THE UNIVERSITY OF OSLO

MASTER THESIS

Department of Economics

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Title: The relative effectiveness of monetary and fiscal policy in LDC's countries in comparison with OECD countries (In Open Economy).

Preface:

My efforts will be directed towards the research work titled "The Relative Effectiveness of Monetary and Fiscal Policies in LDC's (Least Developed Countries) in comparison with the OECD (Organization of Economic Co-Operation and Development) countries in open economy framework (I take Bangladesh from LDC and Norway from OECD as proxy)".

Monetary policy is designed by monetary authority using the tools namely- bank rate, exchange rate, and required reserve ratio etc., specially the central banks to regulate the money supply with a view of obtaining desired level of growth rate. All the steps taken under monetary policy have the same goal of determining a suitable quantity of money supply as a result of which the economy grows in a smooth and sustainable manner targeting to control the harmful inflation. On the other hand, fiscal policy is fully designed by fiscal authority. Government, the fiscal authority, regulates the policy by using some tools namely tax, government expenditure etc. The aim of using these tools is to foster economic growth through changing the level of total out-put Y; (Y= C+I+G+X, in an open economy case). The tool which the fiscal authority widely uses is obviously the government expenditure on Consumption and Investment (G) while Central Bank, the monetary authority uses interest rate and exchange rate to re-determine the level of Private Consumption Expenditure (C), the Private Investment (I) and the Net-Export (X) to balance the internal and external imbalances. Every year government spends a certain amount of money in the form of investment & consumption. As economic theory reveals, this expenditure plays a vital role in changing the economy's output growth through multiplier process.

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1. Summary:

This paper is designed to find out the nature of effectiveness of monetary and fiscal policy on a developing Economy in comparison with a developed Economy. At the very beginning of my study, under section 2; I will identify the problem of my thesis, the method to proceed after it, construct the problem into model, data collecting process, solving way and will draw the conclusion. Under consideration of open economy and taking into account a standard busyness cycle model in section 3, I start with a short presentation of Mundell-Fleming-Tobin model in light of the effectiveness of these two policies on a developed economy in consideration of both fixed and flexible exchange rates and I will go through both the monetary and fiscal policy and their effectiveness on it. Both in the short and long term economic instruments and their short and long term mechanisms have been considered to find out the stable and unstable equilibrium with the policy effectiveness during different types of shocks.

At section 4, I've tried to discuss briefly the core contents (findings and analysis process) of some literatures related with my topic. I've gone through around 30 papers at the very begging of my study, read them, summarized and relate with my field. I include here around 20 out of them which I thought highly relevant with my topic. I organize them separately related the monetary policy, fiscal policy and the policy mix. Based on the form of Gian and Kaur (1952, an India Case), Darret Model (1984), Mr. Latif and Mr. Choudhury (1998), Mr. Rahman (2005) and Dr. Sayera Younus (2011) I construct my main regression model under the section 5, then I've extend them for my empirical analysis with a very simple linear framework following the OLS estimator. I consider the change in out-put (Y) growth as the depended variable as a proxy of GDP growth; Change in Government expenditure as the explanatory variable as a proxy of Fiscal policy and the change in money supply (Broad Money Supply) as a proxy of monetary policy as another explanatory variable. All the variables are calculated in their real term to avoid any types of inflationary effects on my findings. I've collected data from the year 1974-2012 (39 years available only) for Bangladesh case and from 1961-2012 (52 years) for Norway case, run the regression and analyzed the findings under this section.

Then, under the section 6, I've discussed the economic performance of Bangladesh and Norway in light of some economic indicators by taking into account of empirical evidences which I've attach here (two sets of data both for the case of Bangladesh and Norway). Then I've discussed elaborately my findings in section 7 and compare the effectiveness of these two policies on Norway and Bangladesh. In section 8, I've discussed my findings based on all my theoretical and empirical analysis as concluding remarks. Under this section I went through some critical analysis of my findings and compared with some other scholars who have worked at the similar field before. I mentioned here the draw-backs of their analysis and tried to compare them with my findings. Under section 9, I've mentioned all the references, readings etc. And finally under section 10, I've discussed the weakness of my data collecting process, process of constructing the variables and regression analysis methods. The sources of data that I've used here are given under it.

2. Problem Identification and the main Concern of this Study:

From my study, particularly some books and articles like- Asbjørn Rødseth (2000), "Open Economy Macroeconomics" and Peter Flaschel; Ganggolf Groh; Christian Proano and Willi Semmler (2008), "Topics in Applied Macro-Dynamic Theory" and above mentioned 30 articles I get some general ideas about the instrumental wings of monetary and fiscal policy and their degree of effectiveness during the booms and recessions under the cases of fixed and floating exchange rates. One thing I got here that, comparative study knowledge of the nature of relative effectiveness of monetary and fiscal policy in between a developed (Norway from OECD) and developing (Bangladesh from LCD) country can still be added to enrich the economic theories in this field.

Macroeconomic theory states that the total growth of the economy is the simultaneous effect of monetary & fiscal policy. The wheel of development moves taking forces from these two wings of policy. It is empirically evident that economic development cannot be achieved without proper use of both monetary & fiscal policies. Any misalignment between these two tools is most likely to precede economic instability. Countries like Bangladesh need faster development to ensure higher per-capita income and better quality of life to be able to keep pace with the changing scenario of the global economy. But the countries like Norway want to hold the growth rate that they have and want to reach higher and higher economic position and want to ensure the possible maximum social welfare. So, the instruments of these two policies used by a developing country and a developed country are not the same as well as their effectiveness's are also different.

Thus, especially from LDC's point of view, it is of immense need to make an overall assessment of the extent of the effectiveness of these two types of policies separately. In this working effort the prime question to be addressed is- *which one is more effective on Bangladesh (LDC Case) and on Norway, (OECD Case) monetary or fiscal policy?* The answer is quite subjective. It depends on many factors among which stage of economic development is more important. In other words, the role of monetary & fiscal policies in LDCs is ambiguous. But it is to remember that the measure of effectiveness of different policies, whatever small it is, acts as signals for the policy makers. They have to keep eyes on the measures while designing the policies to reach the target.

Monetary and fiscal policy that a country immensely uses as the controlling tools to recover instabilities in different economic circumstances [my intension to discuss them is to get a way to proceed my core question of this topic and find the ways by which I can solve this problem and can get an accurate solution]. To get some basic idea and obvious effects of monetary and fiscal tools I start with the old Mundell and Tobin model and proceed up to the latest Mundell-Fleming-Tobin model from Rødseth (2000); Flaschel, Groh, Proano and Semmler (2008) and an old article by Robert A. Mundell (1963). Later on I'll develop my discussion to establish the theory in light of policy effectiveness on Bangladesh and Norway. I find all these three sources are the core content of my thesis and feel that these contents should discuss briefly as the basics for my paper work.

To adhere my core question about the effectiveness of these two policies on a developed and under-developed economy I need to go through some empirical analysis and mathematical calculations to clear my theoretical claims. The knowledge I get studying Mundell-Fleming-Tobin model is needed to apply in my case for an LCD and OECD country to find some strong evidence to draw accurate empirical conclusions. At empirical study section, I collected the secondary data for both Bangladesh and Norway for the variables, process them (calculate them in real term) in relevant form, use SPSS, run regressions, get the outcomes and analyzed them with evidences. Then I've tried to figure out some forecasting remarks for the policy makers of both Bangladesh and Norway from my findings of empirical analysis. I've tried to draw some comparisons of policy effectiveness of Bangladesh and Norway. Then I reach the concluding remarks in light of my findings and end up with some suggestions for these economies from my study knowledge. As I've already mentioned that my concern is to go through all the policy instruments and their mechanisms under open economy framework, I want to discuss elaborately the internal and external imbalances and their remedies using the policy tools under fixed and floating exchange rates. At this stage of my discussions and before look at on anything else let's start with the main Mundell-Fleming-Tobin model.

3. General Framework of the Original Mundell-Fleming-Tobin Model:

Based on the original Fleming (1962) and Mundell (1963) model as well as the portfolio and real business cycle model (Tobin-1975), my discussion will develop through the main Mundell-Fleming and Tobin model described by Asbjørn Rødseth (2000) in his famous book titled, "Open Economy Macroeconomics" and Peter Flaschel; Ganggolf Groh; Christian Proano and Willi Semmler (2008) titled "Topics in Applied Macro-Dynamic Theory". The intension of this section is to get theoretical framework of Monetary and fiscal policy in a standard open economy and their mechanisms. At the very beginning of this section, let's consider some assumptions taken by the writers in this model which are well described on those sources:

1. Home and foreign goods are imperfect substitutes.
2. Prices of goods are predetermined and the production is determined by demand.
3. From Keynesian theory-

   → there is some spare capacity of the economy.

4. From old Mundell-Fleming model-

   → Capital movements are usually treated as a gradual flow.

5. Foreign exchange market was primarily seen as a flow market where the current account is a significant component of net supply also in the short run.
6. Stocks are not allowed to jump momentarily except the case when the capital is perfectly mobile.

The equations of the main Mundell-Fleming-Tobin IS-LM Frameworks:

$$Y = C(Y_p, W_p, \rho, \overset{*}{\rho}) + I(\rho, \overset{*}{\rho}) + G + X(R, Y, \overset{*}{Y}) \qquad \dots\dots\dots\dots\dots\dots\dots\dots\dots (1)$$

$$Y_p = Y - \rho^* \frac{EF^*}{P} - T \qquad \dots\dots\dots\dots\dots\dots\dots\dots\dots \quad (2)$$

$$W_p = \frac{M_0 + B_0 + EF_{\rho 0}}{P} \qquad \dots\dots\dots\dots\dots\dots\dots\dots\dots \quad (3)$$

$$\rho = i - p_e \qquad \dots\dots\dots\dots\dots\dots\dots\dots\dots \quad (4)$$

$$R = \frac{EP_*}{P} \qquad \dots\dots\dots\dots\dots\dots\dots\dots\dots \quad (5)$$

$$r = i - i_* - e_e(E) \qquad \dots\dots\dots\dots\dots\dots\dots\dots\dots \quad (6)$$

$$\frac{M}{P} = m(i, Y) \qquad \dots\dots\dots\dots\dots\dots\dots\dots\dots \quad (7)$$

$$\frac{B}{P} = W_p - f(r, W_p) - m(i, Y) \qquad \dots\dots\dots\dots\dots\dots\dots\dots\dots \quad (8)$$

$$\frac{EF_p}{P} = f(r, W_p) \qquad \dots\dots\dots\dots\dots\dots\dots\dots\dots \quad (9)$$

$$F_g + F_p + F_* = 0 \qquad \dots\dots\dots\dots\dots\dots\dots\dots\dots \quad (10)$$

Here, the equation 1 is the traditional Tobin's National Income equation where left hand side of it, is the total out-put and the right hand side of it, is the aggregate demand of Private consumption C, Private Investment I, Government consumption and expenditure G and the net export X (export-import, which is the function of Risk Premium R, national income Y and return from foreign investment Y^*). They define all these variables later on by 9 more equations here. Let's proceed defining by the equation-to-equation. On the left hand side of the equation 1, we have Y which is the total production and on the right hand side we have different components of aggregate demand where private consumption C, Private investment I, Government expenditure (consumption and investment) G, and the net export X. The Consumption function C is actually $C(Y_p, W_p, \rho, \rho^*)$ where Consumption C is positively related with Y_p and W_p but negatively related with ρ and ρ^*. Here Y_p *is the earnings (disposable income) from wage (national income) after tax*, which comes from $Y - \rho^* EF^*/P - T$ is described by the equation no. 2. Where T is tax rate and $\rho^* EF^*/P$ is loan re-payment. W_p is the *wealth income* which comes from $\dfrac{M_0 + B_0 + EF_{\rho 0}}{P}$ is described by the equation no. 3 where the components of numerator of it are three types of asset demands (where M_0 is the nominal total private money supply; B_0 is the bond market money supply from private sector and EF_0 is the Foreign Investment of domestic asset market) which is discounted by the price (Denominator). ρ is the *domestic interest rate* which is defined by $i - p_e$ in the equation no. 4.

And ρ^* is the foreign market interest rate. Investment I is the function of two types of interest rates which are ρ and ρ^*. Government expenditure G is entirely policy oriented and assumed

exogenous here. R is the risk premium which is defined by EP^*/P in the equation no. 5 where P = Domestic Price level and P^* = Foreign Price Level.

Equation 5-10 has taken from the main Tobin´s (1975) portfolio model where equation 6 represents the *regressive expectations* which is the *domestic investment expectations* (i) minus *external investment expectations* (i_*), minus *expected depreciation* ($e_e(E)$). Equation 7 represents *the LM (Liquidity Preference-Money supply curve) equation*, specifically asset demand equation of the private sector, where M/P is the real money demand (m_2) which is the function of domestic interest rate (i) and the national income (Y). Equation 8 shows the *bond market investment conditions* (total earnings from the bond market investment) which is the final account from W_p after subtracting loan re-payment $f(r, W_p)$ and re-investment amount $m(i,Y)$ from it. Equation 9 shows the *loan repayment account* of an investor. And finally equation 10 indicates the *equilibrium condition for the foreign currency market* which can also be written as:- $F_g + F_p = -F_*$ where F_g = Domestic Government Asset, F_p = Domestic Private Asset and F_* = Foreign Asset.

