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THE EFFECTS OF ECONOMIC POLICIES ON GDP PER CAPITA – LESSONS FROM BANGLADESH

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ABSTRACT

This paper aims to examine the relationship between economic policies and economic wellbeing measured by GDP per capita. The single equation econometric technique has also been used to examine the relationship using a time series data for the period 1972-2015. Models shows that government spending, fiscal policy, along with some other covariates (excluding money supply, the monetary policy) have some significant effect on GDP per capita whereas the inclusion of money supply into the model shrinked the effects of government spending on GDP per capita and the effect of money supply is much more stronger than the government spending and the effect of population growth on GDP per capita is found significantly negative.

1. INTRODUCTION

Around the globe, the government aims to achieve steady state and stable economic growth with a view to attaining national agenda like alleviating poverty or curbing poverty to a certain level or even to attaining a better standard of living. The government can follow fiscal strategies, or monetary strategies, or their mixed. In an economy, either small or big, the role of government as enforcement institution as well as the demander of goods and services is very important. The government collects revenues from the individuals, households, business firms, entrepreneurs, corporate institutions, and various organizations through imposing various kinds of direct or indirect taxes/levies on income or asset.The government spends the money in implementing the development projects and in operating the state.The government also provides assistance to the consumers, producers, institutions, and organizationsthrough transfer money in the form of subsidy or in the form of cash incentives for enhancing the welfare. These actions of the government have impacts on the economy. The incremental spending of the government affects the economy positively

while the incremental taxation policy affects the economy negatively by discouraging consumers to spend more or reducing the disposable income. Therefore, the government plans to follow a balanced budget strategy, a process of keeping the budget deficit unchanged.

Theoretically, consumers' spending depends on disposable income, the gap between income and payable taxes, and it is an increasing function of disposable income. The consumers' propensity to spend is largely influenced two factors: the marginal propensity to disposable income and the marginal tax rate. In a simple economy, where investment and net exports are exogenously determined, the change in income will be the sum of the change in consumption and change in government expenditure. If the fiscal policy changes holding the budget deficit unchanged, then consumption is less likely to change, however, it will change proportionately if fiscal policy changes with an increase in the budget deficit (see appendix).

In Bangladesh, the government announces annual budget in July of every year. The economic agents keenly get interested in what is changed in the budget, what is the level of government expenditure, how the spending will be financed, what will be the tax policy, and many more. In fiscal year 2015-16, the private consumption expenditure was around 70 percent of the GDP, the national savings were 30 percent of the GDP, the public expenditure was 17.1 percent of the GDP, export was 9.7 percent of GDP, and import was 11.5 percent of the GDP. The relative contribution of private consumption in GDP implies that any shocks affecting income and thereby to consumption expenditure due to external factors, will affect theGDP significantly.

Since 1990s, Bangladesh has spent over 14 per cent of the GDP as public expenditure with moderate expenditure for development purposes. The government is currently spending nearly 15.75 percent of GDP on an average and the budget share of development expenditure is increasing over time. The government earns major revenues from taxes in which the indirect taxes contribute majorly, over 70 per cent, and this overwhelming scenario has been shifted recently. The increasing nature of public spending in absolute term is expected to contribute to GDP. Moreover, the country aims to achieve the middle income country status as well as to attain the goals of being a developed country in the near future. To attain those goals, the government must increase its spending judiciously.

This paper aims to assess the effect of fiscal policy in Bangladesh on per capita GDP. We start with the question "what will be the effects of expansionary fiscal policies on per capita GDP?" Although the effects of fiscal policy is being assessed using the econometric techniques.

2. LITERATURE REVIEW

A plethora of studies, both theoretically and empirically, has been carried out globally. Studies focused on the effects of fiscal policy on a wide range of economic variables like

economic growth (Boskin, 2012; Kofi Ocran, 2011; Balatsky & Ekimova, 2012; Babalola & Aminu, 2011; Abata *et.al.*, 2012; Auerbach & Gorodnichenko, 2012), investment (Alesina & Ardagna, 2010; Davig & Leeper, 2011; Isaac & Samwel, 2012), inflation (Sim, 2011), exchange rate (Monacelli & Perotti, 2010), external deficit (Ferrero, 2010; Abbas*et,al.*, 2011), etc. The authors used public expenditure, tax policy, and deficits as fiscal policy variables and found different responses ofmacroeconomic variables to fiscal innovations. Both theory and empirics suggest that government expenditure affects economic growth positively while incremental taxes affects GDP growth rate negatively.

3. METHODOLOGY

The econometric specification of the relationship between public expenditure and GDP per capita along with other explanatory variables has been modeled as follows:

Strategy 1:

$$\left(\frac{GDP}{Pop}\right)_t = \beta_0 + \beta_1\left(\frac{G}{GDP}\right)_t + \beta_2\left(\frac{FDI}{GDP}\right)_t + \beta_3\left(\frac{SAV}{GDP}\right)_t + \beta_4\left(\frac{X}{GDP}\right)_t + \beta_5 DIR_t + \beta_6 POP_t$$

In this specification, the left-side represent per capita GDP, the term $\frac{G}{GDP}$ represents the government expenditure as a proportion of GDP, $\frac{FDI}{GDP}$ represents the FDI-GDP ratio, and $\frac{X}{GDP}$ is the export-GDP ratio. The other explanatory variables are deposit interest rate (DIR) and population growth rate (POP). The term *u* is is the stochastic disturbance term satisfying the standard assumptions of linear regression model. The subscript t of the variables represents time.

