Corruption and Growth in a Developing Country like India

A Dissertation Submitted in Partial Fulfillment of the Requirement for the Degree of Master of Philosophy (Arts) in Economics of Jadavpur University, Kolkata, India

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Certified that the thesis entitled, **Corruption and Growth in a Developing Country like India**, submitted by me towards the partial fulfillment of the Degree of Master of Philosophy (Arts) in **Economics** of Jadavpur University, is based upon my own original work and there is no plagiarism. This is also to certify that the work has not been submitted by me for the award of any other degree/diploma of the same Institution where the work is carried out, or to any other Institution. A paper out of this dissertation has also been presented by me at a seminar/conference at **One-Day National Research Scholars' Seminar in Economics, Department of Economics, Jadavpur University**, thereby fulfilling the criteria for submission, as per the M.Phil Regulation (2017) of Jadavpur University.

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On the basis of academic merit and satisfying all the criteria as declared above, the dissertation work of **Kalyan Ram** entitled **Corruption and Growth in a Developing Country like India**, is now ready for submission towards the partial fulfillment of the Degree of Master of Philosophy (Arts) in **Economics** of Jadavpur University.

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CONTENTS

Abstract

The objective of this paper is to examine how corruption affects growth and inflation in a developing country like India. In this endeavour, we have first considered the case of a closed economy, where, corruption is manifested in tax evasion. We have, then, extended our analysis to the case of an open economy, where, besides tax evasion, corruption also leads to illegal outflow of capital.

The model that has been envisaged is based on the Keynesian framework, where prices are rigid and aggregate output is demand determined. In the specification of the aggregate demand function, we have incorporated the relevant features of the Indian economy. A careful analysis of the relevant data has revealed that investment in India is a function of not only interest rate but also exchange rate. Again, given Government of India's strict adherence to a fiscal deficit target, government's expenditure, instead of being autonomous, becomes an increasing function of GDP. An increase in government expenditure improves law and order, infrastructure (such as road conditions, traffic congestions, drainage etc.). All these factors reduce cost of production giving a boost to investment and lowering the price level.

Even though it is not explicitly stated in most of the text books, Keynesian theory seeks to explain short period (annual or quarterly, for example) growth rate and inflation rate. Let us explain. The equations of the Keynesian model represent an economy in a given period of time. In the given period, GDP and price level of the previous period are given and known. Hence, determination of GDP and the price level in the given period amounts to determination of the growth rate of GDP and the rate of inflation from the previous period to the given period. More precisely, Keynesian theory is of the view that in normal circumstances in a capitalist economy, there exists unemployed labour and capital so that aggregate output is demand determined. Hence, aggregate output in any given period is determined among others, by the autonomous component of aggregate demand. Hence, growth rate of the autonomous component of demand is a determinant, among others, of growth rate of Y.

The paper shows that in the case of a closed economy, following an exogenous increase in the rate of tax evasion, aggregate demand falls substantially reducing

the growth rate and raising the rate of inflation. This means that, the higher the rate of growth of tax evasion, given everything else, the lower is the growth rate of GDP. When we extend our model to the case of an open economy, the contraction in the level of GDP and, therefore, the fall in the growth rate following an exogenous increase in the level of corruption is likely to be more severe. The reason may be the following. The rise in the incidence of tax evasion and the consequent fall in tax revenue lower aggregate consumption expenditure in the net, since aggregate consumption expenditure is the sum of personal and public consumption. Investment goes down too on account of the increase in cost of production. In addition, in an open economy, the price rise due to the cost-push brings about a substantial fall in net export. This fall in net export is likely to be quite large in case of India. The reason may be stated as follows. Since India does not have an independent knowledge or technological base, it has to produce most of its goods and services with imported technology, which is never state of the art. Hence, its export potential is quite limited. Close substitutes of all the goods and services India produces are available everywhere else. Hence, even a slight increase in the price of Indian goods is likely to bring about a substantial fall in its net export. Moreover, an exogenous increase in the level of corruption leads to an increase in illegal outflow of capital. The shrinkage in the net export coupled with the increase in the illegal capital flight will lead to a steep increase in the exchange rate bringing about a further fall in investment demand. Thus, the fall in GDP and the growth rate will be much larger in an open economy like India. Thus, the rate of growth of corruption emerges as an important determinant of the rate of growth of GDP. The higher the rate of growth of corruption, given everything else, the lower is the growth rate of GDP.

1. Introduction

Several studies have empirically derived the result that corruption is detrimental to economic growth (Mauro, 1995 & Svensson, 2005). However, no theoretical work has been carried out to examine the relationship between corruption and growth. This paper seeks to fill up this gap by examining the relationship between corruption and growth theoretically within a Keynesian framework developed for both closed and open economies. Another reason for undertaking the theoretical work is the following. Many economists have pointed out that the inherent difficulties of collecting good empirical data have made them undertake an analytical and speculative approach (Bardhan, 1997). This has also induced us into our theoretical endeavour. The paper begins with a brief overview of some of the significant works that have been done so far in this sphere. Thereafter, a Keynesian model is introduced in which prices are held to be rigid and aggregate output is demand determined. Keynes (1936) denied that a capitalist economy would automatically adapt to provide full employment, and believed that the volatile and ungovernable psychology of markets would lead to periodic booms and crises. According to Keynes, mainly growth in autonomous components of consumption, investment expenditure and export determine growth in GDP. On the other hand, Neo-Classical economics shows that a capitalist economy contains a mechanism that automatically leads to full employment of all productive resources. Hence, growth in GDP is driven by growth in the stocks of labour, capital and technological progress. We have considered two major manifestations of corruption, namely tax evasion and illegal outflow of domestic saving to foreign countries and examined how they affect growth.

2. Corruption: What it means and How it affects Growth

Robert Hughes (2010) says that although the detection and elimination of corruption is a difficult task, yet the social, cultural and economic deterioration caused by corruption is much evident. Hughes, has hinted at the subjective nature of corruption; that is to say that what is corruption in some places might not be considered so in others. Andrei Shleifer & Robert W. Vishny (1993), restricting their focus to government corruption define it as the sale by government officials of government property for personal gain. They have argued that corruption may be costly to economic development because firstly, governmental agencies & bureaucracies become free to impose independent bribes on private agents seeking permits. Such competing bureaucracies, each of which can stop a project from proceeding, hamper investment and growth around the world. Leff (1964) & Huntington (1968) have advocated "efficient corruption" claim that bribery may allow firms to get things done in an economy plagued by bureaucratic hold-ups and bad, rigid laws. But, in most theories that link corruption to slower economic growth, corruption is said to have given rise to inappropriate allocation of talent, technology and capital (Svensson, 2005). Taking clue from some of the subjective indices of corruption, Paolo Mauro (1995) tries to establish that corruption lowers investment and, thereby, lowers economic growth. Using corruption index and empirical estimates, he has found that corruption is strongly negatively associated with the investment rate, which is significant both in statistical and economic sense. Pranab Bardhan (1997) has used the term corruption to imply the use of public office for private gain. He has tried to show that corruption adversely effects investment and growth. One interesting thing put forward by him is the fact that corruption has generally declined with economic growth in most rich countries.

