00**
			Rho	0.85	0.28
			PP	-5.94	0.00**
			ADF	-4.20	0.00**
		Individual AR Coefs	Rho	1.50	0.13
			PP	-6.26	0.00**
			ADF	-4.25	0.00**
	Individual intercept	Common AR Coefs	V	1.32	0.17
			Rho	0.77	0.30
			PP	-3.70	0.00**
			ADF	-5.32	0.00**
		Individual AR Coefs	Rho	1.50	0.13
			PP	-3.96	0.00**
			ADF	-5.90	0.00**
	No intercept or trend	Commons AR Coefs	V	-0.09	0.40
			Rho	1.40	0.15
			PP	1.10	0.22
			ADF	-1.89	0.07*
		Individual AR Coefs	Rho	2.32	0.03**
			PP	1.94	0.06*
			ADF	-1.91	0.06*
MODEL 2 SAV, FD, INF, RIR, TAX and D	Individual intercept and individual trend	Common AR Coefs	V	0.46	0.36
			Rho	2.24	0.03**
			PP	-4.95	0.00**
			ADF	-2.30	0.03**
		Individual AR Coefs	Rho	2.96	0.00**
			PP	-5.13	0.00**
			ADF	-2.14	0.04**
	Individual intercept	Common AR Coefs	V	0.02	0.40
			Rho	1.51	0.13
			PP	-2.62	0.01**
			ADF	-1.46	0.14
		Individual AR Coefs	Rho	2.32	0.03**
			PP	-2.65	0.01**
			ADF	-1.27	0.18
	No intercept or trend	Common AR Coefs	V	-2.03	0.05*
			Rho	1.75	0.09*
			PP	0.22	0.39
			ADF	-0.23	0.39
		Individual AR Coefs	Rho	2.74	0.00**
			PP	0.81	0.29
			ADF	0.23	0.39
Variables	Trend	Alternative hypothesis	Statistics		Probability
MODEL 1 GR ,FD, INF, RIR, TAX and D	Individual intercept and individual trend	Common AR Coefs	V	2.97	0.00**
			Rho	0.85	0.28
			PP	-5.94	0.00**
			ADF	-4.20	0.00**
		Individual AR Coefs	Rho	1.50	0.13
			PP	-6.26	0.00**
			ADF	-4.25	0.00**
	Individual intercept	Common AR Coefs	V	1.32	0.17
			Rho	0.77	0.30
			PP	-3.70	0.00**
			ADF	-5.32	0.00**

[3] Null Hypothesis: No cointegration -Automatic lag length selection based on SIC.

		Individual AR Coefs	Rho	1.50	0.13
			PP	-3.96	0.00**
			ADF	-5.90	0.00**
	No intercept or trend	Commons AR Coefs	V	-0.09	0.40
			Rho	1.40	0.15
			PP	1.10	0.22
			ADF	-1.89	0.07*
		Individual AR Coefs	Rho	2.32	0.03**
			PP	1.94	0.06*
			ADF	-1.91	0.06*
MODEL 2 SAV, FD, INF, RIR, TAX and D	Individual intercept and individual trend	Common AR Coefs	V	0.46	0.36
			Rho	2.24	0.03**
			PP	-4.95	0.00**
			ADF	-2.30	0.03**
		Individual AR Coefs	Rho	2.96	0.00**
			PP	-5.13	0.00**
			ADF	-2.14	0.04**
	Individual intercept	Common AR Coefs	V	0.02	0.40
			Rho	1.51	0.13
			PP	-2.62	0.01**
			ADF	-1.46	0.14
		Individual AR Coefs	Rho	2.32	0.03**
			PP	-2.65	0.01**
			ADF	-1.27	0.18
	No intercept or trend	Common AR Coefs	V	-2.03	0.05*
			Rho	1.75	0.09*
			PP	0.22	0.39
			ADF	-0.23	0.39
		Individual AR Coefs	Rho	2.74	0.00**
			PP	0.81	0.29
			ADF	0.23	0.39