The above model is nested type econometric model. We have estimated four types of model: (i) model 1 – the simple model showing the relationship between GDP per capita and share of public expenditure; (ii) model 2 – a Solow type relationship between GDP per capita, savings rate, and population growth; (iii) model 3 – an extension of model 2 where the variable interest rate on deposit appear as additional explanatory variables; and (iv) model 4 – the full model, model incorporating the remaining part of the external sector.

Strategy 2: The model formulated in strategy 1 is transformed into a semi-log model and the model is written as:

$$\ln\left(\frac{GDP}{Pop}\right)_t = \beta_0 + \beta_1\left(\frac{G}{GDP}\right)_t + \beta_2\left(\frac{FDI}{GDP}\right)_t + \beta_3\left(\frac{SAV}{GDP}\right)_t + \beta_4\left(\frac{X}{GDP}\right)_t + \beta_5\left(\frac{M^S}{GDP}\right)_t + \beta_6 DIR_t + \beta_7 POP_t + u_t$$

The only difference between strategy 1 and strategy 2 is that the dependent variable is in log form in the second strategy while that is in absolute level of strategy 1 and this model controls the effect of money supply. The coefficients of this model will measure the relative change in per capita GDP for an absolute change in a single explanatory variable holding the effects of other variables constant.

Estimation of the models, either strategy 1 or strategy 2, is challenging because the variables are from time series data and time series variables could be stationary and non-stationary. But in the estimation of the models in strategy 1 and strategy 2 using OLS method requires that the variables have to be stationary or at least they have to be co-integrated.

In generic form, let assume Y_t is a variable and it follows the following process:

$$Y_t = \rho Y_{t-1} + e_t \qquad -1 \leq r \leq 1$$

Here, e_t is white noise error term. If $\rho = 1$, that is, there is a unit root, the process is called random walk model without drift and Y_t follows nonstationary stochastic process. The subtraction of the term Y_{t-1} from both sides of the above expression, will give us $\Delta Y_t = \delta Y_{t-1} + e_t$ where the symbol Δ is the first difference operator, $\Delta Y_t = Y_t - Y_{t-1}$, and $\delta = (\rho - 1)$. If we test the null hypothesis that $\delta = 0$ implying $\rho = 1$ against the alternative hypothesis $\delta \neq 0$, we can conclude whether the series Y_t is stationary or nonstationary. In this simple setting, $\delta = 0$ implies that $\Delta Y_t = e_t$. Since e_t is white noise and stationary, the expression $\Delta Y_t = e_t$ implies that the first difference of a random walk time series is stationary.

While there are many methods of testing unit roots, Augmented Dicky Fuller test (see Dickey & Fuller, 1979) is popularly used to test unit root. The ADF test consists of estimating the following general regression:

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \sum_{i=1}^{m} \alpha_i \Delta Y_{t-i} + \varepsilon_t$$

Here is pure white noise error term and t is time. The number of lagged differences is selected empirically.

If the variables are not stationary, the regression results, in the strategies 1 and 2, will be suspected to be spurious, a non-sense regression. However, if the variables are co-integrated, the estimated results will present the long-run relationship between the dependent variable and independent variables. In a single equation model, the co-integration can be tested using Engle-Granger or Augmented Engle-Granger test. The idea can be explored if we assume that Y_t and X_t are $I(1)$ type two nonstationary series and are linearly related as $Y_t = \beta_1 + \beta_2 X_t + \epsilon_t$, then $\epsilon_t = Y_t \ \beta_1 - \beta_2 X_t$. If ϵ_t becomes stationary, then Y_t and X_t are co-integrated. If the variables are co-integrated, the regression model will show the long-run relationship between variables. At this stage, one can face two issues: (i) what is the short-