3. Methodology

We subscribe to the view that almost all the markets in a country like India are oligopolies. Producers, as pointed out by Kalecki (1954), set their prices on the basis of cost and their positions vis-à-vis their rivals. They adjust their outputs to meet the demand that comes forth at the prices set. We therefore use a Keynesian framework where aggregate output is demand determined and prices are set on the basis of cost. We subscribe to the Keynesian view that normally in a capitalist economy in every period there exists unemployed workers and unutilized production capacity so that aggregate output is demand determined and growth in aggregate output is due to growth in aggregate demand. Thus, growth in aggregate output is determined by growth in the autonomous components of aggregate demand.

4. Impact of Corruption: The Case of a Closed Economy

We seek to explain how corruption affects a country like India. However, for simplicity, we first disregard transactions with the rest of the world and consider a closed economy. The model for a closed economy is presented below:

In India, the RBI seeks to regulate the interest rate and keeps it at a target level. Hence, we regard interest rate, denoted r, as a policy variable of the RBI. Thus, $r = \bar{r}$, where $\bar{r}$ is the target level of the interest rate.

Let us now focus on the investment function. A careful analysis of the relevant data has revealed that investment in India is a function of interest rate. Again, given Government of India's strict adherence to a fiscal deficit target, government's expenditure, instead of being autonomous, becomes an increasing function of GDP. An increase in government expenditure improves law and order, infrastructure (such as road conditions, traffic congestions, drainage etc.). All these factors reduce cost of production giving a boost to investment and lowering the price level. So, investment is a function of both interest rate and government expenditure.

Aggregate consumption is an increasing function of disposable income and increase in consumption due to one unit increase in disposable income is assumed to be less than one. We shall, as we have already pointed out, develop a Keynesian model where GDP, which we denote by Y, is determined by its demand and prices are rigid. The economy is a closed economy having no foreign transactions.

Accordingly, the three different components of aggregate planned final demand in the commodity market in the present case (incorporating tax evasion rate, θ) are given by the following equations:

Consumption function: $C = C[\big(1 - t(1-\theta)\big)Y]$ and $0 < C'(= \frac{\partial C}{\partial\left(1-t(1-\theta)\right)Y}) < 1$……………........(1)

Investment function: $I = I(\bar{r}, G)$ and $I_G (= \frac{\partial I}{\partial G}) > 0$………………(2)

Government expenditure: $G = t(1-\theta)Y$ and $G_Y\left(=\frac{\partial G}{\partial Y}\right) = t(1-\theta) > 0$……………...(3)

Where, C = Aggregate planned private consumption expenditure, Y = GDP, I = Aggregate planned gross investment expenditure, t = tax rate and $0 < t < 1$, tY = total tax revenue net of subsidies collected by the government, $\bar{r}$ = given interest rate, G = Government's consumption expenditure, θ = tax evasion rate and $0 < t < 1$, $t\theta Y$=total amount of tax avoided due to tax evasion.

Now, the equilibrium condition of the real sector is given by the following equation:

$Y = C + I + G$………………………….(4)

Putting the values of C, I and G in equation (4) we get,

$Y = C\left[\left(1 - t(1-\theta)\right)Y\right] + I[\bar{r}, t(1-\theta)Y] + t(1-\theta)Y$……………………….(5)

The specification of the model is now complete. Substituting equation (1), (2) & (3) into equation (4), we get the equilibrium value of Y.

Equation (5) shows that the product market equilibrium where aggregate supply (AS) is demand determined. R.H.S. & L.H.S. of equation (5) shows the AD and AS respectively. Now we measure AD & AS along the vertical axis and Y along the horizontal axis. Now, we focus on the shapes of AD & AS schedules against Y, keeping r, θ and t as fixed. If Y rises by 1 unit, then C rises by $C^{'}[1 - t(1-\theta)]dY$, I rises by $I_G t(1-\theta)dY$ and G rises by $t(1-\theta)dY$, where $I_G > 0$. So, AD will rise by$[C^{'}\{1 - t(1-\theta)\} + I_G t(1-\theta) + t(1-\theta)]dY$. Its position is determined by its positive vertical intercept (autonomous consumption & autonomous investment expenditure). Vertically summing up C, I and G, we get the AD schedule, which is upward rising. The coordinates of every point on the 45° line in figure 1 are equal. Thus, at the point of intersection of the 45° line and AD, AD equals AS. Hence the economy is in equilibrium. The equilibrium Y(Y^e) corresponds to this point.

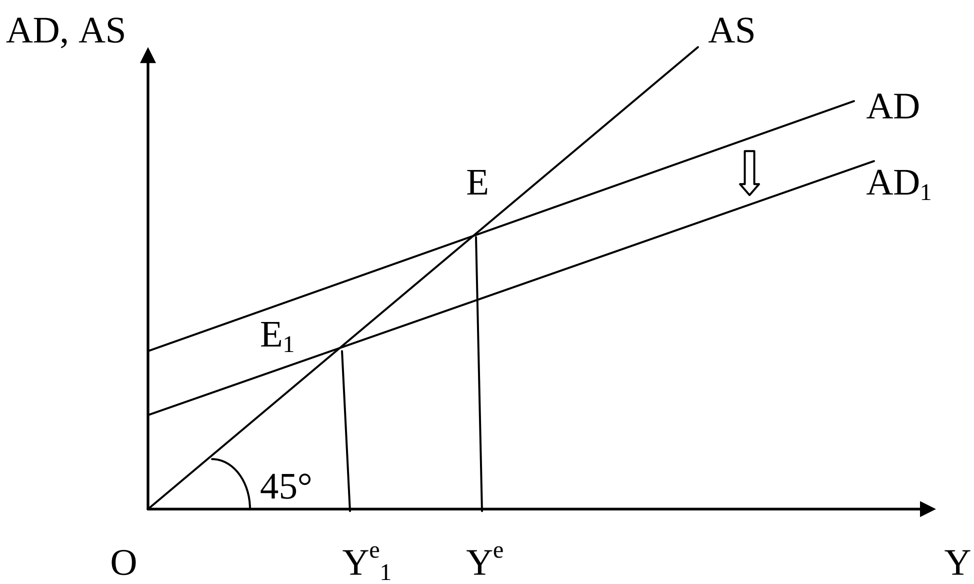

Figure 1: Effect of an increase in θ on Y

The effect of an increase in θ

Let us see the impact of θ on equation (1), (2) and (3). Now we fixed Y at Y_0. In equation (1), an increase in θ by 1 unit, then consumption expenditure rises by $C' tYd\theta$. In equation (3), G will fall by $tYd\theta$ in absolute terms due to 1 unit increase in θ. In equation (2), an increase in θ by 1 unit lowers I by $I_G tYd\theta$. To carry out the exercise graphically, we have to examine how these changes affect the AD schedule in figure 1. There are two opposite effects on AD. On the one hand, an increase in θ corresponding to any given Y reduces G and I lowering aggregate demand at every Y by $(dG + dI) = (1 + I_G)tYd\theta$. The increase in θ, on the other hand, raises personal disposable income at every Y by tY and thereby increases C by $C^{'}tYd\theta$. So, AD rises by $C^{'}tYd\theta$. Therefore, in the net aggregate planned demand at every Y goes down by $[(1+I_G)tYd\theta - C^{'}tYd\theta] = (1+I_G-C^{'})tYd\theta$ in absolute terms. Here, $C^{'}tY < (1+I_G)tY$. When this is the case, the AD schedule will shift downward by the amount $(1+I_G-C^{'})tY$ in figure 1. Hence the equilibrium value of Y will go down. The new equilibrium value of Y is labeled Y_1^e.