6.2.1.2 Panel cointegration test

The panel cointegration test conducted using Pedroni (1999, 2004) that allow for heterogeneous intercepts and trend coefficients across cross-sections, with different methods of constructing statistics for testing the null hypothesis of no cointegration. There are two alternative hypotheses: the homogenous alternative which is called the within-dimension test, or panel statistics test, and the heterogeneous alternative referred to as the between-dimension, or group statistics test. For the within-dimension statistics the null hypothesis of no cointegration for the panel cointegration test is:

H_o: $\gamma_i = 1$ for all *i*

H_o: $\gamma_i < 1$ for all *i*

Whereas the between-dimension statistics the null hypothesis of no cointegration for the panel cointegration test is:

H_o: $\gamma_i = 1$ for all *i*

H_o: $\gamma_i < 1$ for all *i*

Because of no exogeneity requirements are imposed on the regressors of the cointegrating regressions and pooling only the information regarding the possible existence of the cointegrating relationships, Pedroni cointegration test outwit other methods.

The panel cointegration test result disclosed the existence cointegration between the explanatory variables and the dependent variable. As shown in the Table 3 under Individual intercept and individual trend assumption in all cases except rho-statistics in case of model one and v-statistics in case of model two, rejects the null hypothesis of no cointegration at 5% and 10% level of significance. This implies that the variable has a long run relationship and evidenced to continue to the next step which is regression part of the study.

6.2.2 Regression Results

In this section we did the estimation by classifying the explanatory variables in to fiscal and non fiscal variables. Table 4 includes the regression result for dependent variable growth using the dynamic GMM, fixed effect and random effect estimation. In this table all explanatory variables are used including the lag of dependent variable. In table 5 we employed the same regression for saving considering the economic growth variable as one of explanatory variable. Table 6 reports regression result excluding non-fiscal variables in order to evaluate whether the fiscal variable a lone are explaining significantly the effects of fiscal deficit on economic growth and saving as the growth and saving theory argued.

Table 4. Regression result for Growth (GR) dependent variable

Independent variables	GMM Estimation				Fixed effect Estimation				Random effect Estimation			
	Coeff.	Std.	t.stat.	Prob.	Coeff.	Std.	t.stat.	Prob.	Coeff.	Std.	t.stat.	Prob.
GR(-1)	0.33	0.13	0.61***	0.00	0.28	0.22	1.25	0.22	0.33	0.13	2.59**	0.01
FD	0.50	0.22	2.32**	0.02	0.51	0.24	2.07**	0.04	0.50	0.22	2.30**	0.03
INF	0.00	0.01	-0.38	0.71	0.01	0.01	0.51	0.62	0.00	0.01	-0.37	0.71
RIR	-0.12	0.09	-1.34	0.19	-0.12	0.06	-2.06**	0.04	-0.13	0.09	-1.33	0.19
TAX	-0.57	0.14	-4.02***	0.00	-0.85	0.26	-3.33	0.00	-0.57	0.14	-3.98*	0.00
TO	0.09	0.05	1.78*	0.08	0.08	0.06	1.31	0.20	0.09	0.05	1.76*	0.08
FDEV	0.03	0.22	1.48	0.15	0.04	0.02	1.75*	0.09	0.03	0.02	1.46	0.15
SAV	-0.06	0.08	-0.74	0.46	0.06	0.22	0.28	0.78	-0.06	0.08	-0.73	0.47
D	0.06	0.03	1.84*	0.07	0.04	0.05	0.79	0.43	0.06	0.03	1.82*	0.08
Const.	6.72	3.50	1.92*	0.06	6.91	3.13	2.21**	0.03	6.72	3.54	1.90*	0.06

Table 5. Regression result for Domestic Saving (%GDP)