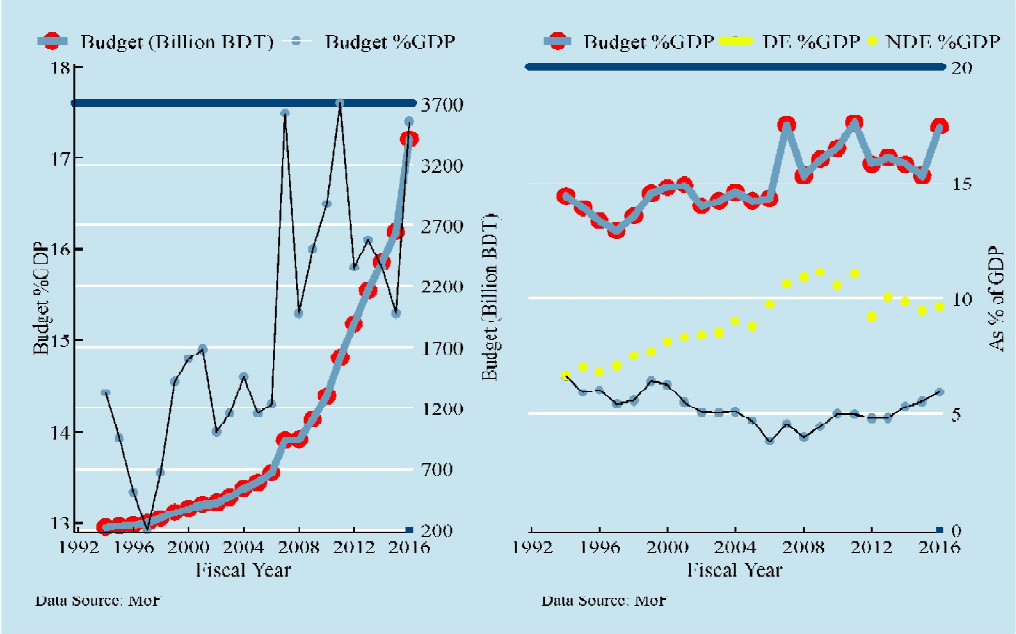
run effect of a particular explanatory variable on the regressand, and (ii) if the economy is at short-run disequilibrium position, how will the adjustment take place to reach the long-run equilibrium position? These two issues can be handled using error correction mechanism. Engle and Granger proposed error correction model to estimate the short-run effects as well as the speed of adjustment of disequilibrium. To formulate the process, let assume X_t represents the vector of explanatory variable and linear regression model is written as $Y_t = \beta X_t + v_t$, then the error correction model can be written as:

$$\Delta Y_t = \alpha \Delta X_t + \gamma v_{t-1} + \xi_t$$

Here Δ is the first difference operator and ξ_t is the random error term.

The ECM equation shows that the first difference of the regressand depends on the first difference of a set of explanatory variables and on equilibrium error terms. Theoretically, the short-run disequilibrium can be corrected if γ becomes negative, otherwise, the model will be out of equilibrium. If γ becomes statistically insignificant, that is, the equilibrium error become zero, the regressand adjusts to changes in regressors in the same period.

Figure 1: Recent trend of national, development and non-development budget in Bangladesh (1992-2016)



Source: Drawn by the Author based on data obtained from Bangladesh Economic Review

4. RECENT TRENDS OF PUBLIC EXPENDITURE IN BANGLADESH

Conceptually, the fiscal policy aims to determine the public expenditure and public revenue and aims to make balance between them. Government through its formulation and implementing body designs and executes the fiscal policies. The objective of a sound fiscal policy is to maintain a stable macro economy through harmonizing public expenditure management for fostering economic growth through creating an enabling environment for the private sector.

The size of national budget proposed at the parliament in FY 2008-09 was BDT 94140 crore and the budget in Bangladesh has grown by around 17.5 percent annually and stood at BDT222491 crore in FY 2013-14. In fiscal year 2014-15, the proposed budget was BDT 250506 crore. The national budget as percentage of GDP was 15.3% in FY 2008-09 and 15.9% in FY 2009-10. However, it increased from 15.9 in FY 2009-10 to 16.3 in FY 2010-11, 0.4 percentage points higher than FY 2009-10. In the last three fiscal years, the national budget as percentage of GDP was more than 18%. In FY 2012-13, the budget as a percentage of GDP became 18.2, which was around 0.8 percentage points higher than the previous fiscal year. In fiscal year 2013-14 and 2014-15, the proposed budget was around 18.7 percent of the GDP, whereas the revised budget was around 15.8 percent of GDP. The data show that while the national budget is increasing at a constant rate, 10-12 percent, the national budget as a percent of GDP has increased exponentially.

The instantaneous rate of growth of budget is estimated at 15.9 while the compound (over a period of time) rate of growth, for the fiscal year 2008-09 to 2014-15, is estimated at 17.3 percent. The national budget as percentage of GDP has grown at the rate of 3.43 percent and it has shown an increasing pattern. The average budget size as percentage of GDP was 16.84 for the period FY 2008-09 to FY 2015-16. The revenue receipts for FY2015-16 have been estimated at Tk. 2 lakh 8 thousand and 443 crore, which is 12.1percent of GDP, of which NBR tax revenue is estimated at Tk. 1 lakh 76 thousand 370 crore (10.3 percent of GDP). Tax revenue from non-NBR sources has been estimated at Tk. 5 thousand 874 crore (0.3 percent of GDP). Besides, Tk. 26 thousand 199 crore (1.5 percent of GDP) is expected to be collected from non-tax sources.