Let us now derive the result mathematically. Substituting the equilibrium value of Y denoted by Y^e into (5) and then taking total differential of both sides of the resulting identity treating $\bar{r}$ and t as constant, we have,

$$dY^e = [C^{'}\{1-t(1-\theta)\} + I_G t(1-\theta) + t(1-\theta)]dY^e - (1+I_G - C^{'})tYd\theta \quad \text{.........................(6)}$$

The LHS of equation (6) gives the change in the value of Y from the initial equilibrium to the new one. The RHS gives the change in the aggregate planned demand from the initial equilibrium to the new one. Since Y and AD are equal in both the initial and the new equilibrium situations, changes in the former and the latter from the initial equilibrium to the new one must be equal. This explains (6). Equation (6) contains only one unknown dY^e, since $d\theta$ is known to us. We can solve (6) for dY^e. Thus,

$$dY^e = -\frac{(1+I_G - C^{'})tY\ d\theta}{1-[C'\{1-t(1-\theta)\} + I_G t(1-\theta) + t(1-\theta)]} \quad \text{.....................(7)}$$

Let us explain equation (7). Following an increase in θ by $d\theta$, AD goes up by $C^{'}tYd\theta$ at the initial equilibrium Y. At the same time, following the increase in θ by $d\theta$, AD goes down by $(1+I_G)tYd\theta$ at the initial equilibrium Y. Hence, planned aggregate demand at the initial equilibrium Y goes down and thereby creates an excess supply of $(1+I_G-C^{'})tYd\theta$. To remove the excess supply, producers will reduce Y and a new equilibrium is established when the fall in Y reduces excess supply to zero. Now, a fall in Y by 1 unit, given AD, reduces excess supply, (Y – AD), by 1 unit in absolute terms. Hence, C goes down by $[C^{'}\{1-t(1-\theta)\}]$, I goes down by $[I_G t(1-\theta)]$ and G goes down by $[t(1-\theta)]$. Thus, in the net per unit fall in Y excess supply falls in absolute terms by $1-[C^{'}\{1-t(1-\theta)\} + I_G t(1-\theta) + t(1-\theta)]$. Therefore, excess supply will fall by

$(1 + I_G - C')tYd\theta$ in absolute terms when Y goes down by, $\frac{(1+ I_G - C')tY\, d\theta}{1-[C'\{1 - t(1 - \theta)\}+ I_G t(1 - \theta)+t(1 - \theta)]}$

Let us now explain the multiplier process that takes place following the increase in θ by $d\theta$. So, there emerges an excess supply of $(1 + I_G - C')tYd\theta$ at the initial equilibrium Y. Hence, producers will reduce Y by $(1 + I_G - C')tYd\theta$. This fall in Y will reduce C, I and G by $[C'\{1 - t(1 - \theta)\}]dY$, $I_G t(1 - \theta)dY$ and $t(1 - \theta)dY$ respectively in the second round creating a situation of excess supply again. Producers will therefore decrease GDP by $[C'\{1 - t(1 - \theta)\} + I_G t(1 - \theta) + t(1 - \theta)](1 + I_G - C')tYd\theta$, which in turn will lead to a further round of contraction in income, demand and production and so on. This process of contraction will stop and the economy will achieve a new equilibrium, when the excess supply that is generated in each round eventually falls to zero. Thus, the total decrease in the GDP is given by,

$[(1+I_G-C')\, tY]d\theta + [C'\{1 - t(1 - \theta)\} + I_G t(1 - \theta) + t(1 - \theta)]\, [(1+I_G-C')\, tY]d\theta + [C'\{1 - t(1 - \theta)\} + I_G t(1 - \theta) + t(1 - \theta)]^2\, [(1+I_G -C')\, tY]d\theta + \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots$

$= [(1+I_G-C')\, tY]\, [1 + \{C'(1 - t(1 - \theta)) + I_G t(1 - \theta) + t(1 - \theta)\} + \{C'(1 - t(1 - \theta)) + I_G t(1 - \theta) + t(1 - \theta)\}^2 + \ldots\ldots\ldots\ldots]$

$$= \frac{(1+ I_G - C')tY\, d\theta}{1-[C'\{1 - t(1 - \theta)\}+ I_G t(1 - \theta)+t(1 - \theta)]}$$

Hence, Y will fall by $\frac{(1+ I_G - C')tY\, d\theta}{1-[C'\{1 - t(1 - \theta)\}+ I_G t(1 - \theta)+t(1 - \theta)]}$. So, if tax evasion rate rises, economic growth will fall. Thus, rate of growth of tax evasion emerges as a determinant of growth. The higher the rate of growth of tax evasion, the lower is the growth rate of GDP.

Now, we will discuss about the inflation rate. For this, we have to first state how price is formed. Following Kalecki (1954), we assume that producers set the price by applying a mark-up to the average variable cost of production. The one determinant of average variable cost is wage, which is fixed in the short run. And the other determinant is government expenditure, so that an increase in government expenditure improves law and order, infrastructure (such as road conditions, traffic congestions, drainage etc.); all these factors reduce cost of production and lowers the price level. Hence, we get

$P = P(G)$; $P_G < 0$……………………(8)

Putting the value of G (given by (3)) in equation (8) we get,

$P = P[t(1-\theta)Y]$…………………..(9)

Now, taking total differential of equation (9) we get,

$$dP = P_G[t(1-\theta)dY - tYd\theta]$$
$$dP = P_G\left[t(1-\theta)\frac{-(1+I_G - C')tY\,d\theta}{1-[C'\{1-t(1-\theta)\}+I_G t(1-\theta)+t(1-\theta)]} - tYd\theta\right]$$
$$dP = -P_G\left[t(1-\theta)\frac{(1+I_G - C')tY}{1-[C'\{1-t(1-\theta)\}+I_G t(1-\theta)+t(1-\theta)]} + tY\right]d\theta > 0 \quad \text{……….(10)}$$

This shows that, dP will be positive. Hence, following an exogenous increase in the rate of tax evasion, price will go up and rate of inflation will increase. Thus, we get the following proposition:

Proposition 1: In the case of a closed economy, following an exogenous increase in the rate of tax evasion, aggregate demand falls substantially reducing the growth rate and raising the rate of inflation. Therefore, given everything else, an increase in the growth rate of tax evasion will lower growth rate of GDP and raise the rate of inflation.

5. Impact of Corruption: Extension to the Case of an Open Economy without Capital Mobility

In an open economy, $(C + I + G)$ represents aggregate demand of domestic economic agents for both domestic and foreign goods. To get domestic economic agents' demand for domestic goods, we have to subtract from $(C + I + G)$ domestic economic agents' demand for foreign goods, which is referred to as import demand and denoted by M. However, M represents domestic economic agents' import demand in terms of domestic goods, while C, I and G are expressed in terms of domestic goods. So, $(C + I + G - M)$ gives domestic economic agents' demand for domestic goods. Again, in an open economy, domestic economic agents are not the only source of demand for domestic goods, foreigners also demand domestic goods. Thus, to get aggregate demand for domestic goods in an open economy, we have to add to aggregate demand for domestic goods of domestic economic agents foreigners' demand for domestic goods, which is referred to as export demand and denoted by X. Thus, in an open economy, aggregate demand for domestically produced goods is given by $(C + I + G + X - M)$.