Independent variables	GMM regression				Fixed effect regression				Random effect regression			
	Coeff.	Std.	t.stat.	Prob.	Coeff.	Std.	t.stat.	Prob.	Coeff.	Std.	t.stat.	Prob.
SAV(-1)	0.79	0.08	10.29***	0.00	0.57	0.09	6.44***	0.00	0.59	0.09	6.92***	0.00
FD	0.16	0.20	0.78	0.44	0.36	0.19	1.90**	0.06	0.35	0.19	1.88*	0.07
INF	0.01	0.01	1.40	0.17	0.00	0.01	-0.31	0.76	0.00	0.01	-0.05	0.96
RIR	-0.19	0.09	-2.21**	0.03	-0.16	0.08	-2.07**	0.04	-0.16	0.08	-2.15**	0.04
TAX	-0.35	0.12	-3.03***	0.00	-0.08	0.25	-0.33	0.74	-0.16	0.24	-0.66	0.51
TO	0.08	0.04	1.89*	0.06	0.12	0.04	3.11***	0.00	0.12	0.04	3.99***	0.00
FDEV	0.00	0.02	-0.15	0.88	-0.04	0.02	-2.22**	0.03	-0.04	0.02	-2.11**	0.04
D	0.05	0.03	1.62	0.11	0.15	0.04	3.59***	0.00	0.15	0.04	3.54***	0.00
Cons.	5.51	3.20	1.72*	0.09	8.03	3.09	2.60**	0.01	8.07	6.23	1.29	0.20

*** significant at the 1 percent level; ** significant at the 5 percent level;* significant at the 10 percent level. The dependent variable in the regressions is domestic saving to GDP. The time period covered is between 1990 and 2008. All explanatory variables used in the regressions are percentage of GDP. The fixed effect estimation utilizes cross-section fixed (country fixed effects) and corrects for autocorrelation of the error terms. Panel GMM (Generalized Method of Moments) is applied to the sample to limit the number of moment conditions.

6.3 Discussion

The rising budget deficit has been considered as one of the main constraints on economic growth in developing economies. Fischer (1993), also argued that large deficits are simply an indicator of general macroeconomic instability which is injurious to economic growth. Contrary to the standard economic theory and many empirical studies, our regression result for fiscal deficit showed that unique result. As showed in table 4, 5 and 6, the coefficients for fiscal deficit results are significant and positively correlated to economic growth and saving. Basically our regression result is not the first when it showed positively correlation between fiscal deficit and economic growth.

Similarly regression result for inflation also repeated what we have observed in the case of deficit. However, the results are not significant except for table 6 in case of saving. Though many empirical studies investigated that inflation and economic growth are negatively correlated, both Fischer's (1991) estimates, Sala-I Martin (1991) have found an insignificant link between growth and inflation. In fact the level of inflation (i.e. low, moderate and high) matters to reduce the rate of economic growth. This statement is supported by the study of Clark (1993). He investigated that across low and moderate inflation countries there is no consistent and significant relationship between growth and inflation. Moreover, Levine and Zervos (1993) conclude that marginal changes in moderate inflation rates may not be negatively associated with growth. The coefficient of variable

taxation in our regression result is significant and negatively correlated with economic growth and saving which is in line with economics theory. Several empirical studies also confirmed that high marginal tax rates reduce economic growth. Among them, Padovano and Galli (2001; 2002) assured that the negative effects of high marginal tax rates have negative effects on economic growth.

Table 6. Regression only using fiscal variables for both growth and saving

	Dependent Variables							
Fiscal variables	**GDP Per Capita Growth (%)[4]**				**Gross Domestic Saving as % GDP**			
	Coeff.	**Std.**	**t.stat.**	**Prob.**	**Coeff.**	**Std.**	**t.stat.**	**Prob.**
GR(-1) ^SAV(-1)	0.42	0.12	3.45***	0.00	0.87	0.06	13.69***	0.00
FD	0.58	0.22	2.61**	0.01	0.29	0.20	1.47	0.15
INF	0.01	0.01	1.25	0.22	0.02	0.01	2.13**	0.04
RIR	-0.12	0.10	-1.26	0.22	-0.23	0.08	-2.69**	0.01
TAX	-0.29	0.07	-4.19***	0.00	-0.20	0.09	-2.30**	0.03
DEBT	0.06	0.03	2.01*	0.05	0.08	0.03	2.90**	0.01
Cons.	6.02	1.91	3.15***	0.00	3.71	2.86	1.29**	0.02