Total expenditure for FY 2015-16 has been estimated at Tk. 2 lakh 95 thousand 100 crore (17.2 percent of GDP). Taking ADP allocation for autonomous bodies to the tune of Tk. 3 thousand 996 crore into account, the size of the total budget will stand at almost Tk.3 lakh crore. The allocation for non-development expenditure, including other expenses has been estimated at Tk.1 lakh 98 thousand 100 crore (11.5 percent of GDP). In addition, Tk. 97 thousand crore has been estimated for ADP. Together with the allocation of Tk. 3 thousand 996 crore for autonomous bodies, total development expenditure stands at Tk. 1 lakh 996 crore (11.6 percent of GDP).

The decomposition of budget into development and non-development component shows that the development budget as percentage of the national budget is stationary and ranges

mostly from 4-6 percent, while the non-development budget contains mostly linear positive trend with little fluctuation in the last decade and since 2008, there is a downward trend in the share of non-developmental budget to GDP. The composition of the national budget, hence, shows non-stationary and mostly contains a random walk with trend and drift. The gap between development budget as percentage of GDP and development budget as percentage of GDP was small in 1990s, but after 1990s, in 2000s the gap tends to get widen and in between 2004 and 2012, the gap has reached at the maximum. In the recent fiscal years, the gaps have been tended to decline.

5. ECONOMETRIC RESULTS AND DISCUSSIONS

The data show that the GDP, since 1972, grew at 4.53 percent on average, while the compound growth rate is estimated to be 4.63. The GDP series has an upward trend and the trend coefficient value 2757 implying that ever year the GDP is growing by 2757 million USD. On the other hand, the average GDP per capita for the last three years is around 990. The GDP per capita grows at 4.33 percent, a lower growth rate than the GDP growth rate. The GDP per capita has positive trend and every year the GDP per capita grows by around 14.7 USD. In a simplistic view, the increasing pattern of GDP per capita can be seen as the outcome of two forces: (i) increasing GDP and (ii) decreasing the population growth, over the period, the population declines at the rate of 1.84 per cent. The average population growth in the last three years is estimated at 1.21 percent.

The savings, investments, exports and government expenditure, the key components of GDP, show an upward trend. The result shows that savings grows at the rate of 15.7 percent, FDI increases at the rate of 20.5 percent, and export receipts increases at the rate of 10.5 percent while government expenditure grows at the rate of 8.8 percent. The government expenditure GDP ratio, FDI-GDP ratio, savings-GDP ratio, and export-GDP ratio have also upward trends. In the last three years, the average FDI-GDP ratio is estimated at 0.02, the savings GDP ratio at 0.25 and export-GDP ratio of 0.22. The deposit interest rate grows up at the rate of 2.04 percent and the trend coefficient is measured at 0.062.

The pairwise correlation between government expenditure as percentage of GDP and deposit interest rate is negative. Most of the pairwise correlation coefficient is positive. There is a high level of pairwise correlation between GDP per capita, FDI-GDP ratio, savings-GDP ratio, and export-GDP ratio. There is also a high level pairwise correlation between export-GDP and FDI-GDP ratio as well as between export-GDP ratio and savings-GDP ratio. The pairwise correlation of the variables with population growth rate is found negative except the positive correlation between the deposit interest rate and population growth rate.

The ADF test shows that the variables in the models of strategy 1 and strategy 2 are non-stationary at their level, but they are stationary at their first difference level except the

GDP per capita variable. The log of GDP per capita variable, however, is stationary at its first difference level. Therefore, the regression results of strategy 1 may seem spurious. However, the test for spurious regression shows that the model is not spurious (see appendix).

Since the log of GDP per capita variable and the proposed set of explanatory variable is non-stationary at level, but stationary at their first difference level, the conformity of the long run regression model is satisfied. We have estimated the long-run regression model and the results are reported in table 1.

Table 1: OLS based long-run regression results: dependent variable – log of GDP per capita

	Model 1	*Model 2*	*Model 3*	*Model 4*
	Coefficient	*Coefficient*	*Coefficient*	*Coefficient*
Constant	4.83***	5.89***	6.05***	5.82***
	(12.83)	(58.58)	(71.46)	(149.98)
Govt. expenditure as % of GDP	0.29***	0.03***	0.05***	0.01
	(3.68)	(1.57)	(3.65)	(1.49)
FDI-GDP ratio		16.27***	12.73***	6.06***
		(5.22)	(5.01)	(4.51)
Savings-GDP ratio		2.74***	1.76***	0.61***
		(10.95)	(6.33)	(4.14)
Population Growth		-0.08***	-0.24***	-0.08***
		(-2.92)	(-6.23)	(-4.01)
Deposit interest rate			0.02***	0.01***
			(4.99)	(3.52)
Export-GDP ratio				1.47***
				(6.15)
Real money supply GDP ratio				0.75***
				(11.14)
Model's Summary Statistics				
Durbin-Watson d-statistic	d(2, 43) = 0.23	d(5,43) = .88	d(6,43) =1.13	d(8,43) =1.91
Durbin's alternative test (Chi-square)	145.00	13.28	5.79	0.04
ll (null)	-14.39	-14.39	-14.39	-14.39
ll (model)	-8.25	64.50	75.58	114.64
AIC	20.50	-119.00	-139.15	-213.29
BIC	24.02	-110.20	-128.59	-199.20
Model Specification Test	F(3, 38) = 13.75	F(3, 35) = 8.94	F(3, 34) = 10.12	F(3, 32) = 0.82
Heteroscedasticity test (Chi-square value)	27.38	24.58	30.80	41.03
Multicollinearity test (VIF)	1.00	3.29	5.84	12.75
Is the regression spurious?	No	No	No	No

Source: Estimated by the author (2018)

Note: The figures in parentheses show calculated t-values. The asterisks on the coefficient value indicate their significance: * for significance at 10 percent level, ** for significance at 5 percent level, and *** for significance at 1 percent level.