In case of open economy, investment is likely to depend not only on the rate of interest and government expenditure but also on the price of foreign capital goods in domestic currency. Hence, besides $\bar{r}$ & G, we incorporate P^*e as an argument in the investment function. Here we have not distinguished between foreign capital goods and other foreign goods and taken P^* as the average price of foreign goods in foreign currency, whereas, e denotes nominal exchange rate. In other words, e gives the price of foreign currency in terms of domestic currency. So, P^*e gives the price of foreign goods and services in domestic currency. Here, higher is the value of P^*e, lower will be the level of investment, i.e. $\frac{\partial I}{\partial (P^*e)} < 0$. The reason may be stated as follows. Aggregate investment and production are highly import intensive in India. Since India does not have any indigenous base of knowledge and technology, it has to import most of the knowledge and high-tech products it uses. An increase in P^*e makes foreign capital goods costlier. This raises cost of investment. Hence, given expectations, investment declines.

Export demand (X) for domestically produced goods is taken to be an increasing function of both Y^* and $\frac{P^*e}{P}$. Here, Y^* and $\frac{P^*e}{P}$ denote foreign GDP and real exchange rate respectively. P*e amount of domestic currency is needed to buy one unit of foreign goods. If we divide it by P (average price of domestically produced goods and services in domestic currency), we get how much domestic goods P^*e amount of domestic currency can buy. Thus, real exchange rate gives us the amount of domestic goods that one can purchase with the amount of domestic currency needed to buy one unit of the foreign goods. In other words, the real exchange rate gives us the amount of domestic goods that one has to give up to purchase one unit of the foreign goods. Thus, real exchange rate gives the price of the foreign goods in terms of the domestic goods. The higher the value of $\frac{P^*e}{P}$, the dearer are foreign goods relative to domestic goods and hence, the greater is the incentive on the part of the foreigners to substitute domestic goods for foreign goods. So, X is an increasing function of $\frac{P^*e}{P}$. Given $\frac{P^*e}{P}$, an increase in Y^* is likely to increase export demand.

Domestic economic agents' import demand (M) in terms of domestic goods is likely to be a decreasing function of $\frac{P^*e}{P}$. The higher the real exchange rate, $\frac{P^*e}{P}$, the higher is the price of the foreign goods in terms of domestic goods and hence, the greater is the incentive on the part of the domestic economic agents to substitute domestic goods for foreign goods. Therefore, domestic economy's import demand is likely to be a decreasing function of $\frac{P^*e}{P}$. Here, C represents consumption demand not only for domestic goods but also for imported consumption goods. Hence, an increase in C is likely to represent an increase in demand for both domestic consumption goods and imported consumption goods. On the other hand, following an increase in P^*e, I declines. The fall in I, reduces demand for not only domestic capital goods but also imported capital goods raising net export. So, we have taken import demand (M) to be an increasing function of C and I i.e. $(\partial M/\partial C)>0$ & $(\partial M/\partial I)>0$. A part of G may also represent demand for foreign goods. However, for simplicity, we have assumed that the whole of G represents demand for domestic goods only.

We assume that the domestic price level, P, is a decreasing function of G (already explained) but an increasing function of e, as they are very important determinants of cost of production in Indian context. It is common knowledge that in India, imported intermediate inputs such as, petroleum, fertilizer, electronic components, etc. are essential for production (GoI(2014, p.160)). So, higher the exchange rate, higher will be the price of imported intermediate goods. Hence, P is an increasing function of e. P should also be an increasing function of the money wage rate (W). In our model we assume W to be fixed and do not consider it explicitly as a determinant of P. Thus, we have

$P = P(G, e)$; $P_G < 0$, $P_e > 0$……………………….(11)

In an open economy, a ceteris paribus rise in the domestic price level brings about a fall in net export. This fall in net export is likely to be quite large in case of India. The reason may be stated as follows. Since India does not have an independent knowledge or technological base, it has to produce most of its goods and services with imported technology, which is never state of the art. Hence, its export potential is quite limited. Close substitutes of all the goods and services India produces are available everywhere else. Hence, even a slight increase in the price of Indian goods is likely to bring about a substantial fall in its net export.

In the present case, the rest of the equations of the model are given as follows:

Consumption function: $C = C[(1 - t(1 - \theta))Y]$……………………..(12)

Investment function: $I = I(\bar{r}, G, P^*e)$ and $\bar{r} =$ given interest rate, $P^*e =$price of foreign goods and services in domestic currency, $I_{P*e} = \frac{\partial I}{\partial (P*e)} <0$…………….(13)

Government expenditure: $G = t(1 - \theta)Y$……………….(14)

Export demand: $X = X(\frac{P^*e}{P(G,e)}, Y^*)$; $\frac{\partial X}{\partial p} >0$, $\frac{\partial X}{\partial Y^*} >0$, where, $p = \frac{P^*e}{P}$…………..(15)

Import demand: $M = M(\frac{P^*e}{P(G,e)}, C, I)$; $\frac{\partial M}{\partial p} = M_p <0$, $\frac{\partial M}{\partial Y} = M_Y >0$, $\frac{\partial M}{\partial C} = M_C >0$, $\frac{\partial M}{\partial I} = M_I >0$………………………..(16)

Now, the equilibrium condition of the real sector is given by the following equation:

$Y = C + I + G + X - M$…………………..(17)

Putting the values of C, I, G, X and M in equation (17) we get,

$$Y = C[(1 - t(1-\theta))Y] + I(\bar{r}, t(1-\theta)Y, P^*e) + t(1-\theta)Y + X\left(\frac{P^*e}{P(t(1-\theta)Y,e)}, Y^*\right) - M\left(\frac{P^*e}{P(t(1-\theta)Y,e)}, C[(1-t(1-\theta))Y], I(\bar{r}, t(1-\theta)Y, P^*e)\right) \text{…………………..(18)}$$

Balance of payment equilibrium condition is given by,

$$X\left(\frac{P^*e}{P(t(1-\theta)Y,e)}, Y^*\right) - M\left(\frac{P^*e}{P(t(1-\theta)Y,e)}, C[(1-t(1-\theta))Y], I(\bar{r}, t(1-\theta)Y, P^*e)\right) = 0 \text{….(19)}$$

We find from equation (18) that aggregate planned demand as given by its RHS is a function of Y, e and the exogenous variables, such as $\bar{r}$, t, θ, Y^*, among others. On the other hand, the LHS of equation (19) gives the BOP. We find from (19) that it is a function of Y, e and the exogenous variables Y^*, C, I, among others. Eqs. (18) and (19) are the two key equations in our model. They contain two endogenous variables in two unknowns Y and e. We can solve the two equations for the equilibrium values of the two endogenous variables.