This IS-LM model has ten equations and the ten endogenous variables. The instrumental variables of the government policy are- E, F_g, i, M, B, P, F_*, M_0, B_0, F_{p0} which all are predetermined here. P is predetermined meaning that we have nominal wage rigidity. Here we have some variables which are exogenous as well. These are- G, T, P_*, i_*, Y_* and ρ_*. Here P_e is also assumed as exogenous for the simplicity of this model.

The primary purpose of this model is to discuss how Y is determined; and hence Y is of course always endogenous. The assisting variables Y_p, R, r, and ρ are endogenously determined by their respective definitional equations where W_p, F_p is also endogenous. Thus there are seven variables, which are endogenous irrespective of policy regime. This leaves rooms for choosing three endogenous and two exogenous variables among the five remaining variables which are potentially candidates for fixing appropriate policy of E, F_g, i, M and B. This means that we can distinguish between the same six regimes. *If the exchange rate is fixed, E is exogenous and F_g is endogenous. If the exchange rate is floating, then it is the other way around.* Here the monetary instrument could be either one of i, M or B. The other two variables must be then the endogenous variables.

3.1 Policy under Fixed Exchange Rates:

Under fixed exchange rates the main Mundell-Fleming-Tobin model is solved by the help of familiar IS-LM framework. As we said the equation number no. 1 represent the IS curve and equation 7 represent the LM curve here. In order to show the relationship between i and Y, they suggest imagining that we need to substitute equation 2-5 into equation 1 and differentiate with respect to i which produces the slope of IS curve:-

$$\frac{dY}{di}\Big|_{IS} = \frac{C_\rho + I_\rho}{1 - C_Y - X_Y} < 0 \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots \quad (11)$$

Here $C_\rho < 0$; $I_\rho > 0$ and the whole denominator is positive, so the whole expression is negative means that the slope of IS equation is negative. In addition to the IS curve, we need one more curve describing the combination of i and Y consistent with equilibrium in the asset markets, and that is the LM curve which represent a standard money supply in the economy as a

standard closed economic model. In this case we need a different curves for each of the three monetary regimes: 1st one is for IS, 2nd one is for LM- where M is exogenous and 3rd one is for BB- Bond market curve where B is exogenous.

The slope of LM curve we get from the differentiation of equation number 7 that yields…….

$$\frac{di}{dy}\bigg|_{LM} = -\frac{m_Y}{m_i} > 0 \qquad\qquad \text{……………………} (12)$$

As $m_i < 0$ and $m_y > 0$ so the whole expression is positive. So, the LM curve has the usual positive slope. Similarly, we get the slope of BB curve by differentiating the equation 8 that yields….

$$\frac{di}{dy}\bigg|_{BB} = -\frac{m_Y}{f_r + m_i} > 0 \qquad\qquad \text{………………..} (13)$$

Here $m_i > f_r$ and since m_i is negative so the whole expression is positive. Here we can see, the BB curve is increasing because a higher volume of transactions reduces the demand for bonds, and the higher interest rate is then required to keep the market in equilibrium in the situation when the B is given. The case of BB curve is less steep than LM curve, because an increase in interest rate increases the demand for bonds more than it reduces the demand for money. The solution of this model is the intersecting points of these four curves where the level of Y is Y_0 and the level of i is i_0. But these intersection is not any automatic case but the intersections of these three markets (IS, LM and BB) all together keeps the market clear and attain this equilibrium.

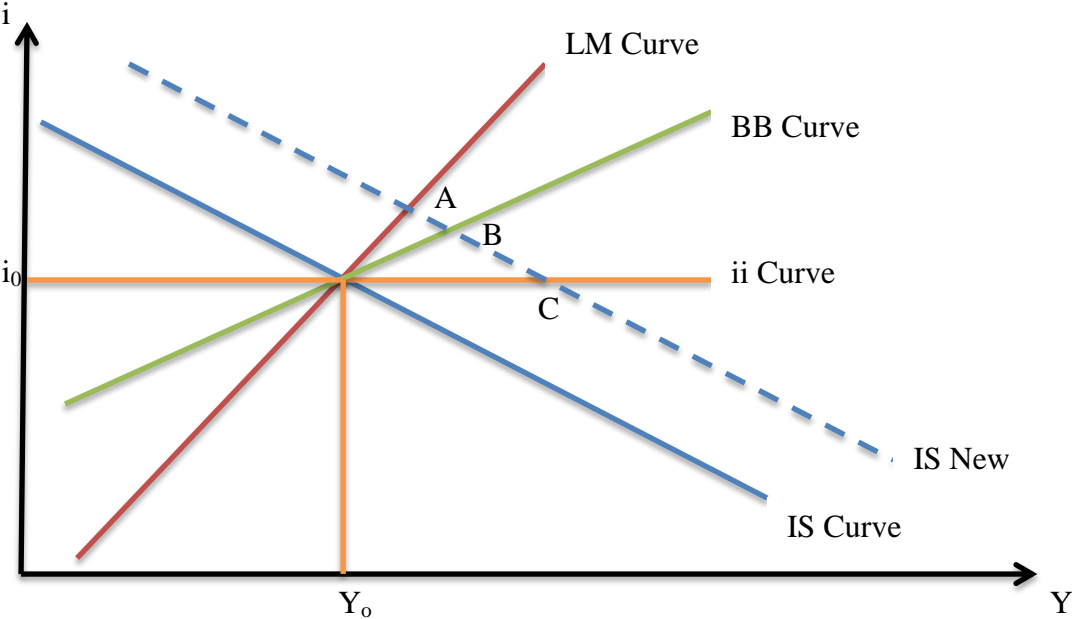Let's see the very first diagram of equilibrium here-

Fig: 1 shows the equilibrium condition in the Goods market and the financial market.

Here the BB curve also represents the combinations of i and Y which are here compatible with equilibrium in the Bond market for a given supply of bonds. And the last one is the ii curve that shows the level of an exogenous interest rate.

For an example- suppose, the interest rate is exogenous then the equilibrium value of Y and i is the Y_0 and i_0 by the intersection of IS and ii curve. Under this situation the central bank now need to adjust the level of money supply to accommodate the ensuing demand for money. By the Walras Law LM and BB curve must go through the Y_0 and i_0 level as the foreign exchange market is kept in equilibrium by interventions and for this reason the bond market must go through Y_0 and i_0 level and similar arguments can be made if M or B are exogenous.

Let us consider any shifting of IS curve to the right: It can happen by the increase of G for any reason. Then LM will go through the original LM as before and meet IS at the point A, the BB curve will meet IS at B and the ii curve will meet the IS curve at C as it has no effect by the changing of G. Then for clearing the market and re-gain the equilibrium LM and BB curves need to shift at C as the central bank need to re-adjust the money supply (increase to meet the excess demand of money). But if the M is kept constant then the new equilibrium will be at the point A as the ii curve then need to shift up.

Fiscal Policy:

The preceding figure (Fig: 1) shows the strongest effect of fiscal policy when the interest rate is fixed. The impact is smaller when the central bank keeps the stock of outstanding government bonds, B, constant and even smaller when the central bank is keeping the money supply constant. The ranking of the effects on the interest rate is the opposite. The effects on foreign exchange reserve are determined by the effects of interest rate. Y has no direct impact on the demand for foreign exchange. An increase in the interest rate raises the foreign exchange reserves. So, we see the highest increase in the foreign exchange reserves when the central bank sterilizes but if the interest rate is kept constant, there is no effect on F_g. As we know the expansion of Y raises the demand for money, now if the interest rate is kept constant then the central bank need to increase the supply of money to meet the money demand due to the increase of G here which is the main reason of increasing the IS curve. And CB usually does it by selling bonds to the households. On the other hand, if the CB wants to keep the stock of money constant, then its cleared that the increased money demand push the interest rate up and it of course depends on the original increase in the demand for goods. But in the intermediate case where the CB keeps the B constant, the increased demand for money is partly accommodated as the public sells foreign currency which makes the money supply not sterilized by the CB. Thus an expansionary fiscal policy leads in all regimes to increased demand for imports and to a deterioration of the trade balance and the current account. Over time this means a loss of foreign exchange reserves. But in the short period for which this model is designed, this effect is negligible.

Monetary Policy:

Let's see the monetary policy mechanisms in the short run under the Mundell-Fleming-Tobin model now-

The first thing, which we already know, that the effect of an exogenous increase in i are obvious in our current IS- LM settings with BB curve in our market equilibrium. Let's consider another graph here to understand more in details-
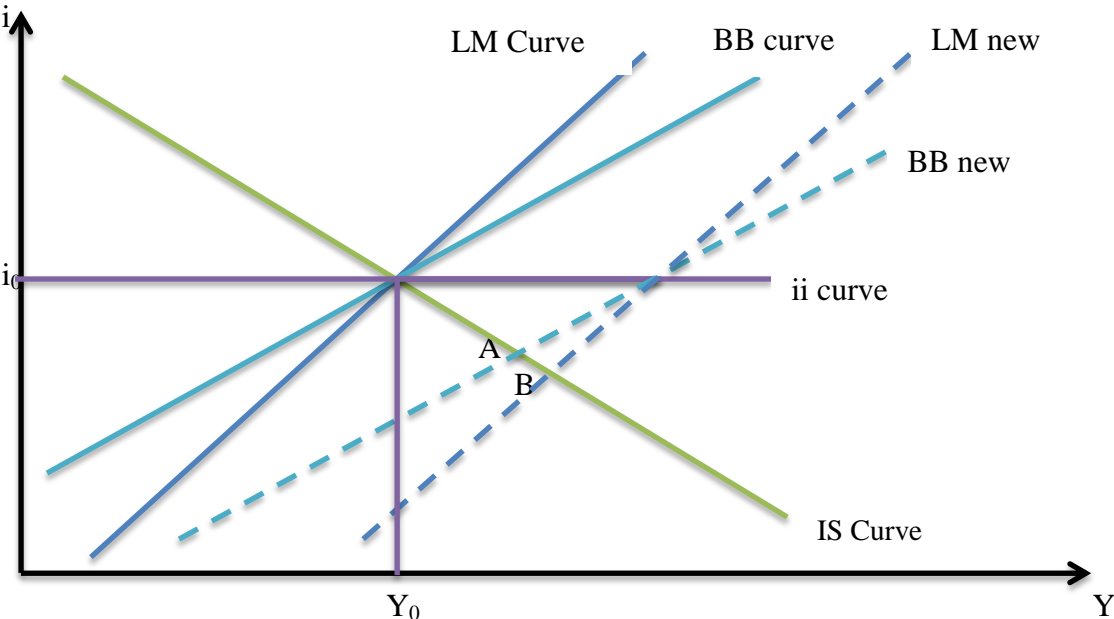
Fig- 2: Effects of a monetary expansion in short run.

In this figure our initial Y and i is the Y_0 and i_0 which we get from the interaction of the IS, LM, ii and BB curves, same as before (fiscal policy case). An open market purchase of domestic bonds shifts the LM and BB curves down-wards (to the right) where LM intersect with IS at the point B (with sterilization by CB) and BB curve intersects with IS at the point A (without sterilization by CB) but LM and BB intersect with ii at the same horizontal as ii has no effect to increase or decrease initially but it will decrease later on as purchasing 1 billion dollar by bonds by CB makes the interest rates lower. And the reduced interest rate leads to an outflow of foreign currency, which reduces the money supply in the secondary effects. If this is not sterilized, the interest rate increases somewhat again but if it is sterilized, there is no countervailing effect as market can re-adjust automatically as sterilization means the greatest decline in i, which also means the greatest decline in the foreign exchange reserves.

Shocks and Stabilizations:

Three types of shocks they mentioned in this model are as follows:-

Real Demand Shocks: A pure real demand shock can be a shift in one of the component demand functions; C, I and X in our IS equation or a shift in variables such as P_* or Y_* which determines the actual IS curve, but has no direct impact on the financial markets. Pure real demand shocks shift the IS curve in the same way as fiscal policy does.

Monetary Shocks: A pure monetary shock can be a shift in the demand function for money. A pure monetary shock shifts the equilibrium conditions in the money and bond markets in the same way as monetary policy does when open market operations carried out.

Foreign Exchange Shock: And finally the Foreign Exchange Shock can be shifting in the f function or in exchange rate expectations (e_e). A pure foreign exchange shocks shift the equilibrium condition in the foreign exchange market and when there is no sterilization, also the equilibrium condition in the bond market.

Beside these three shocks, some exogenous variables may cause composite shocks. For an example, i_* affects both the foreign exchange market and the good markets directly.

Fiscal Policy can be used to neutralize the output effects of demand shocks. For an example- a fall in private investment demand can be met by an equal increase in government investment demand which can keep the IS curve from shifting. Similarly an increase in consumer demand may be met by a tax increase which decreases the consumer demand back to the initial level. The level of fiscal intervention to stabilize the given demand shock is the same irrespective of the monetary policy regime. For an example- if the private investment falls by 50 billion kroner, then it needs 50 billion kroner of government investment to neutralize this effect and keep the IS curve back in place irrespective of whether the CB sterilizes or not, it does not matter.

On the other hand open market operation can stabilize the effect of a money demand shock on interest rates and on aggregate demand. Sterilized foreign exchange rate can neutralize the foreign exchange shocks on interest rates and outputs. These policy tools entirely depends on which monetary regimes we have, because we know from the old Tobin´s model that sterilization may be difficult or impossible if capital mobility is high (perfectly capital mobility case).