The simple model, model 1 in table 1), shows that there is positive relationship between the log of GDP per capita and the proportion of public expenditure to GDP and the coefficient suggests that a 0.1 point change in the ratio of public expenditure to GDP increases the GDP per capita by 2.9 percent. But this model is not correctly specified, it suffers from the problem of omission of important variables from the model. In addition, it also suffers from autocorrelation, and heteroscedasticity problem. In the second model, where FDI-GDP ratio, savings-GDP ratio and population growth rate appear as explanatory variables along with the fiscal variable. The sign of the fiscal variable remains positive, but the relative size of the effect declines. The result shows that a 0.1 point change in public expenditure to GDP ratio increases the GDP per capita by 0.3 percent holding the effects of other variables constant. This relationship is found statistically significant at the 1 percent level of significance. Other things remaining same, the results reveal significant positive effects of FDI-GDP ratio and savings-GDP ratio on log of GDP per capita. There is an inverse relationship between population growth and log of GDP per capita. The result shows that a 10 percentage point increase in population growth will reduce GDP per capita by around 0.8 percent holding the effects of other things remaining the same. Although model 2 does not suffer from multicollinearity problem and non-sense regression, it suffers from autocorrelation and heteroscedasticity problems. Therefore, the coefficients, though unbiased, are inefficient. The inclusion of deposit interest rate as an explanatory variable in the model, the direction of the effects remain same but the size of the effect changes, for example, the effect of a 0.1 point increase in fiscal variable increases the GDP per capita by 0.5 percent holding other things remaining the same but the reduction in GDP per capita due to population growth is accelerating. The effects of FDI-GDP ratio and savings GDP ratio decline compared to the model 2.

No doubt that money supply is also the key determinants of economic growth. In an economy, the estimation of the effects of fiscal policy on growth will be biased if the effect of money supply is not controlled. The fourth model includes real money supply-GDP ratio as an additional explanatory variable. Moreover, the export-GDP ratio has also been included to control the external effects on growth. The results of fourth model are interesting. The effect of fiscal variable on log of GDP per capita becomes insignificant. Although the coefficients of the variables FDI-GDP ratio, savings-GDP ratio, and population growth are highly significant, their relative effects become less than half or less than the corresponding coefficients of model 3. The coefficients of export-GDP ratio and real money supply-GDP ratio are significant at the 1 percent level of significance. The fourth model suggests that the external economy has much more effect on GDP per capita than the internal economy. Model 4 is a correctly specified model and the model is free of the autocorrelation problem as the Durbin-Watson d statistics are around 1.9. But this model is heavily influenced by the heteroscedastic variances. Heteroscedasticity is prevalent in other models as well. Therefore, heteroscedasticity corrected model should be more reliable. To correct

heteroscedasticity, we have estimated the coefficients using the feasible GLS method. The results are reported in table 2.

Table 2: FGLS based long-run regression results: dependent variable – log of GDP per capita

	Model 1	*Model 2*	*Model 3*	*Model 4*
	Coefficient	*Coefficient*	*Coefficient*	*Coefficient*
Constant	4.82***	5.91***	6.08***	5.82***
	(135.92)	(96.47)	(112.59)	(253.41)
Government expenditure as % of GDP	0.29***	0.02***	0.05***	0.01***
	(35.78)	(5.02)	(5.53)	(4.09)
FDI-GDP ratio		16.07***	12.27***	6.32***
		(19.77)	(26.44)	(11.62)
Savings-GDP ratio		2.72***	1.74***	0.61***
		(17.53)	(13.97)	(13.50)
Population Growth		-0.08***	-0.25***	-0.08***
		(-4.60)	(-12.66)	(-9.19)
Deposit interest rate			0.02***	0.01***
			(10.51)	(9.87)
Export-GDP ratio				1.46***
				(15.92)
Real money supply GDP ratio				0.74***
				(43.96)
Model's Summary Statistics				
Durbin-Watson d-statistic	d(2, 43) = 0.23	d(5,43) = .867	d(6,43) = 1.10	d(8,43) = 1.936
Durbin's alternative test (Chi-square)	141.82	13.14	5.83	0.03
ll(null)	33.31	-13.64	4.19	28.90
ll(model)	107.97	122.17	152.63	220.16
AIC	-211.94	-234.34	-293.25	-424.32
BIC	-208.42	-225.54	-282.68	-410.23
Model Specification Test	F(3, 38) =4.26	F(3, 35) =2.56	F(3, 34)=3.56	F(3, 32) =2.01
Multicollinearity test (VIF)	1.00	11.05	18.91	45.32

Source: Estimated by the author (2018)

Note: The figures in parentheses show calculated t-values. The asterisks on the coefficient value indicate their significance: * for significance at 10 percent level, ** for significance at 5 percent level, and *** for significance at 1 percent level.