Substituting equation (19) in to (18) we get,

$$Y = C[(1 - t(1-\theta))Y] + I(\bar{r}, t(1-\theta)Y, P^*e) + t(1-\theta)Y \text{ ………………..(20)}$$

We can solve (19) and (20) for the equilibrium values of Y and e. We show the solution first diagrammatically:

At every Y the level of planned aggregate demand as shown by the AD(e_0) schedule representing the RHS of (20) in Figure 2 is equal to the sum of $I[\bar{r}, t(1 - \theta)Y, P^*e_0]$, G, C and net export $[X(\frac{P^* e_0}{P}, Y^*) - M(\frac{P^* e_0}{P}, C, I)]$. The 45° line helps us identify the goods market equilibrium value of Y, when $e = e_0$. Focus on the point of intersection of the AD(e_0) schedule and the 45° line. We denote the value of Y

that corresponds to the point of intersection by Y_0. Hence the value of Y that equilibrates the goods market, with $e = e_0$ is Y_0. Thus, (Y_0, e_0), as shown in figure 3 is a point on the YY schedule, which gives all the combinations of Y and e that keeps the goods market in equilibrium. Now, suppose e is raised from e_0 by de to e_1 $(e_1>e_0)$. This decreases planned aggregate demand at every Y by $(-I_{P^*e} P^* de)$. Therefore, it brings about a downward shift in the AD schedule by the same amount. The new AD schedule is shown by the line $AD(e_1)$ in figure 2. The vertical distance between $AD(e_1)$ schedule and $AD(e_0)$ schedule is given by $(I_{P^*e} P^* de) <0$. Clearly, $AD(e_1)$ schedule will intersect the 45° line at a lower Y. We denote this Y by Y_1. Thus, (Y_1,e_1) is another point on the YY schedule as shown in figure 3. It clearly shows that YY schedule is a downward sloping curve. It means that along YY curve, Y and e move in the opposite directions.

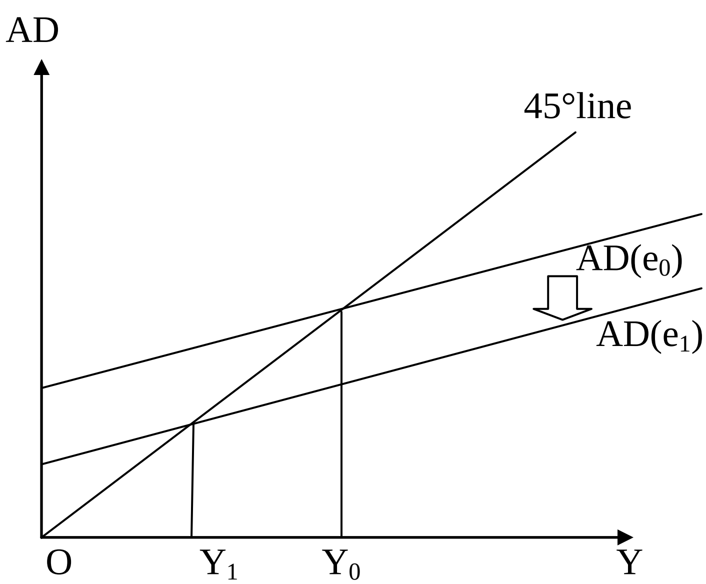

Figure 2: Graphical derivation of the YY

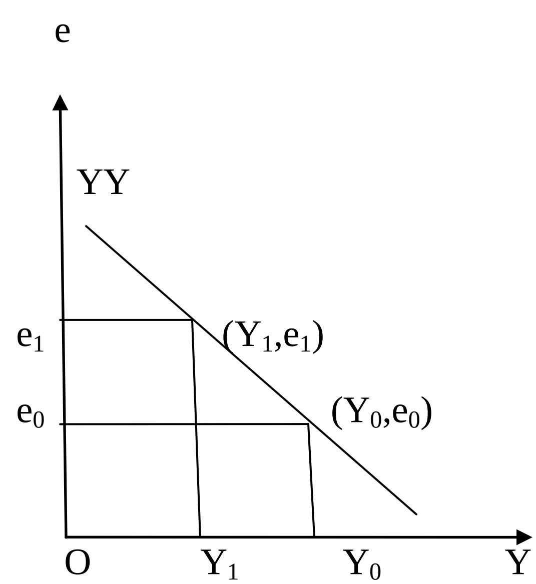

Figure 3: YY curve

Let us now examine how the BOP schedule giving all the combinations of Y and e that satisfy (19) look like? Consider a pair (Y, e) that satisfies equation (19). If we now raise Y keeping e unchanged, then import demand will rise but export demand remains unchanged. So, LHS of equation (19) will go down at the given e. Hence, there is a deficit in BOP. To keep the BOP in equilibrium at the higher level of Y, e has to be raised. Thus, the BT (BOP) schedule is upward rising, i.e. Y and e move in the same direction along the BT schedule. This is shown in figure 4.

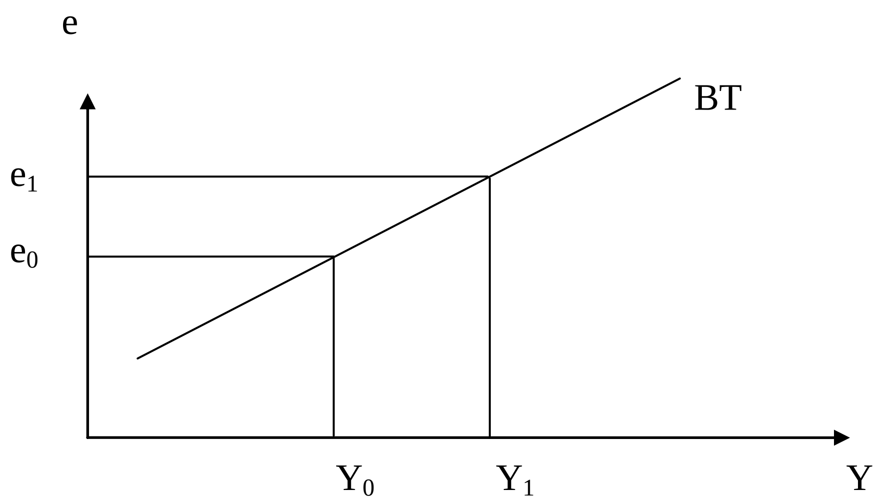

Figure 4: BT curve

Equations (20) & (19) contain two unknowns, namely, Y and e. We can solve these equations for the equilibrium values of the two endogenous variables. The solution of (9) and (8) is shown in figure 5, where, e is measured on the vertical axis and Y on the horizontal axis. The lines YY and BT represent (20) and (19) respectively in figure 5. The equilibrium corresponds to the point of intersection of the two lines. The equilibrium values of Y and e are denoted by Y_0 and e_0 in figure 5.

The effect of an increase in θ

We shall now examine how YY and BT schedules shift following an increase in θ. Focus on YY first. Take any given (Y, e) on the initial YY schedule. Following a rise in θ, as follows from equation (20), aggregate demand for domestic goods, as given by the RHS of equation (20), becomes less at the given (Y, e), given all other exogenous variables. Thus, there emerges excess supply of domestic goods at the given (Y, e). Therefore, the goods market will be in equilibrium at a lower Y corresponding to the given e or at a smaller e corresponding to the given Y. Thus, YY shifts down or to the left. The new YY schedule is labeled YY_1. Consider the BT schedule now. Take any (Y, e) on it. Following a ceteris paribus increase in θ, net export falls from zero creating a BOP deficit at the given (Y, e) in (19). The BOP will be in equilibrium at a lower Y corresponding to the given e or, at a higher e corresponding to the given Y. Thus, BB in figure 5 will also shift to the left. The new BT schedule is BT_1. In the new equilibrium, Y will be less, but e may change in either direction. However, we shall focus on the case where e becomes higher in the new equilibrium. It is quite clear from figure 5 that if the magnitude of the horizontal shift in BT is larger than that in YY, e will rise. Otherwise it will either stay unchanged or fall.