They summarized the effects of these three main shocks with no sterilization as-

1. Reduces the impact of real demand shocks (shifts in IS curve)
2. Increases the impact of money demand shocks (shifts in LM and BB of equal amount)
3. Removes the impact of foreign exchange shocks (which shifts only BB).

The third alternative they mentioned- a fixed interest rate which can remove the impact of both money demand and foreign exchange shocks, but it maximizes the impact of real demand shocks.

The Impact of increase in Capital Mobility:

The main Mundell-Fleming-Tobin model claims a higher degree of capital mobility means a less steep BB curve because a small increase in i attracts a large inflow of foreign exchange, which means a large increase of money supply. And for the same reason when Y increase a large share of increased transaction demands are satisfied in this way. If capital mobility is perfect then the BB curve becomes a horizontal line just like the ii curve at $i = i_* + e_e(E)$.

From figure:1, we can see a flatter BB curve means that a fiscal expansion has a stronger effect on Y and has less effect on i. More specifically, high capital mobility increases the impact of fiscal policy on aggregate demand. But on the other hand we can see in figure:2 that a flatter BB curve means a market operation of a given size has smaller effect on both Y and i. More specifically higher capital mobility means that the monetary policy has less effect on aggregate demand. So, monetary policy becomes less effective when capital mobility is

higher or perfect. And of course, perfect capital mobility means that the interest rate is determined by the parity condition where i= i∗+e_e(E).

The effect of Devaluation in this framework:

The main Mundell-Fleming-Tobin model examines the effects of devaluation on IS curve by shifting it to the right here as an expansionary effects of Fiscal Policy cause an expansionary fiscal policy has an effect on IS side. They calculated this effect by differentiating equation number 1 with respect to E and Y keeping i constant and get-

$$\frac{dY}{dE} = \frac{(-C_Y \rho_* F_* + C_W F_{p0} + X_R P_*)/P}{1 - C_Y - X_Y} = \frac{\Delta E}{1 - C_Y - X_Y} \qquad \text{...................... (14)}$$

The denominator of 14 is positive here but the numerator has the following three terms, they mentioned-

1. The competitiveness effect ($X_R P_*$): an increase in E raises the real exchange rate R and thus has a positive impact on net export.
2. The wealth effect ($C_W F_{p0}$): when $F_p > 0$, an increase in E increases the wealth of the private sector and thus consumption.
3. The income effect (-$C_Y \rho_* F_*$): If $F_* > 0$, a devaluation decreases the real disposable income, but if $F_* < 0$, it is then the other way around.

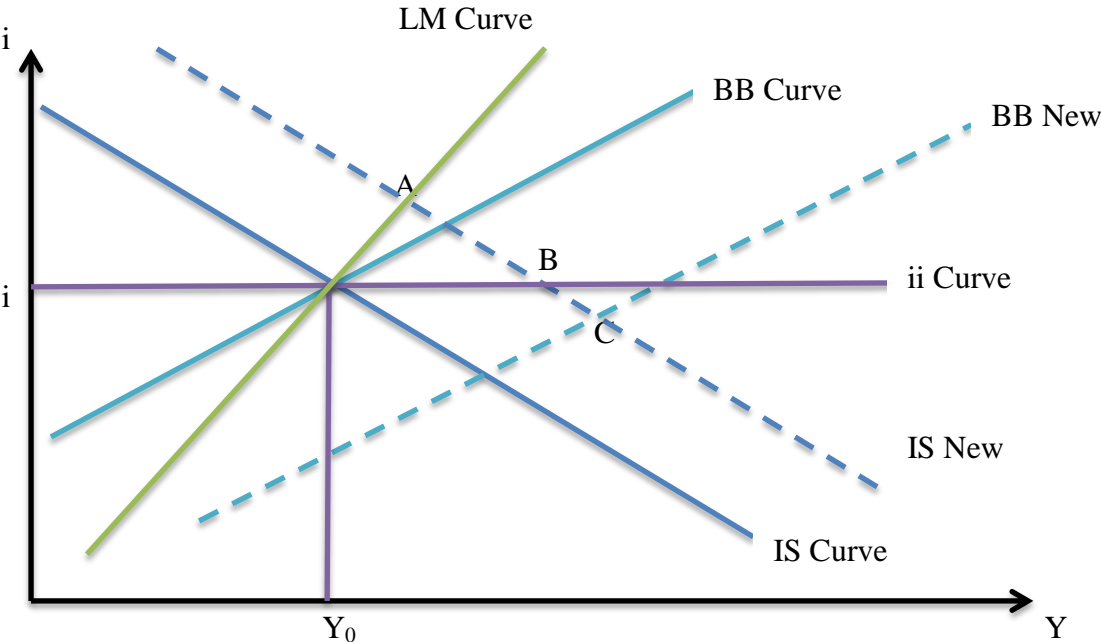Let's see these effects by another diagram here:

Fig-3: Effects of devaluation.

Due to the expansionary Fiscal policy IS shifts to the right as BB shifts downwards due to the devaluation but the LM and ii has no effects of it as they do not depends on the exchange

rates. The Economy ends up at point A with full sterilization, at point B with fixed exchange rates and at point C with no sterilization. Devaluation creates some changes in foreign exchange reserves as well. Let's see these effects now-

There are two types of effects on the foreign Exchange Reserves due to devaluation:

1. The Portfolio Composition Effects: After the effects of devaluation people want to rebalance their portfolio. When $F_p>0$ then they have a capital gain which they want to reinvest. Thus they sell their foreign exchange to the central bank which has the same effect in all three monetary regimes.
2. The Effects through the Risk Premium: When M is exogenous the interest rates increase which increase the expected gain of risk premium which increase the reserve later on. But on the other hand if i is exogenous then the expected gain reduces which reduce the reserve. Now if B is exogenous we do not whether the interest rate goes up or goes down, so the effect is unknown in the case of B but still they claim that reserves must increase. In this case the new LM is lower than the old one so M must have increased.

Effects of Changing the Price level:

As we know from our main model, the foreign price level enters into our model through the real exchange rate. When the foreign price level increases, net exports goes up which shift the IS curve to the right which means the inflation of foreign economy has an expansionary effects on the domestic economy but because of the nominal rigidity in price formation, prices of home goods are unaffected.

On the other hand the price of home goods P affects IS equation through the real exchange rate, through the real wealth and through the real interest income. As long as $W_p>0$ and $F_*<0$, all effects are contractive which induces the IS curve shifts to the left. In the money market, there is also an effect of it; an increase in P increases the demand for money at the expense of the demand for kroner bond that makes the LM curve shifts to the left as well. Thus Price of domestic goods has a contractionary effect on Y when there is full sterilization but the effect of interest rate is ambiguous.

3.2 Policy Mechanisms under Floating Exchange Rate:

In this part of this model, we now consider the floating exchange rate into the IS-LM set up and try to figure out the effectiveness of policy instruments. From the fixed exchange rate of this model we know that IS curve depends on the exchange rate and that the exchange rate depends on the interest rate. And the further relationship is given by the equilibrium condition for the foreign exchange market which we can derive by plugging in our equation 9 into the equation 10 and can end up by the expression-

$$\text{F}_g + \frac{P}{E} f\left(i - i_* - e_e(E), \frac{M_0 + B_0 + EF_{p0}}{P}\right) = -F_* \qquad \dots\dots\dots\dots\dots (15)$$

And if we solve it for E then we get:- $E = E(i-i_*, P, F_g)$ where $E_1<0$

This function is imagined and inserted into the IS curve and get a new IS curve called ISFX (where FX is for Floating Exchange rate) which also represents the Y and i combinations but in floating exchange rate now.
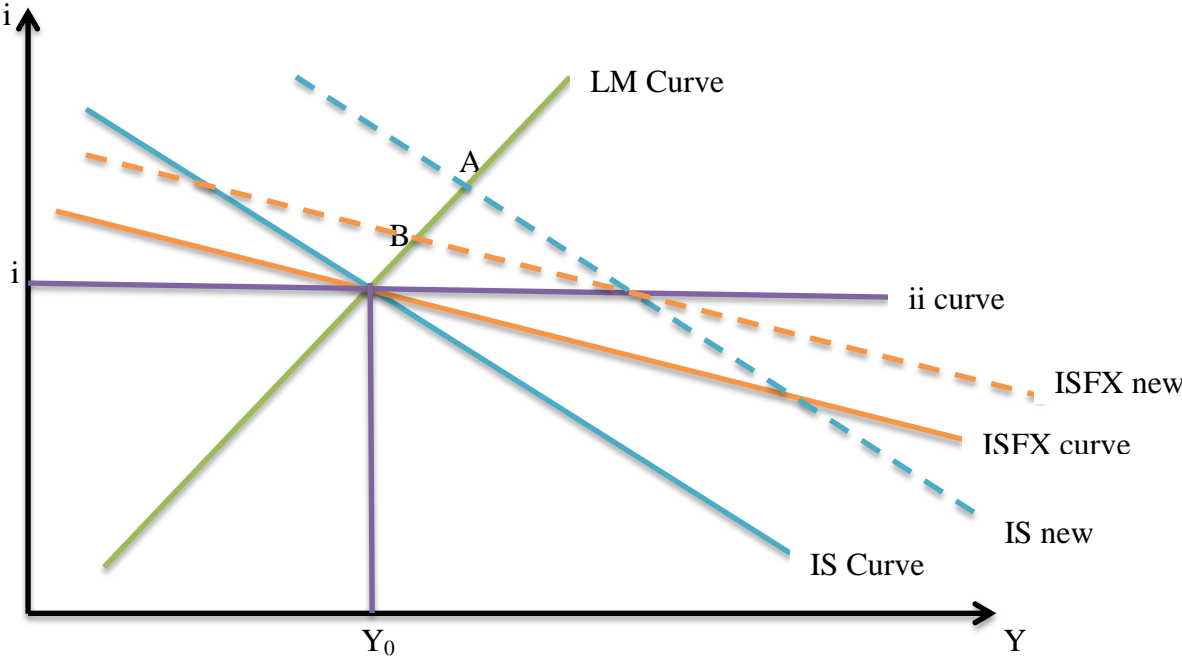
Fig-4: Effect of a fiscal expansion under fixed and Floating Exchange rate.

In this diagram IS shows the Y and i combination in Fixed Exchange Rate while ISFX shows the Y, i combination in the Floating Exchange rate which are consistent with equilibrium in both the goods market and the foreign exchange market when F_g is given.

As we can see here, the ISFX curve is flatter than the IS curve, because an increase in the interest rate leads to an appreciation of the domestic currency which means that demand is shifted away from the home goods and towards foreign goods. It also means a reduction in the wealth in the private sector (as $F_p>0$) which again means the reduction of consumer demand. So, finally we can conclude that an increase in the interest rate has a more contractionary effect when the exchange rate is floating than it is fixed.

And the slope of ISFX curve is-

$$\frac{dY}{di}\Big|_{ISFX} = \frac{C_p + I_p + \Delta_E E_1}{1 - C_Y - X_Y} < 0 \qquad \dots\dots\dots\dots\dots\dots \quad (16)$$

Here as before $C_\rho<0$, $I_\rho>0$ and $E_1<0$, so this numerator is less than the numerator of equation (11) and having the same denominator equation (16) < (11) that means the slope of ISFX is less than the slope of IS curve, for this reason it's more flatter than the IS curve which was in the fixed exchange rate. And as we have here the $E_1<0$ is negative which means that a given increase in the interest rate has a stronger effect on aggregate demand when the exchange rate is floating than when it is fixed. And of course the LM and E will not change at all as they

have no effect for whatever floating or fixed exchange rate. With floating exchange rates the BB curve co-insides with the LM curve since keeping M and B exogenous.

Fiscal Policy:

As we know an expansionary fiscal policy shifts the ISFX (just like the IS section) curve to the right and if the interest rate is fixed at initial level, the exchange rate does not change at all. So, if G increases, for any reason then ISFX shifts to the right and the economy will end up at point A when exchange rate is floating (in the figure: 4) and B when the exchange rate is fixed. Notable: when interest rate is fixed, fiscal policy has the same effect on Y whether the exchange rate is fixed or floating. It does no matter. And if the money supply is given then fiscal expansion has more effect on aggregate demand in the case of floating exchange rate than it is fixed. A fiscal expansion produces an increase in interest rate with a given money supply.

They end up like- under the fixed exchange rate the trade balance deteriorates but under the floating exchange rate there is a combined effect of increased imports owing to an increase in Y and a real appreciation. Over the time an increased trade deficit may lead to depreciation of the domestic currency, but this effect beyond the short run that we study here. However, if people realize that the currency is going to depreciate, which will dampen the initial appreciation and possibly reverse it.

Monetary Policy:

As we know an expansionary monetary policy shifts the LM curve to the right (figure: 5). It is now much cleared that the expansionary monetary policy has stronger effect when the exchange rate is floating than it is fixed which we can see in our new figure (next page) by point A and B. The reason is that the reduced interest rate causes a depreciation that again leads more demand of home goods.