The coefficient of is positive in the simple model, model 1, and hence can be discarded from the analysis table. However, the coefficient of, the estimated lagged error correction term, in other three models are negative, suggesting the correction of disequilibrium.

Table 3: OLS based short-run regression results: dependent variable – first difference of log of GDP per capita (The Error Correction Model)

	Model 1	*Model 2*	*Model 3*	*Model 4*
First difference level of	*Coefficient*	*Coefficient*	*Coefficient*	*Coefficient*
Govt. expenditure as % of GDP		0.01	0.02***	0.01
		1.53	2.44	1.17
FDI-GDP ratio		2.88	3.42**	4.79***
		1.56	1.99	3.82
Savings-GDP ratio		0.13	0.19	0.24
		0.39	0.66	1.16
Population Growth		-0.08**	-0.11***	-0.10***
		-2.35	-3.25	-3.89
Deposit interest rate			0.01***	0.01***
			2.85	3.52
Export-GDP ratio				0.71***
				2.76
Real money supply GDP ratio				0.51***
				5.28
ERROR CORRECTION TERM				
One period lag of residual	.034	-0.11	-0.23***	-0.74***
	(2.66)	(-1.38)	(-2.43)	-4.60

Source: Estimated by the author (2018)

Note: The figures in parentheses show calculated t-values. The asterisks on the coefficients indicate their significance: * for significance at 10 percent level, ** for significance at 5 percent level, and *** for significance at 1 percent level.

6. CONCLUSIONS

Theoretically, expansionary fiscal policy has the effects on GDP and hence, the GDP per capita. The direct public expenditure or revenue collection strategy affects the consumers' spending, national investment and national income. In an economy, besides fiscal management, the central bank of the country tries to control the economy through monetary management. Therefore, government sometimes uses the mixed management strategy to stabilize the economy. In a mixed strategy, the public spending and money supply affect GDP per capita positively but the effect of money supply is much more stronger than the public spending. The FDI-GDP ratio and savings-GDP ratio also affect GDP per capita positively while the population growth reduces the GDP per capita.

Appendix

A.1: Definition of variables

GDP	Gross Domestic Product measured in USD at 2010 PPP (Mill. USD)
Government Expenditure	Year wise government's planned expenditure (Mill. USD)
FDI	Year wise foreign direct investment (Mill. USD)
Savings (SAV)	Domestic Savings (Mill. USD)
Exports (X)	The total annual export receipts (Mill. USD)
INF	Inflation rate
DIR	Weighted deposit interest rate
POP	Population growth
$\frac{GDP}{Pop}$	This measures the per capita GDP, the output-labor ratio, or the crude labor productivity.
$\frac{G}{GDP}$	Government expenditure and GDP ratio
$\frac{FDI}{GDP}$	Foreign Direct Investment and GDP ratio
$\frac{SAV}{GDP}$	Domestic Savings and GDP ratio
$\frac{X}{GDP}$	Export receipts and GDP ratio
$\frac{M^S}{GDP}$	Broad Money and GDP ratio

A.2: Summary Statistics of the Variable

Variables	*Average (Last 3 years: 2013-2015)*	*Instantaneous Growth Rate*	*Compound Growth Rate*	*Trend Coefficient*
GDP (Mill. USD)	147407.90	4.53	4.63	2757.60
Government Expenditure (Mill. USD)	9148.01	8.81	9.20	169.58
FDI (Mill. USD)	2840.80	20.46	22.70	44.48
Savings (Mill. USD)	37250.68	15.72	17.02	737.15
Export (Mill. USD)	31985.15	10.50	11.07	615.65
Inflation	6.24	-2.05	-2.03	-0.48
Deposit Interest Rate	9.92	2.04	2.06	0.062
Population Growth Rate	1.21	-1.84	-1.82	-0.033
GDP Per Capita	990.95	4.33	4.42	14.68

Government Expenditure as percent of GDP	5.29	0.96	0.96	0.022
FDI-GDP ratio	0.02	11.18	11.83	0.0003
Savings-GDP ratio	0.25	5.68	5.84	0.0058
Export-GDP ratio	0.22	5.97	6.16	0.0045

Source: Estimated based on WDI database

Note: The instantaneous growth rate is estimated using log-lin model: $\ln Y_t = \beta_1 + \beta_2 \, Time$ where lnY_t is the log of the dependent variable and time is the trend variable. The slope coefficient measures the constant proportional or relative change in dependent variable for a given absolute change in the value of the regressor. It also gives the **instantaneous** (at a point in time) rate of growth and the compound growth rate can be found as follows: $\left(antilog\ \hat{\beta}_2 - 1\right) \times 100$.