*** Significant at the 1 percent level; ** significant at the 5 percent level;* significant at the 10 percent level. The dependent variables in the regressions are per capita annual real GDP growth and domestic saving as a percentage of GDP. The time period covered is between 1990 and 2008. The fiscal policy explanatory variables used for regression are as a percentage of GDP.

Trade openness as expected has a positive and significant result for both growth and saving. Though many studies find no strong positive association between openness and growth of the economy, theories support the positive and strong relation between trade openness and economic growth. The result in table 4 showed that 1% increases for the proxy of trade openness would increase 0.09% increase in economic growth and 0.08% increase in national saving. The coefficient of financial development for economic growth showed a positive and significant correlation at 10%. This result is supported with the result of Goldsmith (1969) and Mckinnon (1973), La Porta et al., (1998) and Levine et al., (2000). However, financial development with saving has revealed a negative and significant relation. Actually in several studies, financial development has ambiguous result with saving. Some argued that the existence of strong and well advanced financial system would encourage taking a credit and increasing their level of consumption which as a result reduces the amount of saving. Other argued that, financial development would encourage saving their part of earning and earning interest and consequently it will contribute for more saving.

The real interest rate correlated negatively and significantly with economic growth and saving. Higher real interest rates would increase incentive to save and less consumption. This is because the future consumption cheaper relative to current consumption (i.e. substitution effect). However, people with savings will get more income from the higher returns; therefore their spending may increase (i.e. income effect).

7. Conclusion and Policy Implications

The welfare of successive generations determined by the sustainable economic growth and sound macroeconomic policy. Economic growth is a major determinant of living standards in society when it is achieved with low and stable inflation and unemployment.

The objective of this study is to show how the fiscal deficit hinders sustainable economic growth in emerging countries. The results provide useful imminent in order to understand and taking precautionary measure. Our regression result for fiscal deficit showed that unique result. As it shown in table 3, 4 and 5, the coefficients for fiscal deficit results are significant and positively correlated to economic growth and saving. Basically our regression result is not the first when it showed positively correlation between fiscal deficit and economic growth.

The variable real interest rate is correlated negatively and significantly with economic growth and saving which support the standard theoretical argument. Whereas the regression result for inflation also repeated what we have observed in the case of deficit. However, the results are not significant

[4] It is annual growth rate in %.

except for table 5 in case of saving. Though many empirical studies investigated that inflation and economic growth are negatively correlated, both Fischer's (1991) estimates, Sala-I Martin (1991) have found an insignificant link between growth and inflation.

Therefore we can conclude that, fiscal deficit would affect the economic growth and saving through the means financing the deficit. As we have seen both taxation and interest rate exhibited a negative and significant relation with economic growth and saving despite the result of debt and inflation.