The Effect of Capital Mobility:

We can see in this diagram (fig: 5 at next page) that an expansionary monetary policy has stronger effects when the exchange rate is floating than fixed because; the degree of capital mobility affects the ISFX curve through the FX part. Higher capital mobility means the exchange rate react strongly to an increase in the interest rate and this increased interest rate then has a stronger contractionary effect on aggregate demand and ISFX curve becomes more flatter due to the higher degree of capital mobility which also means that the fiscal policy has less effects on aggregate demand with higher capital mobility when the exchange rate is floating. But the case is totally different with the fixed exchange rate; means under fixed exchange rate with more capital mobility fiscal policy has strong effect on aggregate demand.

Let's see this scenario on a diagram (next page):
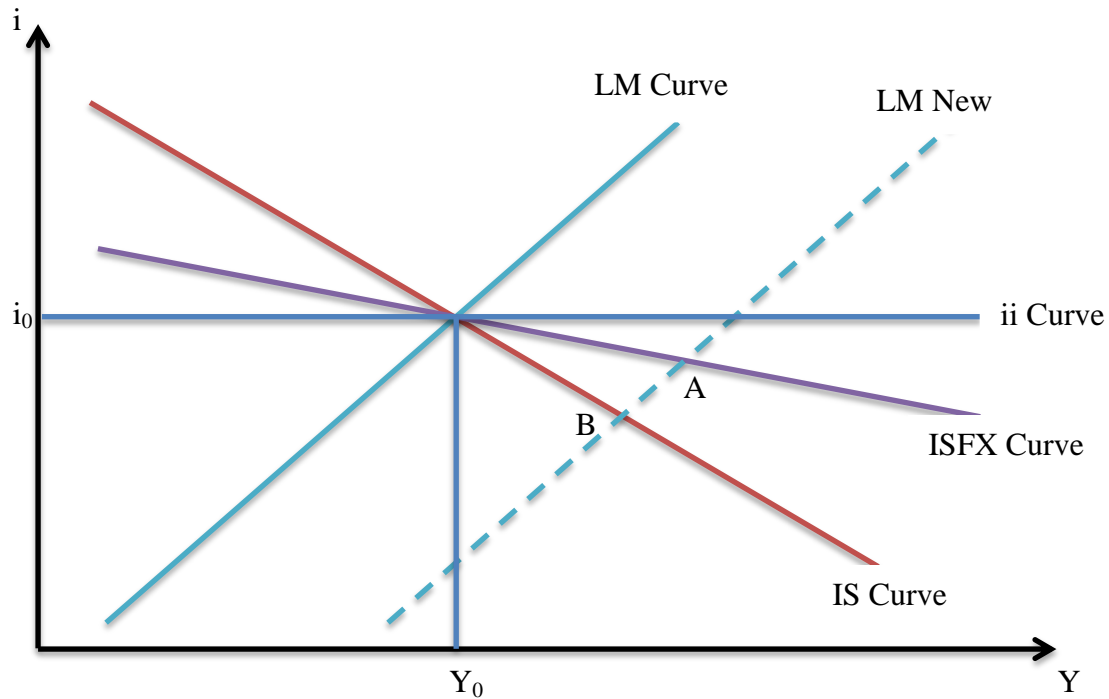
Fig-5: Effects of a monetary expansion under fixed and floating exchange rate.

Some authors claim that fiscal policy has no effect when the capital is fully mobile but it is not true. It depends on e_e (rate of expected depreciations) factor; if it is fixed and constant then this statement is true otherwise not. If e_e is fixed and constant then our ISFX curve will be a horizontal straight line just like ii curve in the case of fixed interest rate.

The response under the shocks:

The main Mundell-Fleming-Tobin model, next discuss the responses of shocks by both monetary and fiscal policy with fixed and floating exchange rates. They consider here only two comparisons: one is between fixed and floating exchange rates when capital mobility is low and M is exogenous in both regimes and another one is when capital mobility is perfect. In second case: the money supply is treated as endogenous under fixed rates and exogenous under floating rates. They use here their derived results for the effects of monetary and fiscal policy as representative for effects of real demand shocks and money demand shocks respectively.

They find for their first case and described as:

1. Real demand shocks, like fiscal policy, have stronger effect on output when the exchange rate is fixed.
2. Monetary shocks, like monetary policy, have a stronger effect on output when the exchange rate is floating.
3. Foreign exchange shocks have no effect on output when the exchange rate is fixed.

3.3 From short to Long Run Equilibrium (The case of fixed exchange rate):

Up to this level of our discussion we described only the short run effects. Now let's consider the long run effects of the policy effectiveness as equilibrium set up which comes through gradual effects by different types of policy instruments. The current state of demand leads the economy to change due to the gradual changes in price. Let's start with the fixed exchange rates then will discuss the cases of floating exchange rates.

In this model some economist shows the stability relating the growth of foreign debt of current account while other relates the inflation to aggregate demand through a Phillip´s curve. These two types of stability process leads the temporary equilibrium over time towards a final stationary states, called the stationary or long run equilibrium which is also called the external and internal balance over time. In this section I will try to discuss the process that how a short-run imbalance balances in long-run.

To simplify our model we can re-adjust some parts and instrument changes in this section. Assuming the perfect capital mobility, real investment is not present here, government budget is balanced in the sense that $W_g = 0$. As we want to find out the effects of permanent shocks, the assumption of balanced budget also seems appropriate. We also assume here the non-inflationary background ($p_* = 0$), and that is why $e = e_e = 0$. No inflation abroad (assumed) and the exchange rate is also fixed which also means that in the long run domestic inflation will also approach to zero. So, the real interest rate is also assumed equal to the nominal rate of interest ($\rho = i$ and $\rho_* = i_*$).

Then the model can re-construct by these three equations now:

$$Y = C\left(Y - i * \frac{EF*}{P} - G, -\frac{EF*}{P} - W_g, i, i*\right) + G + X\left(\frac{EP*}{P}, Y, Y*\right) \quad \text{.............. (17)}$$

$$\dot{P} = P\gamma(Y - \bar{Y}) \quad \text{... (18)}$$

$$\dot{F}* = i_*F_* - \frac{P}{E} X\left(\frac{EP*}{P}, Y, Y*\right) \quad \text{... (19)}$$

Here the first equation is the IS curve (new- for long run stability) where T=G (Tax=Govt.Exp.), 2nd one is the Phillip´s curve assuming with $W_g = 0$ and $\gamma = 0$ as well as the 3rd one is the accumulation of foreign debt. The right hand side of 19 shows the current account deficit in foreign currency.

All these three equations determine the time path of Y, P and F_* given the $P(0) = P_0$, $F_*(0) = F_{*0}$ and $W_g = (-M_0 - B_0 + E(0)F_{g0})/P$. Now, the exogenous variables are- i_*, P_*, Y_*, E, G and I. Let's have a look at the new Phillips curve adjusted with this new form.

Deriving the new Phillips Curve:

Our previous Phillips curve showed the relationship between the real wage growth and the unemployment but here we need to modify and describe the Phillips curve, as it's a bit different.

So, we need a Phillips Curve in the form of:-

$$\frac{\dot{W}}{W} - \left(\frac{\dot{P_c}}{P_c}\right)^e = \gamma(N - \overline{N})$$

Instead of Y and $\overline{Y}$ we plug in here N and $\overline{N}$ assuming that the labor supply A is constant which means that Y = AN, and similarly $\overline{Y} = A\overline{N}$. Under this assumption the new Phillip curve can written as-

$$\frac{\dot{P}}{P} - \left(\frac{\dot{P_c}}{P_c}\right)^e = (\gamma`/A)(Y - \overline{Y}) \qquad \dots\dots\dots\dots\dots\dots \ (*)$$

By definition-

$$\left(\frac{\dot{P_c}}{P_c}\right) = \alpha\frac{\dot{P}}{P} + (1-\alpha)\left(\frac{\dot{E}}{E} + \frac{\dot{P*}}{P*}\right) \qquad \dots\dots\dots\dots\dots\dots \ (**)$$

When this is substituted for the expectations in the Phillip curves above, we get exactly-

$$\frac{\dot{P}}{P} = \frac{\dot{E}}{E} + \frac{\dot{P*}}{P*} + \frac{\gamma'}{A(1-\alpha)}(Y - \overline{Y}) \qquad \dots\dots\dots\dots\dots\dots \ (***)$$

Under fixed exchange rate and non-inflationary environment (***) is the same as 18 with $\gamma = \gamma'/A(1-\alpha)$ which means that the high share of import reduces the slope of this augmented Phillips curve.

The temporary Equilibrium

In the equation 17 we have the definitions that P and F* determines the Y. If we proceed holding this assumption and solve it for Y, we get-

$$Y = Y(P, F_*, x) \qquad \dots\dots\dots\dots\dots\dots \ (20)$$

Where x = (i*, P*, Y*, G, i, E, W_g) which all are the vectors of exogenous variables but we only want to know how P and F* influence Y.

By differentiating (17) with respect to F we get-

$$\frac{\delta Y}{\delta F*} = \frac{(-i*C_Y - C_W)E/P}{1 - C_Y - X_Y} < 0 \qquad \dots\dots\dots\dots \ (21)$$

The denominator of 21 is positive but the numerator is negative as something is negative divided by something positive yields the whole expression is negative. This means that the higher foreign debt (F_*) reduces the consumption demand both through the income effect as well as the wealth effect.

And by differentiating (17) with respect to P yields-

$$\frac{\delta Y}{\delta P} = \frac{(i * C_Y + C_W)W'_* - X_R R}{1 - C_Y - X_Y} \cdot \frac{1}{P} < 0 \qquad\qquad \text{……………….……… (22)}$$

Where $W_*` = EF_*/P$ is the real value of the foreign debt measured in terms of home good. The first part of the numerator is the wealth effect, which is positive but 2nd part of it is negative (real appreciation). So, the overall effect is negative means $\delta Y/\delta P < 0$ which means that the slope of aggregate demand curve is negative. But if the country is net debtor that means if have $W_* > 0$ then the 1st term will be positive which will dominate the 2nd term, and then the price increase on home goods is expansionary.

The Stationary Equilibrium

By plugging in equation 18 and 19 into 20, we get two differential equations, like-

$$P^\circ = \Phi_1(P, F_*, x) \qquad\qquad \text{………………………………. (23) and}$$

$$F_*^{\ \circ} = \Phi_2(P, F_*, x) \qquad\qquad \text{………………………………. (24)}$$

Now if we solve these for the stationary point we get the following-

$$P^\circ = \Phi_1(P, F_*, x) = 0 \approx Y=Y(P, F_*, x) \approx \overline{Y} \qquad \text{……………………..……. (25)}$$

$$F_*^{\ \circ} = \Phi_2(P, F_*, x) = 0 \approx X(EP_*/P, Y, Y_*) \approx i_*EF_*/P (=i_*W_*`) \quad \text{………………….... (26)}$$

Here, these are the stationary values for P and F_* where equation 25 shows the internal balance and equation 26 shows the external balance which means the current account is balanced (trade surplus = interests payments on foreign debt). While 25 shows the long run out-put from supply side internal balance. Now if we plug in Y= $\acute{Y}$ into 26 with internal balance, then we get-

$$C(\acute{Y} - i_*W_*` - G_* - W_*` - W_g, i, i_*) + G + X(R, \acute{Y}, Y_*) = \overline{Y}$$

And for the external balance we get-

$$i_*W_*` = X(R, \overline{Y}, Y_*) \qquad\qquad \text{………………………….. (27)}$$

And if we now plug in this value into our internal balance equation (consumption function equation) we finally get-

$$C(\overline{Y} - i_*W_*` - G, -W_*` - W_g, i, i_*) + G = \overline{Y} - i_*W_*` \qquad \text{…………………………..… (28)}$$

That shows the equality condition of total consumption in equal to the total national income.

The Stability conditions

The mathematical theory of our stationary condition shows the Jacobian matrix form which is:

$$A = \begin{bmatrix} \phi_{11} & \phi_{12} \\ \phi_{21} & \phi_{22} \end{bmatrix}$$ ……………… (****)

The elements of this matrix are the derivative of our internal and external balance equations. The necessary and sufficient condition for the local asymptotic stability of the stationary state is that:- The Trace; (A) = $\Phi_{11}+\Phi_{22}$ <0; which is negative. And Determinant; IAI = $\Phi_{11}\Phi_{22} - \Phi_{12}\Phi_{21}$ >0 which is negative and $\neq 0$.

To find out the stationary condition, we take the 1st derivative of the equation 18 and 19 and set for Y =Ý which yields-

$$\phi_{11} = \frac{\delta \dot{P}}{\delta P} = P\gamma \frac{\delta Y}{\delta P}$$ ……………….. (29)

$$\phi_{12} = \frac{\delta \dot{P}}{\delta F*} = P\gamma \frac{\delta Y}{\delta F*}$$ ……………. (30)

$$\phi_{21} = \frac{\delta \dot{F}*}{\delta P} = (-X + X_R R)\frac{1}{E} - X_Y \frac{P}{E}.\frac{\delta Y}{\delta P}$$ …………….. (31)

$$\phi_{22} = \frac{\delta \dot{F}*}{\delta F*} = i* - X_Y \frac{P}{E}.\frac{\delta Y}{\delta F*}$$ ………………….. (32)

Here we need to argue that-

Φ_{11}<0 Φ_{12}<0

Φ_{21}>0 Φ_{22}<0

This shall be our standard case that shows the stationary equilibrium is stable as both the trace and determinant condition are satisfied. Here the value of Φ_{11}<0 shows the downward slopes of aggregate demand curve; Φ_{12}<0 shows the higher indebtedness reduces the aggregate demand; Φ_{21}>0 shows if the initial trade-balance and Marshal-Learner condition holds, then the increase of domestic Price has positive effects on trade balance. And finally Φ_{22}<0 shows the effect on foreign debt on the current account deficit. If we substitute dY/dF* from 21 and plug in into 32 we get-

$$\phi_{22} = \frac{i*(1-C_Y)(1-X_Y)+C_W X_Y}{1-C_Y-X_Y} < 0 \qquad \text{................…............ (33)}$$

Here the numerator is negative and the denominator is positive makes the whole expression of $\Phi_{22} < 0$ (negative) means that the wealth effect is stronger which means that the larger foreign debt leads to a smaller current account deficit. And that a higher price level leads to a less aggregate demand and less inflation.