Let us now explain the adjustment process. An increase in θ lowers aggregate demand creating an excess supply at the initial equilibrium (Y, e). The goods market will be in equilibrium at a lower Y, with e fixed at e_0. The fall in Y, raises net export. On the other hand, the increase in θ reduces net exports by raising P relative to P^*e_0. If price sensitivity of net export is sufficiently high, as is likely to be the case in India, net export will be less than its initial equilibrium level. This means that there will be BOP deficit. Hence e will rise. The increase in e will generate excess supply and lead to a further fall in Y. Thus, the economy will move to the new equilibrium with a lower Y and higher e. This explains why a sufficiently high price sensitivity of net exports, given other factors, brings about an increase in e along with a decline in Y following an increase in θ. In other words, an exogenous increase in θ, lower the aggregate demand and so GDP will fall. On the other hand, import demand will rise due to an increase in the rate of tax evasion. The reason why this situation may be obtained in India is the following: When θ rises, government expenditure falls. A decrease in government expenditure leads to a deterioration in law and order, infrastructure (such as road conditions, traffic congestions, drainage etc.). All these factors raise cost of production lowering investment and raising the price level. The price rise due to the cost-push brings about a substantial fall in net export. This fall in net export is likely to be quite large in case of India. Since India does not have an independent knowledge or technological base, it has to produce most of its goods and services with imported technology, which is never state of the art. Hence, its export potential is quite limited. Close substitutes of all the goods and services India produces are available everywhere else. Hence, even a slight increase in the price of Indian goods is likely to bring about a substantial fall in its net export. This is the reason why following an increase in θ for exogenous reasons Y is likely to fall and e is likely to rise in India.

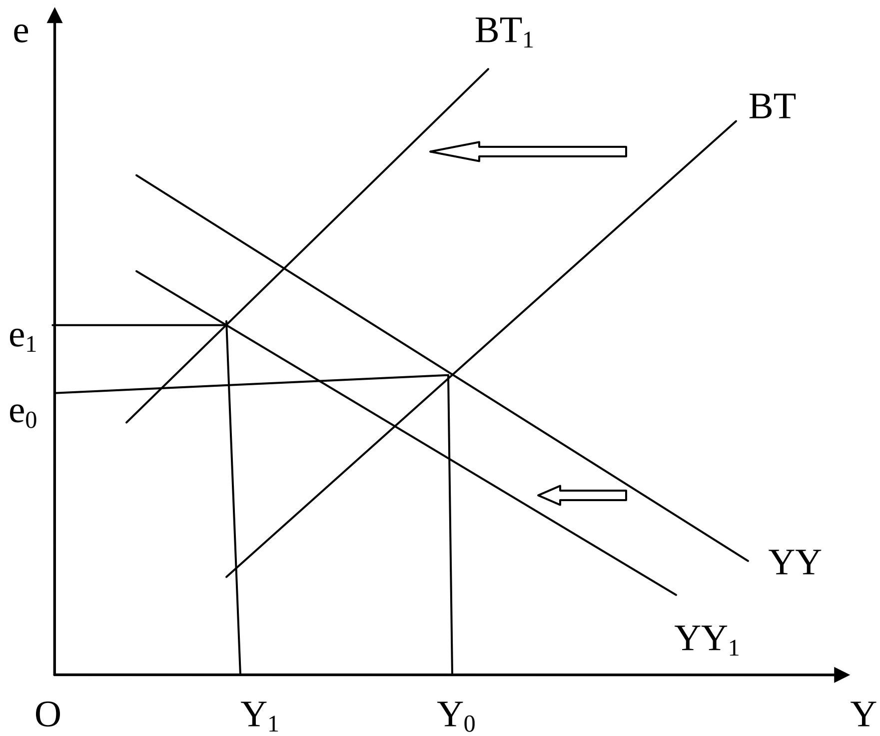

Figure 5: Effect of an increase in θ on Y and e

We find from equation (20) that aggregate planned demand as given by the RHS of equation (9), and which we shall denote by E is a function of e and Y, given the exogenous variables such as $t, \bar{r}$and θ among others. We thus rewrite equation (20) as,

$Y = E(Y, e; \theta, t, \bar{r})$, where, 0< $E_Y < 1$(by assumption), $E_Y \equiv C'\big(1 - t(1-\theta)\big) + I_G t(1-\theta) + t(1-\theta)$, $E_e \equiv I_{P*e} P^*$<0 & $E_\theta \equiv -(1 - C' + I_G) tY$<0……………………..(21)

The LHS of equation (19) gives the BOP, which we shall denote by B. We find from (19) that it is a function of Y, e and the exogenous variables, such as $t, \bar{r}, Y^*, \theta$ and among others. We thus rewrite equation (19) as,

$B = B(Y, e; t, \bar{r}, Y^{*}, \theta) = 0$…………(22), where, B_Y<0, B_e>0, B_θ<0.

Taking total differential of equations (21) and (22), treating all exogenous variables other than θ as fixed, we get,

$$dY = E_Y dY + E_e de + E_\theta d\theta \ldots\ldots\ldots\ldots\ldots\ldots\ldots (23)$$

And,

$$B_Y dY + B_e de + B_\theta d\theta = 0 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (24)$$

Solving (24) for de, we get

$$de = -\frac{B_Y}{B_e} dY - \frac{B_\theta}{B_e} d\theta \ldots\ldots\ldots\ldots\ldots\ldots\ldots (25)$$

Putting the value of de in equation (23) we get,

$$dY = \frac{E_\theta - E_e \frac{B_\theta}{B_e}}{1 - E_Y + E_e \frac{B_Y}{B_e}} d\theta < 0 \ldots\ldots\ldots\ldots\ldots\ldots\ldots (26),$$

And from (25) we get, $de = \frac{-\left(\frac{B_Y}{B_e} E_\theta + \frac{B_\theta}{B_e}(1 - E_Y)\right)}{1 - E_Y + E_e \frac{B_Y}{B_e}} d\theta > 0$…………………..(27)

Let us now explain the multiplier process that takes place following the increase in θ by $d\theta$. Following an increase in θ by $d\theta$, there will emerge an excess supply in the goods market at the initial equilibrium (Y_0, e_0). The producers will decrease Y by $(-E_\theta d\theta)$. On the other hand, it will raise import demand and thereby lower net export by $(-B_\theta d\theta)$. Hence, exchange rate will go up so that net export rises to such an extent that the BOP comes to equilibrium. To restore equilibrium in the BOP, ceteris paribus, e has to be higher so that net export goes up by $(-B_\theta d\theta)$. Net export rises by B_e when e rises by 1 unit. Net export rises by 1 unit when e goes up by $\frac{1}{B_e}$. Therefore, net export rises by $(-B_\theta d\theta)$, when e goes up by $(-\frac{B_\theta}{B_e} d\theta)$. This increase in e will lower the level of investment by $(\frac{B_\theta}{B_e} E_e d\theta)$ in the goods market. So, Y will again fall by $(\frac{B_\theta}{B_e}E_e d\theta)$. Hence, total decrease in Y will be $(dY_1 =)(\frac{B_\theta}{B_e}E_e - E_\theta)d\theta$ in the first round.