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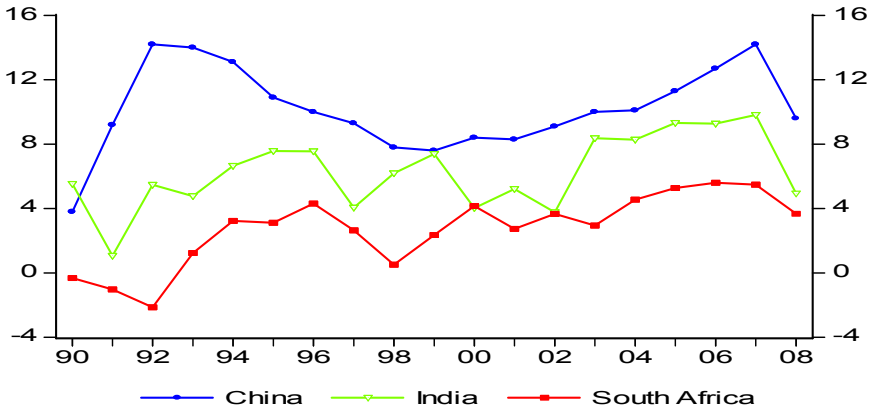
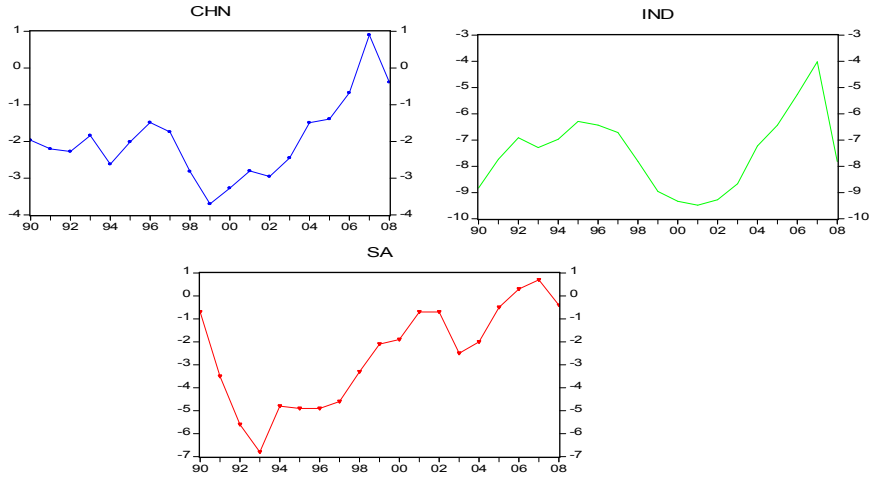
Appendix