Dynamics: The standard case (graphical presentations):

A phase diagram can show the movement from short run to long run effect (in figure 6) for the case of equations 29, 30,31,32 and 33:-
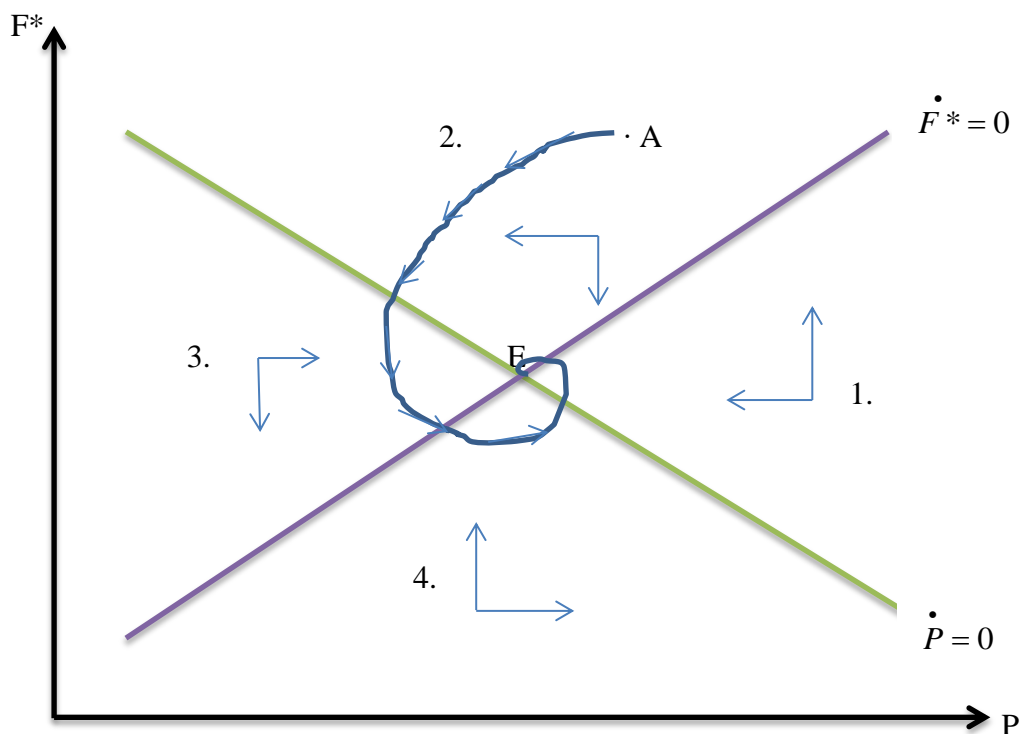
Fig; 6: Transition from short to long run equilibrium: a cycle path.

In this diagram all the signs of the elements of A are satisfied which is shown by a spiral curve from the point A to E. And of course E is the final long-run stable equilibrium in the Economy that is derived from the internal and external balance (P- internal and F- external balance curves here).

The P° curve is the locus of P and F_* which together yield the internal balance that is defined by-

$$\dot{P} = \Phi_1(P, F_*, x) = 0 \qquad \text{...................…............................. (34)}$$

Its slope is negative as the high price level P is compatible with aggregate demand equal to Ý only if the foreign debt is low. We can figure out it mathematically by implicit differentiation as-

$$\frac{dF*}{dP} = -\frac{\phi_{11}}{\phi_{12}} = -\frac{\delta Y / \delta P}{\delta Y / \delta F*} < 0 \qquad \text{.........................} \ (35)$$

Both the denominator and numerator are positive of 35 but its sign is negative, so the whole expression is negative means foreign debt is negatively related with domestic price level. Here the $\overset{\circ}{F*} = 0$ curve shows the locus of P and F* combination which yields the external balance which is defined by 26 where we had-

$$\overset{\bullet}{F}* = \Phi_2(P, F_*, x) = 0 \approx X(EP_*/P, Y, Y_*) \approx i_*EF_*/P(=i_*W_*`)$$

Which can be simplified as- $F_*^{\circ} = \Phi_2(P, F_*, x) = 0$

And the slope of F* curve is-

$$\frac{dF*}{dP} = -\frac{\phi_{21}}{\phi_{22}} > 0 \qquad \text{...} \ (36)$$

Which is positive as $\phi_{22} < 0$ and $\phi_{21} > 0$ which makes the whole expression positive.

Another diagram of dynamic stable equilibrium we can see here:
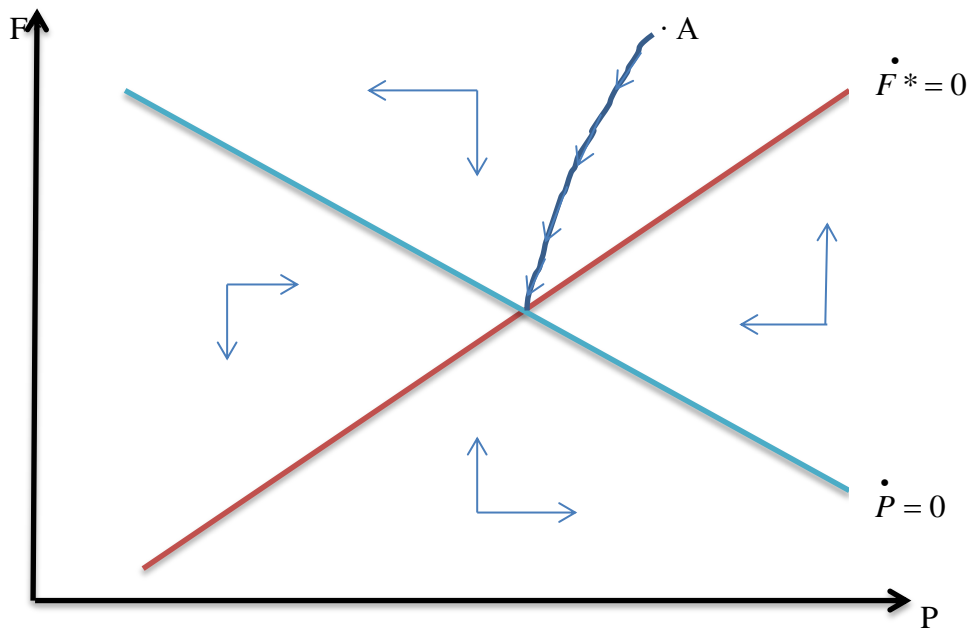
Fig; 7: Transition from short to long run equilibrium: a direct path.

In this case the stable curve converges directly by near a straight line from point A to E rather a cycle by the internal and external balance curves P and F. Figure 7 shows the stable equilibrium from the A to E at the first opportunity while figure 6 shows the interactions and converges towards the stationary equilibrium.

An Expansionary Shock to the Domestic Demand and Stability of Equilibrium:

Let's start by another diagram here for the case of expansionary shock (a positive shift in consumption function or a fiscal expansion)-
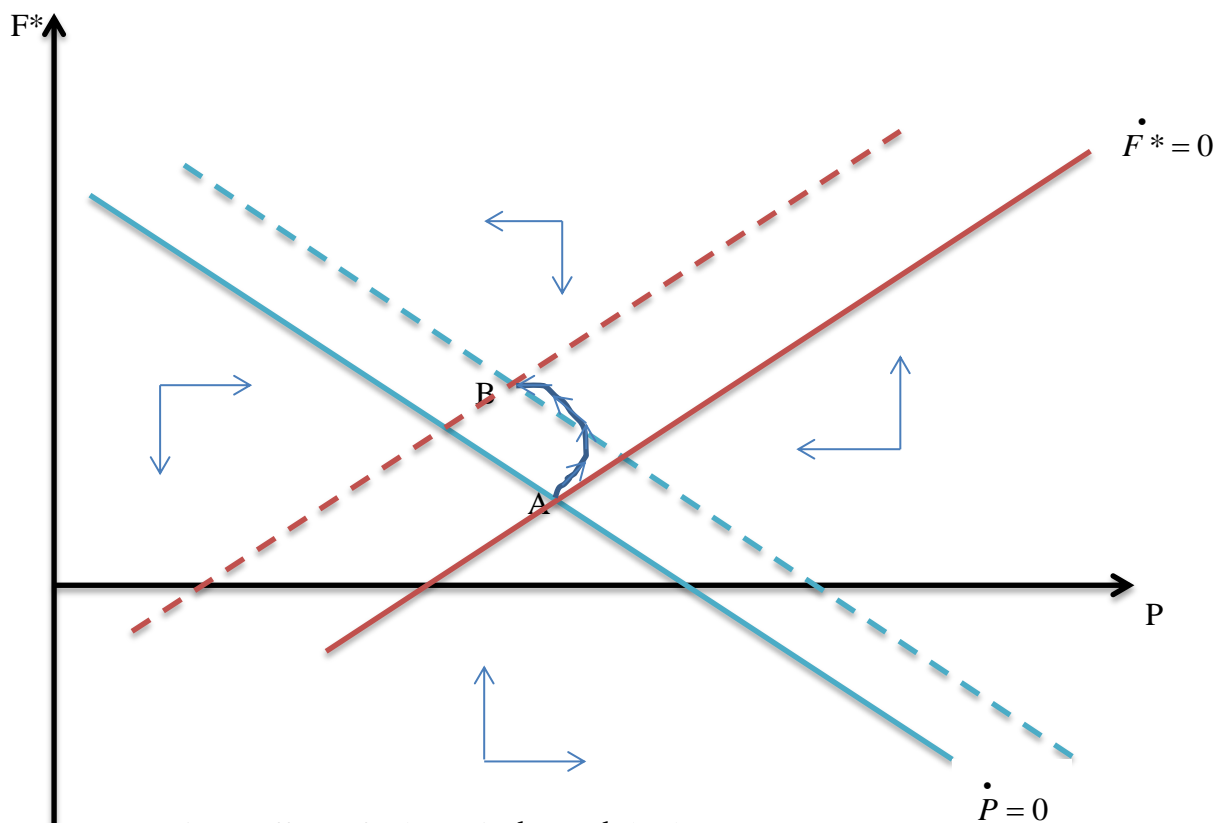
Fig; 8: Effects of a domestic demand shock.

In this diagram we can see the situation of any kind of domestic demand shock can shift the internal balance curve P to the right where a higher price level is required to keep demand down to the $\overline{Y}$ level. A lower price level in foreign market push the F curve shifts to the left to keep the foreign account in balance. So, if there any kind of expansionary shock in the economy, the final stable equilibrium is set up at the point B from the initial equilibrium A.

3.4 From short to long run equilibrium (floating Exchange rate case):

Under this section, let's see the dynamics of the stable (long-run) equilibrium under floating exchange rates. Let's start with a very simple model here, where-

$$Y = C(Y) + X(EP^*/P, Y, Y^*) \qquad \ldots\ldots\ldots\ldots\ldots\ldots \quad (37)$$

$$\frac{M}{P} = m(i, Y) \qquad \ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (38)$$

$$\dot{P} = Y\gamma(Y - \overline{Y}) \qquad \ldots\ldots\ldots\ldots\ldots\ldots.. \quad (39)$$

$$\dot{E} = E(i - i^*) \qquad \ldots\ldots\ldots\ldots\ldots\ldots. \quad (40)$$

Here the equation 37 and 38 is the IS and LM curve as usual, equation 39 is the Phillips curve just like the Phillips curve in our previous section (3.4) and the equation 40 is the dynamic equation for the exchange rate [The variables represent the same meaning of the section 3.1].

Here, Y,i,P and E are endogenous variables while Y_*, P_*, i_* and M are the exogenous. The initial value of P is P_0 which changes overtime but E can jump at any time under the case of floating exchange rates, so it needs to determine endogenously.

Solution of the Model;

This model can be solved just like the previous one (same as the section 3.1), if we solve this for Y and i we get the following equations-

$$Y = Y(EP_*/P, Y_*) \qquad \text{………………….. (41)}$$

And $\qquad i = i(M/P, EP_*/P, Y_*) \qquad \text{………………….. (42)}$

We know from our main model (3.1 sections) that both a real depreciation and an increase in foreign output raise the domestic output, and then the domestic interest rate also increases given a fixed money supply. The solution of the temporary equilibrium can be inserted in 38 and 39 that yield the two differential equations-

$$\dot{P} = \Phi_1(P, E, Y_*, P_*) \qquad \text{……………………… (43) and}$$

$$\dot{E} = \Phi_2(P, E, M, Y_*, P_*) \qquad \text{…………………. (44)}$$

Then the stationary equilibrium is defined by these following equation systems-

$$\dot{P} = 0 \approx Y = Y(EP_*/P, Y_*) = \bar{Y} \qquad \text{…..…………… (45) and}$$

$$\dot{E} = 0 \approx i = i(M/P, EP_*/P, Y_*) = i \qquad \text{………….………… (46)}$$

Equation 45 and 46 determine the curve of P and E which shows the instability of both the internal and external market means that if anybody starts from an arbitrary point like P_0, the economy does not move to the stable equilibrium. The slope of P curve is positive as usual just like our previous sector and the slope of E curve is derived from the equation 46 here which is negative-

$$\frac{dE}{dP} \Big|_{\dot{E}=0} = -\frac{di/dP}{di/dE} < 0 \qquad \text{……………………………… (47)}$$

Both the value of numerator and denominator of equation 47 is positive and having a minus sign before it makes the whole expression negative.