In round 2, the decrease in Y by $(\frac{B_\theta}{B_e}E_e - E_\theta)d\theta$ in the first round will lower aggregate demand by $E_Y dY_1$ and Y will again fall by $E_Y dY_1$. This fall in Y will lower the import demand and thereby raise net export. On the other hand, the fall in Y will lower the government expenditure, which will raise the price level and thereby lower net export. This fall in net export is quite large in India (Ghosh, Ghosh 2016). Hence, in the net there is likely to emerge deficit in the BOP. Then, e rises to such an extent that net export rises. To restore equilibrium in the BOP, ceteris paribus, e has to be higher so that net export goes up by $B_Y dY_1$. Net export rises by B_e, when e rises by 1 unit. Net export rises by 1 unit when e goes up by $\frac{1}{B_e}$. Therefore, net export rises by $B_Y dY_1$, when e goes up by $\frac{B_Y}{B_e}dY_1$. This increase in e will lower the level of investment by $(-\frac{B_Y}{B_e}E_e dY_1)$ in the goods market. Hence, total decrease in Y will be $\left(E_Y - \frac{B_Y}{B_e}E_e\right)dY_1$in the second round. This process will continue. Thus, the total decrease in Y will be,

$$=(\frac{B_\theta}{B_e}E_e - E_\theta)d\theta + (E_Y - \frac{B_Y}{B_e}E_e)(\frac{B_\theta}{B_e}E_e - E_\theta)d\theta + (E_Y - \frac{B_Y}{B_e}E_e)^2(\frac{B_\theta}{B_e}E_e - E_\theta)d\theta + \ldots\ldots\ldots\ldots$$

$$=(\frac{B_\theta}{B_e}E_e - E_\theta)\left[1 + \left(E_Y - \frac{B_Y}{B_e}E_e\right) + (E_Y - \frac{B_Y}{B_e}E_e)^2 + \cdots \ldots\ldots\ldots\ldots\ldots\ldots\ldots..\right]d\theta$$

$$= \frac{(\frac{B_\theta}{B_e}E_e - E_\theta)}{\left(1 - E_Y + \frac{B_Y}{B_e}E_e\right)}d\theta$$

Let us now focus on P. Substituting equation (3) into equation (11) we get,

$$P = P(t(1-\theta)Y, e)\ldots\ldots\ldots\ldots\ldots\ldots(28)$$

Now, taking total differential of equation (28) we get,

$$dP = P_e de + P_G dG$$

$$= P_e\, de + P_G\, t(1-\theta)dY - P_G tY d\theta$$

$$= P_e \frac{-\left(\frac{B_Y}{B_e}E_\theta + \frac{B_\theta}{B_e}(1-E_Y)\right)}{1-E_Y+E_e\frac{B_Y}{B_e}} d\theta + P_G t(1-\theta)\frac{E_\theta - E_e\frac{B_\theta}{B_e}}{1-E_Y+E_e\frac{B_Y}{B_e}} d\theta - P_G tY d\theta$$

$$= [P_e \frac{-\left(\frac{B_Y}{B_e}E_\theta + \frac{B_\theta}{B_e}(1-E_Y)\right)}{1-E_Y+E_e\frac{B_Y}{B_e}} + P_G t(1-\theta)\frac{E_\theta - E_e\frac{B_\theta}{B_e}}{1-E_Y+E_e\frac{B_Y}{B_e}} - P_G tY]d\theta > 0 \text{...........(29)}$$

Hence, following an exogenous increase in the rate of tax evasion, price will go up and rate of inflation will increase. From (29) it follows that P will increase sharply on account of the fall in G due to the fall in Y and the increase in e. Our above discussion yields the following proposition:

Proposition 2: An autonomous increase in θ is likely to bring about a large fall in Y and an increase in both e and P in a country like India even when we bring in foreign trade. Thus, rate of growth of tax evasion emerges as an important determinant of both growth and inflation. An increase in the growth rate of tax evasion will bring down the growth rate of GDP and raise the rate of inflation in a country like India even after incorporation of foreign trade.

6. Impact of Corruption: Open Economy with Capital Mobility

We denote net inflow of capital, defined as the total inflow of capital net of the total outflow of capital, expressed in terms of domestic goods by K. K gives net inflow of capital. The foreign currency market is in equilibrium, when

$$X\left(\frac{P^*e}{P(t(1-\theta)Y,e)},Y^*\right)-M\left(\frac{P^*e}{P(t(1-\theta)Y,e)},C\big[\big(1-t(1-\theta)\big)Y\big],I(\bar{r},t(1-\theta)Y,P^*e)\right)+K(\theta)=0$$

Or, $B(Y,e;t,\bar{r},Y^*,\theta)+K(\theta)=0$……………………….(30)

Where, $K=K(\theta)$. We assume that K is a decreasing function of θ i.e. $\frac{dK}{d\theta}=K_\theta<0$. There are restrictions on Indians buying foreign assets. An increase in θ allows the Indians to evade these restrictions on a larger scale bringing about an increase in the rate of capital outflow. The other determinants of net inflow of capital are interest rate differential and expected rate of depreciation of domestic currency. The former is given here and we assume the latter to be exogenously given also. Hence, we do not consider them explicitly here. The equilibrium condition of the goods market after incorporating into it the BOP equilibrium condition, (30), is given by the following equation:

$$Y=C\big[\big(1-t(1-\theta)\big)Y\big]+I(\bar{r},t(1-\theta)Y,P^*e)+t(1-\theta)Y-K(\theta)$$

Or, $Y=E(Y,e;\theta,t,\bar{r})-K(\theta)$………………..(31)

Taking total differential of equations (30) and (31), treating all exogenous variables other than θ as fixed, we get,

$$dY=E_Y dY+E_e de+(E_\theta-K_\theta)d\theta \ldots\ldots\ldots\ldots\ldots\ldots\ldots (32)$$

And, $B_Y dY+B_e de+(B_\theta+K_\theta)d\theta=0$

$$de=-\frac{B_Y}{B_e}dY-\frac{B_\theta+K_\theta}{B_e}d\theta \ldots\ldots\ldots\ldots\ldots\ldots..(33)$$

Putting the value of de in equation (32), we get

$$dY = \frac{E_\theta - E_e\frac{B_\theta}{B_e} - K_\theta(1+\frac{E_e}{B_e})}{1 - E_Y + E_e\frac{B_Y}{B_e}} d\theta < 0 \ldots\ldots\ldots\ldots\ldots\ldots\ldots (34),$$

Comparing (26) and (34), we get $\frac{E_\theta - E_e\frac{B_\theta}{B_e} - K_\theta(1+\frac{E_e}{B_e})}{1 - E_Y + E_e\frac{B_Y}{B_e}} < \frac{E_\theta - E_e\frac{B_\theta}{B_e}}{1 - E_Y + E_e\frac{B_Y}{B_e}}$. This means that the fall in Y will be much larger in case of capital mobility.