Graph 1. Economic Growth Trend



Graph 2. Fiscal Deficit Trend



Graph 3. Domestic Saving Trend

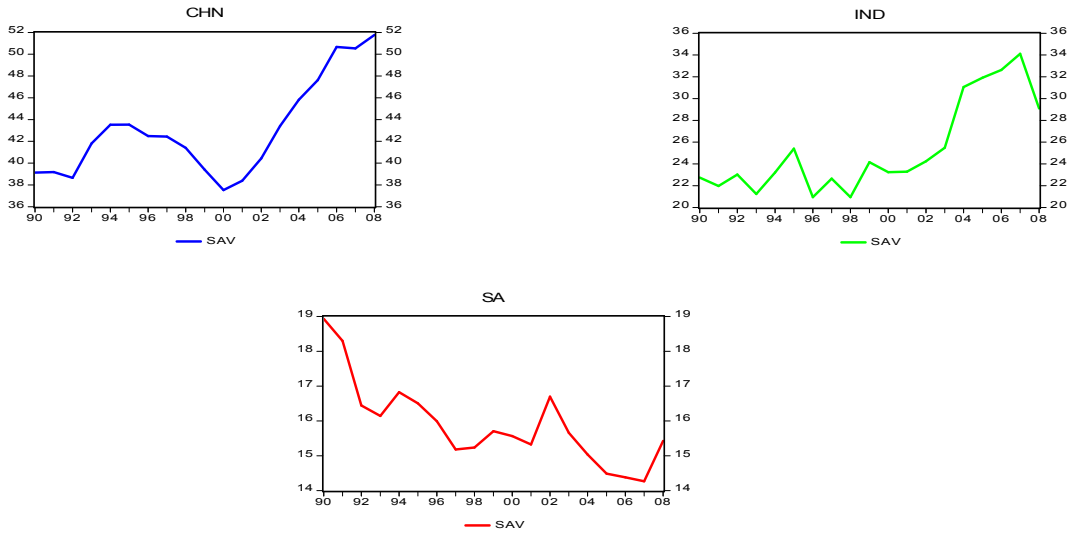


Table 7. Results of Unit root test

Series	Method	Statistics	Prob.[5]	Obs.	Stationary or No
GR	Levin, Lin ^Chu	-1.65*	0.05	51	I(0)
	Im, Pesaran and Shin	-1.83**	0.03	51	I(0)
	ADF-Fisher Chi-square	13.04**	0.04	51	I(0)
	PP-Fisher Chi-square	12.67*	0.05	54	I(0)
GR(-1)	Levin, Lin ^Chu	-2.04**	0.02	51	I(0)
	Im, Pesaran and Shin	-1.32*	0.09	51	I(0)
	ADF-Fisher Chi-square	13.15**	0.04	51	I(0)
	PP-Fisher Chi-square	45.40***	0.00	51	I(1)
FD	Levin, Lin ^Chu	-1.60*	0.05	48	I(1)
	Im, Pesaran and Shin	-2.50**	0.01	48	I(1)
	ADF-Fisher Chi-square	17.20**	0.01	48	I(1)
	PP-Fisher Chi-square	24.67***	0.00	51	I(1)
FDEV	Levin, Lin ^Chu	-0.02	0.49	45	No
	Im, Pesaran and Shin	-1.31*	0.09	48	I(1)
	ADF-Fisher Chi-square	11.19*	0.08	48	I(1)
	PP-Fisher Chi-square	31.98***	0.00	51	I(1)
DEBT	Levin, Lin ^Chu	0.28	0.61	44	No
	Im, Pesaran and Shin	-2.97***	0.00	44	I(2)
	ADF-Fisher Chi-square	20.42***	0.00	44	I(2)
	PP-Fisher Chi-square	15.62**	0.02	50	I(1)
INF	Levin, Lin ^Chu	-1.48*	0.07	48	I(1)
	Im, Pesaran and Shin	-2.60***	0.00	48	I(1)
	ADF-Fisher Chi-square	18.41**	0.01	48	I(1)
	PP-Fisher Chi-square	24.43***	0.00	51	I(1)
TAX	Levin, Lin ^Chu	-4.79***	0.00	48	I(1)
	Im, Pesaran and Shin	-4.07***	0.00	48	I(1)
	ADF-Fisher Chi-square	26.80***	0.00	48	I(1)
	PP-Fisher Chi-square	67.41***	0.00	51	I(1)
TO	Levin, Lin ^Chu	0.45	0.67	45	I(2)
	Im, Pesaran and Shin	-3.34***	0.00	45	I(2)
	ADF-Fisher Chi-square	21.91***	0.00	45	I(2)
	PP-Fisher Chi-square	19.42***	0.00	51	I(1)
RIR	Levin, Lin ^Chu	-2.61***	0.00	48	I(1)
	Im, Pesaran and Shin	-1.57*	0.06	51	I(0)
	ADF-Fisher Chi-square	11.51*	0.07	51	I(0)
	PP-Fisher Chi-square	13.48**	0.04	54	I(0)
SAV	Levin, Lin ^Chu	-1.47*	0.07	48	I(1)
	Im, Pesaran and Shin	-2.14**	0.02	48	I(1)
	ADF-Fisher Chi-square	15.01**	0.02	48	I(1)
	PP-Fisher Chi-square	22.23***	0.00	51	I(1)
INV	Levin, Lin ^Chu	-1.63*	0.05	48	I(1)
	Im, Pesaran and Shin	-4.01***	0.00	45	I(2)
	ADF-Fisher Chi-square	26.23***	0.00	45	I(2)
	PP-Fisher Chi-square	121.79***	0.00	48	I(2)

[5] Probabilities for Fisher tests are computed using an asymptotic Ch -square distribution. All other tests assume asymptotic normality. Im, Pesaran and Shin W-stat; ADF - Fisher Chi-square and PP - Fisher Chi-square-Null Hypothesis: Unit root (Individual unit root process) where as Levin, Lin & Chu test and Breitung t-stat-Null Hypothesis:Unit Root (common unit root process). Automatic lag length selection based on Modified Schwarz Criteria and Bartlett Kernel.