Let's see this full equilibrium scenario by another dynamic graph here (next page):
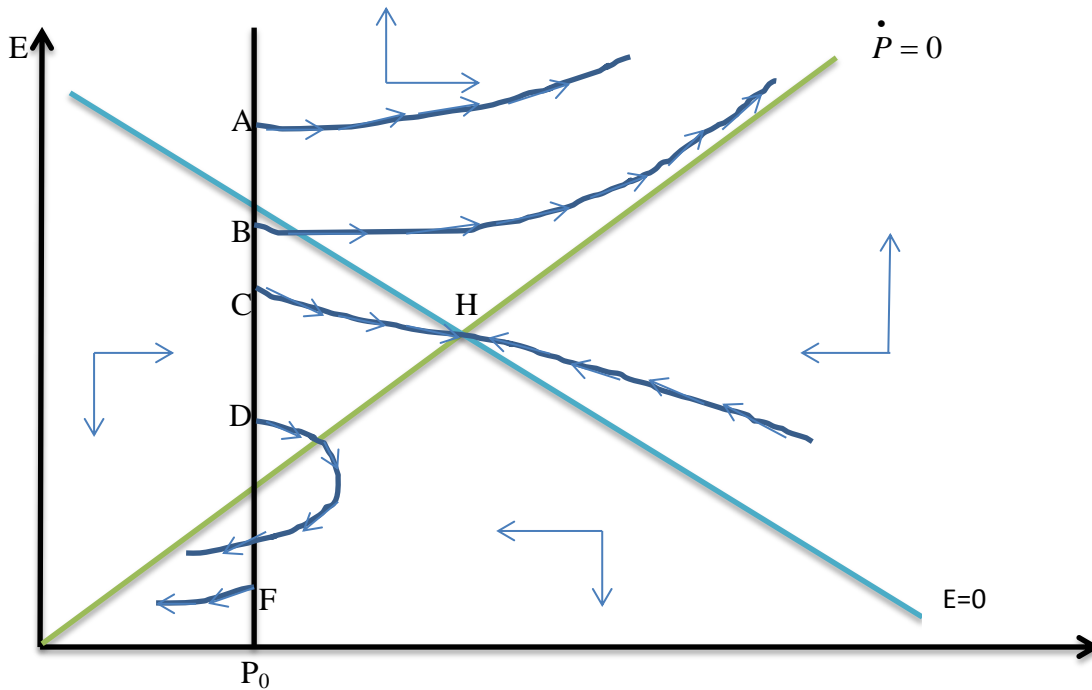
Fig; 9: Alternative time paths for E and P

Figure 9 shows an economy starts with the situation with an unstable arbitrary point suppose P_0 as now Y here is only depend on E/P not only on E or P separately. On P_0 level there imagined 5 different trends /movements of our economy due to the interaction of internal and external balance instruments. Out of these 5 moving point only C goes towards the stable equilibrium H, in the long-run under the floating exchange rate.

A Monetary expansion;

Let's start with a graph (next page) to look at the effect of monetary expansion under this new system:

Figure 10 shows the monetary expansion effect due to the increase in M (money supply). Internal demand is assumed unaffected from any monetary expansion, so our internal balance curve is remains unchanged. It then, only affect the external balance curve E which will shift to the right and the Economy starting from point A will end-up at point C which is the new stable equilibrium under floating exchange rate.

$$\dot{P} = 0$$

E

C
B
A

$\dot{E} = 0$

P

P$_0$
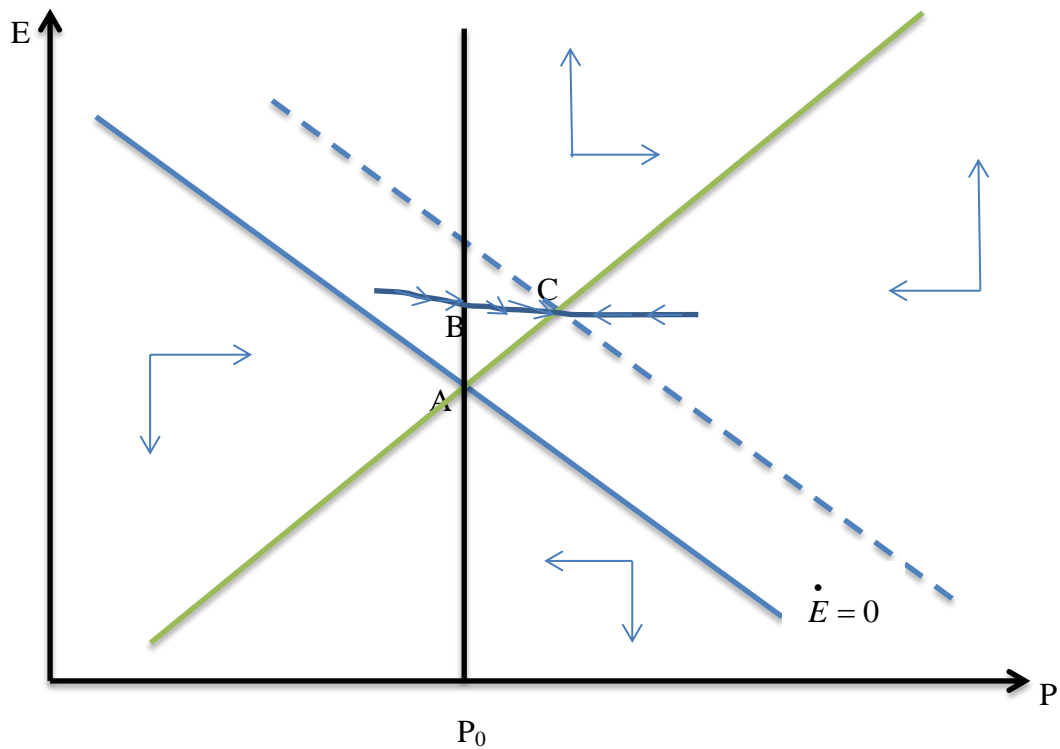
Fig; 10: The effect of a monetary expansion.

A Shock to the Trade balance;

In this section, figure 11 shows the effects of negative trade balance (trade deficit) under floating exchange rate. The initial equilibrium of the economy was A where P is at P_0. Now if there is any trade deficit experience by our considered economy then both the internal and external curve shifts upwards and attain a new equilibrium at point B because due to any shock of trade balance, only E is affected here which makes these two curves shifts upwards. But the P remains at the same level as the E changes at the same ratio both in internal and external balance sheet.

The figure is on the next page:
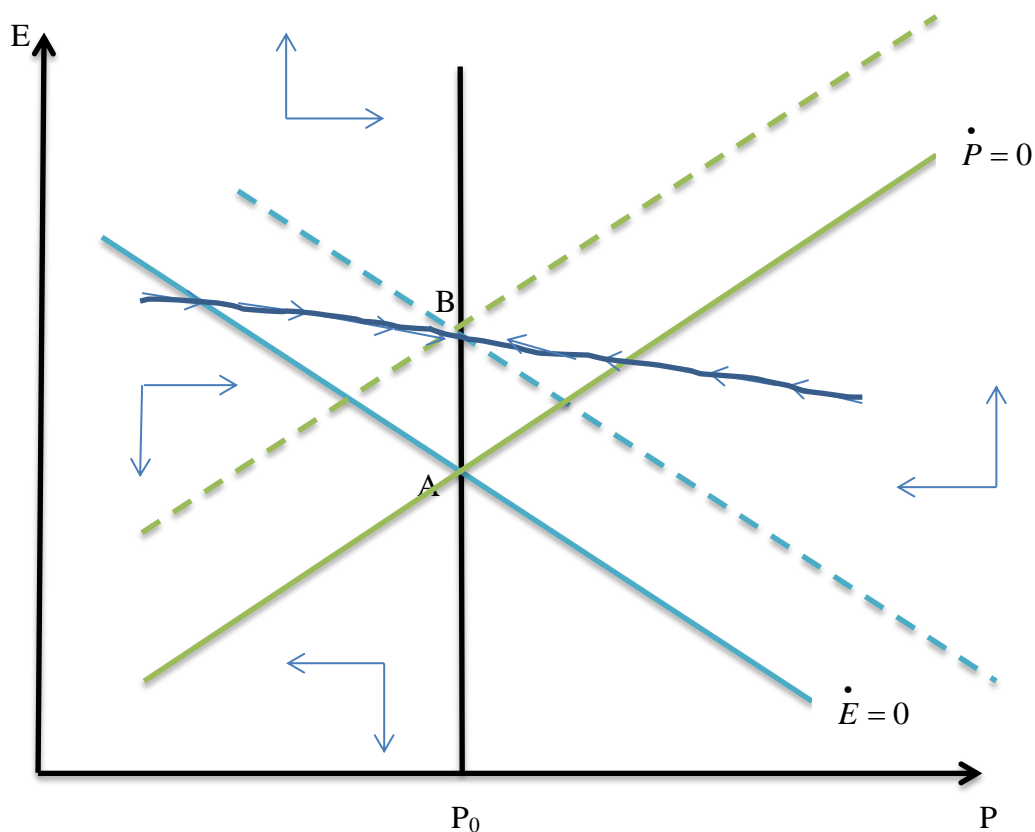
Fig; 11 the effects of a negative trade balance (trade deficit) shock.

[This section is executed from Asbjørn Rødseth (2000); Chapter: 2, 3, 4, 5 and 6; and Peter Flaschel; Ganggolf Groh; Christian Proano and Willi Semmler (2008); Chapter 7].

The discussion up to this stage can more or less describe the dynamics of long and short run equilibrium and their stabilities of a standard economic case. Under different types of shocks in the Mundell-Fleming-Tobins' IS-LM framework it is now more or less understandable to us that how monetary and fiscal policy re-adjust the short and long run equilibrium.

I can summarize the findings of the discussions from this sector (3.1, 3.2, 3.3 and 3.4) as: - a) Fiscal policy has strong effect on out-put growth when the interest rate is fixed under the fixed exchange rates. b) Under the floating exchange rates Monetary policy is more effective than the fiscal policy. As it has a bigger effect of any monetary actions on the money market if the exchange rate is floating. And section 3.3 and 3.4 analyze the dynamics of long-run equilibrium using the policy instruments under both the fixed and floating exchange rates.

The knowledge of remedial processes and the usefulness of monetary and fiscal tools of Mundell-Fleming-Tobin framework are very much effective to describe a standard economic case like Norway (only policy effectiveness) which will be my potential tools for my paper to describe the policy weaknesses taken by a developing country like Bangladesh. Under fixed and floating exchange rates how Norway reacts by its policy tools, and on the other hand how

Bangladesh reacts; and how they should react actually, will be discussed later on in the light of this knowledge. At this stage of discussion I want to look at some other articles and findings by some prominent scholars those who worked at the same field before. Based on this theoretical and empirical knowledge I'll try to go through some empirical analysis for my case considering the effectiveness of monetary and fiscal policy in Bangladesh and Norway but before that let's try to discuss briefly some famous articles related my topic.

4. Literature Review (Literature Related with my Topic):

Mundell-Fleming-Tobin model is highly rich to describe the policy re-adjustments on a standard developed economic scenario like Norway. But I still have a lot of curiosity about the policy mechanisms and their effectiveness on a developing economic scenario. After discussing Mundell-Fleming-Tobin model and different type's dynamics of equilibrium, I want to focus on some thoughts of other scholars about the policy effectiveness of developed, developing and undeveloped countries at this section. At the very beginning of my study I've tried to find out some previous articles related my topic and found some vital and prominent working papers concerning the relative effectiveness of monetary and fiscal policy. Out of some hundreds of papers I've selected 25-30 to include here to reach some clear concluding remarks by those writers from different economic point of views. Literatures give some mixed result regarding the developing and developed countries. The very short concluding remarks of them are described here:-

4.1 Some papers related the fiscal policy is found so far:

A paper titled- Capital mobility and the effectiveness of fiscal policy in open economies- by Mr. Christian Pierdzoich. He said, "The increasing degree of capital mobility can increase the effectiveness of fiscal policy in a standard New-Open Economy Macroeconomics- NOEM and it highly depends on the exchange rate, he analyzed it both theoretically and mathematically".

Another very good article- 'the effects of fiscal policy on consumption in recessions and expansions- by Athanasios Tagkalakis**, "**in a recession period- fiscal policy is highly effective than the monetary policy on an economy, it also increases the long run Consumption, employment rate and the long run investment".