A.3: Pairwise correlation analysis

	GDP Per Capita	*Government Expenditure as percent of GDP*	*FDI-GDP ratio*	*Savings-GDP ratio*	*Export-GDP ratio*	*Deposit Interest Rate*
Government Expenditure as percent of GDP	0.4773	1				
FDI-GDP ratio	0.9513	0.4413	1			
Savings-GDP ratio	0.9373	0.4694	0.8463	1		
Export-GDP ratio	0.9853	0.5045	0.9219	0.9488	1	
Deposit Interest Rate	0.0635	-0.0737	0.0234	0.1162	0.0411	1
Population Growth Rate	-0.8492	-0.352	-0.7896	-0.8098	-0.8539	0.3737

Source: Estimated based on WDI database

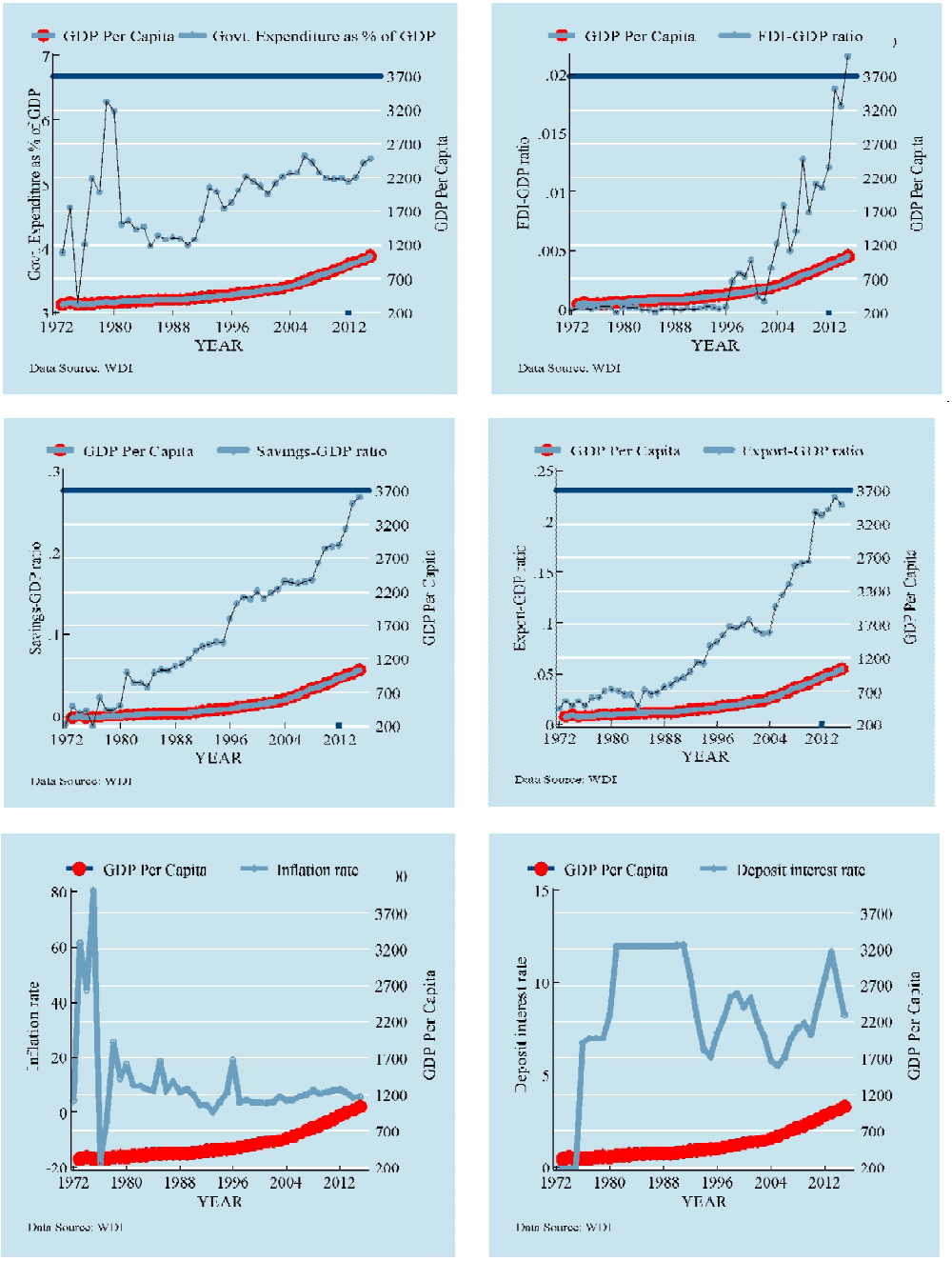
A.4: Testing stationarity

Variables	*At level*			*At first difference*		
	Estimated tau (τ)	*MacKinnon approximate p-value*	*Decision*	*Estimated tau (τ)*	*MacKinnon approximate p-value*	*Decision*
Per capita GDP	3.083	1.000	Non-stationary	-2.287	0.4411	Non-stationary
Log of per capita GDP	0.048	0.9947		-3.994	0.009	Stationary
Govt. Expenditure as percent of GDP	-3.087	0.1094		-6.218	0.0000	
FDI-GDP ratio	0.279	0.9962		-6.769	0.0000	
Savings-GDP ratio	-2.217	0.4802		-5.171	0.0001	
Export-GDP ratio	-0.931	0.9527		-4.961	0.0002	
Deposit Interest Rate	-2.853	0.1783		-4.205	0.0044	
Population Growth Rate	-2.055	0.2628		-8.979	0.0000	