Substituting (34) into (33), we get,

$$de = \frac{-\left[\left(\frac{B_Y}{B_e}E_\theta + \frac{B_\theta}{B_e}(1-E_Y)\right) + (E_Y + B_Y - 1)\frac{K_\theta}{B_e}\right]}{1 - E_Y + E_e\frac{B_Y}{B_e}} d\theta > 0 \ldots\ldots\ldots\ldots\ldots (35)$$

Let us now explain the multiplier process that takes place following the increase in θ by $d\theta$. Following an increase in θ by $d\theta$, there will emerge an excess supply in the goods market at the initial equilibrium (Y_0, e_0). The producers will decrease Y by $(-E_\theta + K_\theta)d\theta$. On the other hand, it will raise import demand and thereby lower (NX+K) by $(-B_\theta - K_\theta)d\theta$. Hence, exchange rate will go up so that net export rises to such an extent that the BOP comes to equilibrium. To restore equilibrium in the BOP, ceteris paribus, e has to be higher so that (NX+K) goes up by $(-B_\theta - K_\theta)d\theta$. Here, the rate of increase in e will be much higher to restore the BOP equilibrium, because the deficit becomes larger. So rate of fall in investment will be higher and therefore rate of fall in Y will be much higher in case of capital mobility. (NX+K) rises by B_e when e rises by 1 unit. (NX+K) rises by 1 unit when e goes up by $\frac{1}{B_e}$. Therefore, (NX+K) rises by $(-B_\theta - K_\theta)d\theta$, when e goes up by $(-\frac{(B_\theta + K_\theta)d\theta}{B_e} d\theta)$. This increase in e will lower the level of investment by $\frac{(B_\theta + K_\theta)}{B_e}E_e d\theta$ in the goods market. So, Y will again fall by $\frac{(B_\theta + K_\theta)}{B_e}E_e d\theta$. Hence, total decrease in Y will be $(dY_1 =)[(-E_\theta + K_\theta) + \frac{(B_\theta + K_\theta)}{B_e}E_e]d\theta$ in the first round. This fall in Y will lower the import demand and thereby raise net export. On the other hand, the fall in Y will lower the government expenditure, which will raise the price level and thereby lower net export. This fall in net export is quite large in India (Ghosh, Ghosh 2016). Hence, in the net there is likely to emerge deficit in the BOP. To restore equilibrium in the BOP, ceteris paribus, e has to be higher so that (NX+K) goes up by $B_Y dY_1$. (NX+K) rises by B_e, when e rises by 1 unit. (NX+K) rises by 1 unit when e goes up by $\frac{1}{B_e}$. Therefore, (NX+K) rises by $B_Y dY_1$, when e goes up by $\frac{B_Y}{B_e} dY_1$. This increase in e will lower the level of investment by $(-\frac{B_Y}{B_e} E_e dY_1)$ in the goods market. Hence, total decrease in Y will be $\left(E_Y - \frac{B_Y}{B_e} E_e\right) dY_1$ in the second round. This process will continue. Thus, the total decrease in Y will be,

$$=[(-E_\theta + K_\theta) + \frac{(B_\theta + K_\theta)}{B_e} E_e]d\theta + (E_Y - \frac{B_Y}{B_e} E_e)[(-E_\theta + K_\theta) + \frac{(B_\theta + K_\theta)}{B_e} E_e]d\theta + \left(E_Y - \frac{B_Y}{B_e} E_e\right)^2 [(-E_\theta + K_\theta) + \frac{(B_\theta + K_\theta)}{B_e} E_e]d\theta + \ldots\ldots\ldots\ldots\ldots\ldots\ldots..$$

$$=[(-E_\theta + K_\theta) + \frac{(B_\theta + K_\theta)}{B_e} E_e]\left[1 + \left(E_Y - \frac{B_Y}{B_e} E_e\right) + \left(E_Y - \frac{B_Y}{B_e} E_e\right)^2 + \cdots \ldots \ldots \ldots\right] d\theta$$

$$= \frac{[(-E_\theta + K_\theta) + \frac{(B_\theta + K_\theta)}{B_e} E_e]}{\left(1 - E_Y + \frac{B_Y}{B_e} E_e\right)} d\theta$$

Let us now focus on P. Taking total differential of equation (28) we get,

$$dP = P_e\, de + P_G\, dG$$

$$= P_e\, de + P_G\, t(1-\theta)dY - P_G tY d\theta$$

$$= P_e \frac{-\left[\left(\frac{B_Y}{B_e} E_\theta + \frac{B_\theta}{B_e}(1 - E_Y)\right) + (E_Y + B_Y - 1)\frac{K_\theta}{B_e}\right]}{1 - E_Y + E_e \frac{B_Y}{B_e}} d\theta + P_G t(1-\theta) \frac{E_\theta - E_e \frac{B_\theta}{B_e} - K_\theta(1 + \frac{E_e}{B_e})}{1 - E_Y + E_e \frac{B_Y}{B_e}} d\theta - P_G tY d\theta$$

$$= [P_e \frac{-\left[\left(\frac{B_Y}{B_e} E_\theta + \frac{B_\theta}{B_e}(1 - E_Y)\right) + (E_Y + B_Y - 1)\frac{K_\theta}{B_e}\right]}{1 - E_Y + E_e \frac{B_Y}{B_e}} + P_G t(1-\theta) \frac{E_\theta - E_e \frac{B_\theta}{B_e} - K_\theta(1 + \frac{E_e}{B_e})}{1 - E_Y + E_e \frac{B_Y}{B_e}} - P_G tY] d\theta > 0 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots..(36)$$

Hence, due to an exogenous increase in the rate of tax evasion, price will go up and rate of inflation will increase. Here, the rate of inflation will be much higher in case of capital mobility. The above discussion yields the following proposition:

Proposition 3: When we incorporate capital mobility, the rate of growth of GDP will fall and the rate of inflation will rise by larger quantities following an exogenous increase in the rate of growth of corruption.

7. Comparison between Closed Economy and Open Economy

In case of a closed economy, $dY = \frac{E_\theta}{1-E_Y} d\theta$

In case of an open economy without capital mobility, $dY = \frac{E_\theta - E_e \frac{B_\theta}{B_e}}{1-E_Y + E_e \frac{B_Y}{B_e}} d\theta$

In case of an open economy with capital mobility, $dY = \frac{E_\theta - E_e \frac{B_\theta}{B_e} - K_\theta (1+\frac{E_e}{B_e})}{1-E_Y + E_e \frac{B_Y}{B_e}} d\theta$

An increase in the growth rate of tax evasion will bring down the growth rate of GDP in a country like India even after incorporation of foreign trade. When we incorporate capital mobility, the rate of growth of GDP will fall by larger quantities following an exogenous increase in the rate of growth of corruption.

8. Conclusion

This dissertation examines how corruption affects growth rate and rate of inflation in a country like India. For this purpose it uses a model based on the tradition set by Keynes and Kalecki. In this model, therefore, GDP is demand determined and prices are set on the basis of cost. We have incorporated in this model major relevant features of the Indian economy. It is clear that in this model, rate of growth of GDP is driven by the rate of growth of aggregate demand. Our analysis yields that the rate of growth of corruption is a major determinant of the rate of growth of GDP and inflation rate. In a country like India, as the analysis in this dissertation yields, an increase in the rate of growth of corruption is likely to substantially lower growth rate and raise the rate of inflation.

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Certificate of Participation

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