In another paper named, 'Fiscal policy rules for stabilization and growth: A simulation analysis of deficit and expenditure targets in a monetary union- by Tilman Bruck and Rudolf Zwiene. These writers studied with the recession period (crisis era) of German Economy and suggest, "Under SGP debt bindings, 3% of GDP, Germany faces some recessionary shocks in international trade balance and economic growth but it has some crucial long run positive effect on controlling inflation, increasing private consumption, investment and sustainability

of the policies that the policy maker took, they also suggest to use/call expenditure target than the deficit target by the government to overcome this situation which also evidences that under the recession period Fiscal policy is more effective than the monetary policy. And this is true even in a developed economy.

At this stage of my study I find an article titled- Fiscal policy and financial crises – what are the actual effects of fiscal policy? – By Nina Larsson Midthjell (2011). Here she argued with practical evidences and conclude as, "Fiscal policy leeway is highly depends on the Government debt and the size of the economy. She also argued that through multiplier process if Government expenditure increase 1 billion then GDP increases 2 billion but it entirely depends on the government debt and the size of the economy. If the government debt is high then it has a negative impact on this multiplier process but if the size of that economy is really big then the impact is much bigger on the GDP".

Another famous paper by the same writer worked with Professor Steiner Holden titled- 'Successful Fiscal Adjustments: Does choice of fiscal instrument matter?' They calculate empirically, went through some practical evidences and made some conclusion in favor of the effectiveness of fiscal policy as- "by taking into account of 21 OECD country data and from the drawback of AAP approach they found and proved that they do not find any clear indication that expenditure cutting have more expansionary effects on growth than tax rises. They claim with their findings here and conclude that government expenditure reduction cannot be good alternative rather increasing taxes on out-put growth". This argument was not clear at as they did not claim it strongly with their findings.

A crowding out effect oriented paper titled- Crowding out and The Effectiveness of fiscal policy: - by Willem H. Buiter. Under the framework of Mundell-Fleming-Tobin model and by the help of IS-LM equations, Buiter calculated and found that, "a big amount of government expenditure by borrowing has nearly no effect to increase the total output in the long run for crowing-out effect as it decreases the private investment and consumption. It is all about the crowding out effects of a large amount of government expenditure through borrowing does not have so much effect on output growth if there is a lot of crowding out problem in the economy rather it can decrease the private investment and consumption in the long run".

The final paper in favor of the effectiveness of fiscal policy that I studied, titled- 'The general equilibrium effects of fiscal policy: Estimates for the Euro area: - by Lorenzo Forni , Libero Monteforte, Luca Sessa. These writers find and conclude as, "Fiscal policy has stronger effect on output growth in EURO area if the real interest rate is fixed".

The papers in this sector however more or less showed and analyzed the logic for the effectiveness of fiscal policy is much stronger than the monetary policy in different point of views.

4.2 On the other hand some papers stands for the stronger effectiveness of monetary policy on output growth on different perspective of the economy I find so far-

'Effectiveness of monetary policy: Choice of exchange rate regimes' - by Laungsuwon Vichaiyut. By using 105 countries, data of 14 sectors and on the basis of white heretochedasticity-consistent standard errors and co-variance method this author calculated and found some significant out-comes choosing flexible exchange rate than the fixed exchange rates under de facto classification. He suggests that, "flexible exchange rate is more effective than the fixed exchange rate for the smooth adjustment of trade and internal monetary shock as well as the manufactured-exporting-countries face terms of trade shock more than the non-manufactured-exporting countries do and highly open countries tend to gain more benefit from adopting the flexible exchange rate regime than relatively closed economy".

Another article written by two writers together titled, 'Financial intermediaries and the effectiveness of monetary controls' by James Tobin and William C. Brainard. They discussed about financial intermediaries activities and effects of proper monetary controls by the help of currency–capital model and found that, "the regulated money market is more stable than the unregulated market where a certain amount of cash flow and a stable rate of interest exist".

A paper related with financial market efficiency and the proper monetary policy titled- 'Financial Market Efficiency and the Effectiveness of Monetary Policy: - by Michael Woodford'. In this paper, "Michael Woodford analyze the Over-Night interest rate policy instead of targeting or fixing the Required Reserve Ratio by the federal Reserve Bank of USA and compared the effectiveness and success of monetary policy with some other developed countries like- UK, Canada, Australia, Sweden and New-Zealand and their success of targeting Over-Night Interest rate policy than targeting the Reserve Ratio by holding the Reserve Ratio only for the Inter-Bank transactions. By holding the central bank reserve ratio and targeting the over-night interest rate is more effective policy to increase out-put growth effectively keeping the inflation under control".

Another paper from the improper monetary policy effect on the persistent inflation and how does it introduce the relative contracting among the economic agents titled- 'Inflation Persistence and Relative Contracting: - By Steinar Holden and John C. Driscoll'. On the basis of Fahrer and Moore model-1995 which was developed describing the draw-back of tailor's model- 1980, Holden and Driscoll found it a real problematic as, "Relative Contracting of Wage Setting model generates the persistent inflation as its reduced form represent the original Tailor's model".

As my last paper in this section I studied- 'monetary regimes and the co-ordination of wage setting: - by Steinar Holden. In this paper Steinar Holden wants to show and proof that, "the equilibrium unemployment is lower under the a membership of an Economic Union, like- Economic and Monetary Union-EMU than having a strictly monetary regimes, alternatively equilibrium unemployment decreases under the less strict monetary regimes". He analyzes some recent papers by Soskice and Iversen- 1998 and Cukierman and Lippi- 2001, and established these strong arguments.

As we can see here these five papers have worked out from different instruments of monetary controls and their effects of different economic circumstances and found some strong

arguments about the effectiveness of monetary policy is stronger on out-put growth as well as on the economic stability in some specific economic situations than the fiscal policy so far.

4.3 *At the final stage of my study I found some strong articles relating my topic about the effectiveness of policy-mix which I considered for my works so far:*

In this section, for the very first article I studied, titled- "The Transmission Process and the Relative effectiveness of Monetary and Fiscal Policy in a Two-Sector Neoclassical Model: Yung Chul Park (1973)". Mr. Park is one of the prominent researcher of IMF in the sector of money credit and banking; On the basis of traditional Keynesian Income-Expenditure model assuming a three sectoral economy- Household, Business firms and the Government, Mr. Park tried to figure out the main draw backs of Tobin's Dynamic Aggregate Model and derived a new transmission process of these three sectors. Here he examined the two sector new-classical model- where he mentioned two sectoral mechanism channels- investment channel and the consumption channel, emphasizing its implications for these channels of monetary policy and the effectiveness of the monetary and fiscal policy. Later on, by using a Cobb-Douglas functional form he derived the consumption and the investment channels mechanism and figure out the effect of the monetary controls and the fiscal policy effect on these two channels. He derived his model holding some assumptions as he described later- 1. The neoclassical model assumes a market for existing capital or, alternatively, a rental market for capital. This is consistent with the absence of a Keynesian investment function. In addition, this assumption allows determination of the endogenous variables of the system without introducing the flow of total demand for output. 2. He assumes that the assets are gross substitutes. That is, a rise in the rate of return on- one asset results, ceteris paribus, is an increase in the demand for that asset and a decrease, or at most no change in the demand for all other assets. 3. The asset demand functions are assumed to be homogeneous of first degree in wages. 4. Real income Y depends on the demand for money function accounts for requirements for transactions balances. If an increase in Y requires wealth owners to increase their holdings of money, it must, given W*, induce them to reduce their holdings of other assets. A priori, it is not possible to establish which asset or group of assets they would liquidate. However, since Walras' Law eliminates the equity market, it is reasonable to assume that wealth owners reduce their holdings of equities in response to an increase in income. Finally he concludes as- "introduction of a competitive market for existing capital into a macroeconomic framework suggests an alternative to the Keynesian view of the transmission process of monetary policy. Considering the controversies and interest in this issue, this alone may justify a closer study of the neoclassical model".

Another famous article by Mr. Robert A. Mundell titled- 'The Appropriate Use of Monetary and Fiscal Policy for Internal and External Stability'. Describing the internal {AD=AS, where the aggregate demands are equal to the aggregate supply of domestic out-put at the full employment} and external {where the net balance of trade- Import=Export, equal to the capital export at the fixed exchange parity} balance Robert A. Mundell mentioned a complete system where he derived a geometric interpretation of two variables- the interest rate and the

government surplus, the following diagram shows the mechanism of stability of the economy through the internal and external balances. It is actually the old version of main Mundell-Fleming-Tobin model. Let's see the diagram he used to describe his dynamic stability process:-
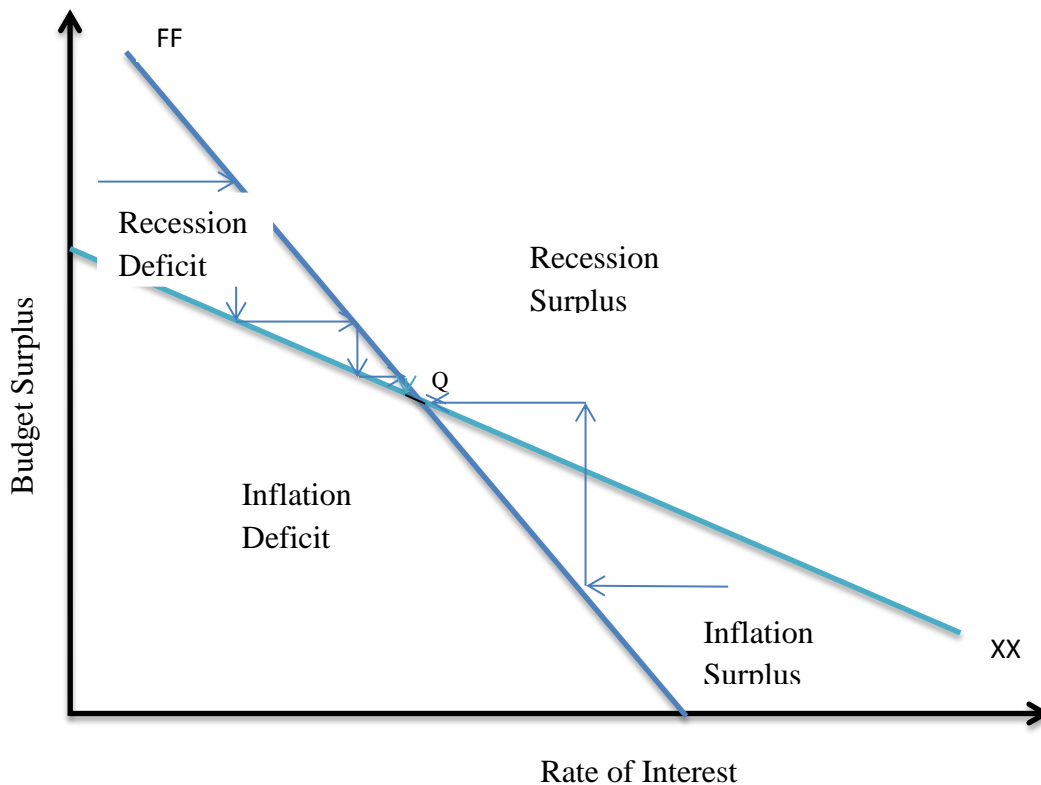
In this diagram as we can see- the vertical axis shows the Budget Surplus and the horizontal axis shows the rate of interest, the XX line is the internal balance schedule and the FF line shows the external balance schedule. He mentioned four types of effects zones named- a) inflation deficit, b) Recession Surplus, c) Inflation Surplus and d) Recession Deficit in the four different parts of this diagram. According to Mundell, Q is the stable equilibrium which attains through the interactions of internal-external balance curves- XX and FF, facing the pressure of those four effect zones.

Later on he argued that, "an initial disequilibrium in the opposite quadrant, representing inflationary pressure and external surplus". To restore equilibrium, the interest rate must be reduced. After that, he conclude at the last stage of his paper as- "It has been demonstrated that, in countries where employment and balance of payments policies are restricted to monetary and fiscal instruments, monetary policy should be reserved for attaining the desired level of the balance of payments, and fiscal policy for preserving internal stability under the conditions assumed here. The opposite system would lead to a progressively worsening unemployment and balance of payments situation".

To search the case of policy effectiveness of Bangladesh, at the very beginning, I find a famous article titled- 'Relative Effectiveness of Monetary and Fiscal Policies on Output

Growth in Bangladesh: A VAR Approach: - by Mr. Habibur Rahman. Based on the Monte-Carlo simulation Mr. Rahman tried to find out the comparative effectiveness of monetary and fiscal policy on out-put growth of Bangladesh by calculating the Vector-Auto-Regressive approach (VAR approach). He quoted and referred some recent studies and mentioned in his paper using modified version of St. Louis equation and Latif and Chowdhury (1998) for Bangladesh and finds that, "fiscal policy is more effective over monetary policy in Bangladesh". While another study claims that, "corrected estimation does not support Benjamin Friedman's claim that fiscal policy is more important than monetary policy". But Mr. Rahman calculated data sets and found the evidence that, "monetary policy has significant impact on economic activity and fiscal policy does not have any impact on real output". And at the end of this paper he reached a conclusion and wrote-"the inter-relationship between monetary and fiscal policy actions, the findings of this paper imply that there is some degree of relationship between them. Therefore, coordinated policy actions are required to extract expected outcome in terms of low inflation and high output growth from the long-run macroeconomic policy in Bangladesh".