Source: Estimated based on WDI database

Note: One period of lag is considered. The interpolated Dickey-Fuller 5% Critical Value is (-3.54). Comparing the estimated tau and critical tau value at 5 percent level of significance, we can conclude that all the reported variables are non-stationary at their level but their first differences are stationary except the per capita GDP.

A.5. Bivariate graphical analysis



Source: Drawn by the author (2018): Data Source - WDI

A.6: Regression model (OLS): Dependent Variable – GDP per capita (USD)

	Model 1 *Coefficient*	*Model 2* *Coefficient*	*Model 3* *Coefficient*	*Model 4* *Coefficient*
Constant	-247.34	385.70***	429.35***	389.21***
	(-1.10)	(6.04)	(5.95)	(6.92)
Government expenditure as % of GDP	162.04***	7.76	25.40**	6.01
	(3.48)	(0.72)	(2.18)	(0.61)
FDI-GDP ratio		18120.02***	15867.35***	10609.30***
		(9.16)	(8.38)	(5.91)
Savings-GDP ratio		1075.78***	598.66***	90.47
		(6.77)	(3.01)	(0.49)
Population Growth		-37.52**	-122.60***	-64.75***
		(-2.14)	(-4.35)	(-2.64)
Inflation rate			0.41	0.04
			(0.85)	(0.11)
Deposit interest rate			11.68***	6.65***
			(3.45)	(2.38)
Export-GDP ratio				1623.63***
				(5.05)
Model's Summary Statistics				
Durbin-Watson d-statistic	d(2,43) = 0.22	d (5,43) =1.22	d(7,43) =1.35	d (8,43) =1.45
Durbin's alternative test (Chi-square)	160.31	7.19	4.06	2.25
ll (null)	-288.62	-288.62	-288.62	-288.62
ll (model)	-283.06	-213.01	-206.33	-194.57
AIC	570.12	436.03	426.65	405.14
BIC	573.64	444.83	438.98	419.23
Model Specification Test				
	F(3, 38) = 11.42	F(3, 35) = 21.42	F(3, 33) = 33.70	F(3, 32) = 10.79
Heteroscedasticity test(Chi-square value)	21.63	27.45	38.07	42.38
Multicollinearity test (VIF)	1.00	3.29	5.68	10.34
Is the regression spurious?	No	No	No	No

Source: Estimated by the author (2018)

Note: The figures in parentheses show calculated t-values. The asterisks on the coefficient value indicate their significance: * for significance at 10 percent level, ** for significance at 5 percent level, and *** for significance at 1 percent level.

A.7: Regression model (Feasible GLS): Dependent Variable – GDP per capita (USD)

	Model 1 *Coefficient*	*Model 2* *Coefficient*	*Model 3* *Coefficient*	*Model 4* *Coefficient*
Constant	-251.73*** (-17.71)	357.86*** (13.60)	434.20*** (12.05)	390.83*** (18.90)
Government expenditure as % of GDP	162.90*** (47.07)	8.96*** (4.08)	22.26*** (4.63)	5.98* (1.84)
FDI-GDP ratio		18541.62*** (28.55)	16396.46*** (26.99)	12084.41*** (12.63)
Savings-GDP ratio		1086.03*** (16.33)	649.49*** (8.11)	139.74 (1.50)
Population Growth		-28.49*** (-3.61)	-118.36*** (-10.30)	-63.14*** (-5.46)
Inflation rate			0.43*** (2.46)	0.10 (1.21)
Deposit interest rate			11.22*** (11.22)	6.25*** (6.00)
Export-GDP ratio				1485.73*** (9.66)
Model's Summary Statistics				
Durbin-Watson d-statistic	d(2,43) =0.22	d(5,43) =1.25	d(7,43) =1.38	d(8,43) =1.54
Durbin's alternative test (Chi-square)	158.64	7.11	3.51	1.76
ll(null)	-213.49	-247.59	-223.33	-251.30
ll(model)	-127.31	-139.79	-98.04	-120.49
AIC	258.63	289.58	210.08	256.98
BIC	262.15	298.39	222.40	271.07
Model Specification Test	F(3,38) =0.31	F(3,35) =3.87	F(3,33) =6.79	F(3,32) =0.71
Heteroscedasticity test (Chi-square)	241.34	59.56	136.95	54.18

Source: Estimated by the author (2018)

Note: The figures in parentheses show calculated t-values. The asterisks on the coefficient value indicate their significance: * for significance at 10 percent level, ** for significance at 5 percent level, and *** for significance at 1 percent level.

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