His Co-ordinated dilemma game is described in the following box:

A Monetary-Fiscal Game: Prisoners Dilemma.

		Central Bank (CB)	
		Co-operation	Non-Cooperation
Fiscal Authority (FA)	Co-Oper action	Low Inflation; High out-put CB=50; FA= 50 Total= 100	Low Inflation; Low out-put CB=60; FA=20 Total= 80
	Non-Co-oper ration	High Inflation; High Out-Put CB= 20; FA=60 Total= 80	High Inflation; Low Out-Put CB=25; FA= 25 Total= 50

Here only one Nash Equilibrium is Non-Cooperation from the both sides which is under the section High Inflation and Low Out-Put where the total pay-off is 50 but it's not the maximum from the social welfare point of view but if both player CB (Central Bank) and FA(Fiscal Authority) are agreed to play under the co-operation then the total out-put is maximum (100) which means that if they have a good policy combination then they can achieve the maximum total out-put for the nation. This is exactly Mr. Rahman wanted to proof in the case of Bangladesh.

For the effectiveness of policy mix I find another article in this perspective titled- 'On the Effectiveness of Monetary Policy and of Fiscal Policy' by Philip Arestis and Malcolm Sawyer. This guy's proceeds by developing a model based on the IS setting of equilibrium in open

economy case and the Ricardian Equivalence in the closed economy case; they developed their arguments in the following ways-

In a combination of simple Keynesian Model where (in a closed economy)-

$$Y= C+I => a+cY+I => Y-cY = a+I => Y(1-c) = a+I => Y= (a+I)/(1-c)$$

It shows actually the IS framework in Keynesian Model. Where $Y = \dfrac{(a+I)}{(1-c)}$

And the Ricardian Equivalence in a closed economy, where-

$$G-T = S-I \quad \text{where } S = G-T+I$$

More specifically- $$S\Delta Y + \Delta SY = \Delta G$$

► The Keynesian model emphasis on the **ΔY** means the rate of change in Out-Put;

► And the Ricardian Equivalence emphasis on the **ΔS** means the rate of change in saving. The Sum of addition of these two changes should be equal to the change in Government expenditure.

By taking into account of the crowding-out effects of both the policies- Mr. Arestis and Mr. Sawyer conclude that, "the interest rate depends on the government expenditure and of course there is no any natural rate of interest that Tailor model claims". Finally on the basis of Aggregate Demand and Supply they reached to a conclusion about the effectiveness of monetary and the fiscal policy and conclude as- "When the level of aggregate demand is stable and only affected by random shocks and the rate of interest, then monetary policy may be an effective way of offsetting those shocks and the power of monetary policy needs to be compared with the power of fiscal policy". It is also argued in this paper that, "shifts in the level of aggregate demand cannot be readily offset by monetary policy. Further, fiscal policy remains a potential tool for offsetting major changes in the level of aggregate demand".

Another research paper developed by a researcher of Bangladesh Bank based on the effectiveness of policy mix, titled- 'Relative Effectiveness of Monetary and Fiscal Policies on Output Growth in Bangladesh: By Sayera Younus (2011). Here she found some surprising and interesting out comes about using the monetary or fiscal policy tools in the different stages of economic fluctuations. Tested the St. Luis Model by using the Log-Natural {logR} of Real Money as the proxy of monetary policy, {Log G} government expenditure as the proxy of fiscal policy, {logr} real interest rate and the {LogY} real GDP as the proxy of real out-put growth; runs the regression and draws the conclusion as, "monetary policy is more effective on out-put growth than the fiscal policy in Bangladesh". She got some empirical evidences for her claims as she used some recent data of Bangladesh of Government expenditure, Revenue and Deficit for fiscal policy instruments and both the real money supply and real rate of interest for the monetary policy instruments. She figures out some points as-

☐The elasticity between real m, real g, and the interest rate r, are 0.19, 0.03 and -0.01 respectively with real y.

□ Like earlier study, this study finds strong and positive relation between money and the real GDP implying that monetary policy is more effective in altering real output in Bangladesh.

□While the relationship between real GDP and government consumption expenditure is significant and positive implying that fiscal policy is also effective in altering output in Bangladesh

□However, in terms of significant level and relative magnitude it appears that monetary policy is more effective than fiscal policy.

Finally she wrote her final conclusion by criticizing some recent articles related this topic as- "The prediction of this study in terms of the relative impact of monetary and fiscal policies on real output growth is sharply contrasting to the findings of Latif and Chowdhury-1998. Their study finds that fiscal policy is more effective over monetary policy in Bangladesh. This is mainly because their study is based on the OLS technique, which suffers from the problems of endogeneity and omitted variables associated with the St. Louis equation as indicated by Mr. Stein (1980) and Ahmed and Johannes 1984".

Next I studied another paper based on policy mix of Bangladesh case titled- 'Monetary and Fiscal Impacts on Economic activities in Bangladesh:' A Note by A. R. Chowdhury (1986). On the basis of the Darrat Model-1984 which is actually a modification of the St. Louis original equation, Mr. Chowdhury ran a regression considering the data set from 1972-1983 of Bangladesh and got some empirical findings where he claims that, "fiscal policy is more effective than the monetary policy in developing countries like Bangladesh in comparison with some developed countries". His regression equation was-

$$Yt = Co + \sum_{i=0}^{j1} m_1 M_{t-1} + \sum_{i=0}^{j2} f_1 F_{t-1} \sum_{i=0}^{j3} e_1 E_{t-1} + U_t$$

Where-   *Y_t= Real out-put growth (as the proxy of GDP).*

                        M_t= is the money supply (narrow money).

                        F_t= is the government expenditure (total).

                        E_t= exporting earnings (export-import).

His findings relating these claims are on the table 1 and 2 (A.R. Choudhury-1986; page: 103 & 104) by regressing this equation in his paper where we can see the empirical findings suggest to establish his claim. He concludes as, "The regression results suggest that growth in government expenditures has a greater impact on changes in nominal income than growth in M_1 and the dynamic analysis of the model suggests that the long-run effects of an unanticipated shock to the monetary and fiscal policy variables are also different. The effects of a shock to government expenditures on nominal income last for a relatively longer period of this compared to a shock to the M_1 variable. Moreover, the magnitude of the effect is also greater in case of the fiscal variable".

Finally I include here another paper by two prominent professor titled-'Relative effectiveness of monetary and fiscal policy: A study of Bangladesh' by Ehsan Latif and Hedayet Ullah Chowdhury (1998). On the basis of Guan and Kaur-1995 form of regression (India case) and by using the econometric model and equations, Mr. Latif and Mr. Chowdhury tried to derive the relative effectiveness of monetary and the fiscal policy considering the data sets from the year 1973-74 to the year 1995-96 of Bangladesh and found some evidence and conclude as, "the fiscal policy is more effective than the monetary policy in Bangladesh.

Through the brief and critical discussion of some plenty of literatures here about the relative effectiveness of monetary and fiscal policy, it is now cleared that the policy effectiveness does not depends on a single factor of economic situation rather it entirely depends on the various factors of the economy, like- the size of the economy, government debt, market structures (money market, good market as well as labor market) exchange rates, reserve ratio, performances of domestic economy, natural resources, infrastructures and the nature of social security.

Different kind of monetary and fiscal tools are only effective on some particular situations and different kind of internal and external imbalances. From Mundell-Fleming-Tobin model this theoretical claim is quiet true but my literature review sector which gives me a bit different results from some particular case studies. My empirical study rather will be directed towards a particular case to find a clear result about the relative effectiveness of monetary and fiscal policy on an OECD country in comparison with an LCD country considering the cases of section 3 and 4 particularly.

Based on my gathered knowledge about the effectiveness of these two policies from theories it's time to start with empirical study to find out the answer of my core question of this paper. In up- coming section, I would like to start my empirical analysis with a developing economy (Bangladesh) then will proceed towards the case of a developed economy (Norway).

5. Empirical Analysis (Constructing the Models and Calculations):

5 a) Bangladesh Part (A brief description of the Economy of Bangladesh):

Bangladesh a country with 160 million of people (LCD listed country) became independent at 16th of December 1971 from Pakistan as its 2nd time of the country's history. India become free from British Colony in the year 1947 after 190 years of ruling by the British East-India Company and divides it for the first time as India and Pakistan (declared as the independent country). Bangladesh was declared as the part of Pakistan (named East Pakistan). So, land of Bangladesh was being free after 214 years of foreign rulings (190+24=214 years) and experienced two severe famines (1770 and 1969) during this period. Having Illiteracy, severe poverty with a vast population, the economic reformation was fumbling and stopping in every single sector of the economy. There was no proper banking system, no financial market, destroyed infrastructures, the first 5-8 years she had to struggle to settle. After the general election in the year 1973 the government of Bangladesh started to reform all economic institutes and took a lot of reformation steps. A part of it, the central Bank of Bangladesh (The Bangladesh Bank) has been establish primarily in year 1972 by an amendment law of Bangladesh Bank aiming some goals which are as follows:-

► maintain reasonable price stability.

►ensure a stable balance of payment position and maintained an external competitiveness of the Bangladeshi Taka (Local Currency).

►obtain sustainable economic growth through increased production and employment.

Recently, some major changes have been brought out in the objectives of monetary policy by the Bangladesh Bank (Amendment) Act, 2003 where the following goals and motives are added to be fulfilled: ''to manage the monetary and credit system of Bangladesh with a view to stabilizing domestic currency value and maintaining a competitive external per-value of the Bangladesh, take towards fostering growth and development of country's productive resources in the best national interest.'' [These parts have been added from the Bangladesh Bank amendment Law 1972 and from the recent bank reform act-2003 Publication by the Bangladesh Bank annual Report-2003].

By the bank order act 1972 Bangladesh bank is a self-independent and higher central monetary authority which has the power to regulate all the monetary controls over domestic market and regulate any types of miss-allocation or miss-management by any private monetary authority. It is also the only Central higher monetary institution which fixes the interest rates, exchange rates and the money supply. There are four nationalist banks that work as the four wings of the central bank and these are also the self-independent monetary authority to implement central bank's short, medium and long run monetary plans as well as works as the bank of mass people. These four banks provide loans to the mass people by taking the deposits from them as well as helping the financial market become stronger, dynamic and credible for the Central Bank. They just work like thousands of rural assistant wings of the central bank so that central bank can run soundly as they are the associate

institution of Bangladesh Bank. For an example- they buy security by the name Government and sell them when Government needs and as for the lot public service they receive all types of government treasury and non-treasury bills with electric, gas and water supply (public) bills for the government, more specifically for the central bank. The financial market of Bangladesh is consisted of both the Public and private institutions and they run all together in the form of more or less competitive market structure. And as like the other democratic country Bangladesh has also an independent and constitutional government (Democratic by Constitution) which has a free parliamentary and judicial system to revoke old laws, edit them and introduce new laws. Bangladesh Government is the highest central authority to serve all the citizen of this country as well as it is also the highest Fiscal authority of Bangladesh. (Source: Bangladesh Bureau of Statistics and BANBAIS).

► **A Linear regression model and its analysis (Bangladesh Part):**

From the knowledge of section 3 and 4, I want to now examine my case on an LDC (Bangladesh as a representative of LDC) country and on an OECD (Norway as a representative of OECD) country considering a linear regression model of out-put growth:

$$\Delta Y_t = \delta + \beta_1 \Delta M_t + \beta_2 \Delta G_t + \varepsilon_t \ldots\ldots\ldots\ldots(*). \quad \text{[t indicates the time]}.$$

Where, ΔY_t = the change in the out-put growth.

ΔM_t = the change in money supply as the proxy of monetary policy.

ΔG_t = the change in government expenditure as the proxy of fiscal policy.

ε_t = is the error term.

Here δ is constant co-efficient; while β_1 and β_2 are the coefficients of Money supply and government expenditure. ΔY is the depended variable as a proxy of output growth; ΔG as the explanatory variable as a proxy of Fiscal policy and another explanatory variable ΔM as a proxy of monetary policy. All the variables consider here will be taken in their real term to avoid the inflationary effects.

Using the Ordinary Least Square method (OLS Method) I can then extend the regression equations into three different regression forms following Gian and Kaur (1952, India Case), Darret Model (1984), Mr. Ehsan Latif and Mr. Choudhury (1998), Mr. Habibur Rahman (2005) and Dr. Sayera Younus (2011) as:

$$\Delta Yt = \alpha_0 + \alpha_1 \Delta Mt + \varepsilon_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \ (1)$$

$$\Delta Yt = \beta_0 + \beta_1 \Delta Gt + \varepsilon_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.. \ (2)$$

$$\Delta Yt = \delta_t + \beta_t \Delta Gt + \alpha_t \Delta Mt + \varepsilon_t \ \ldots\ldots\ldots\ldots\ldots\ldots\ldots \ (3)$$

Here, the equation 1 is constructed to see the monetary effects on out-put growth; 2 is for fiscal policy effects on out-put growth and 3 is to see the nature of combined (both monetary and fiscal) effects on out-put growth. [Variables represent the same meaning of the equation (*) here]

Now if I run the regression on the basis some recent data (39 years; from 1974-2012) of Bangladesh, I get the following result for the equation no. 1:-

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1618190791015251800000000,000	1	16181907910152518000000000,000	104,136	,000[b]
	Residual	574947993215212200000000,000	37	15539134951762493000000,000		
	Total	2193138784230463800000000,000	38			

a. Dependent Variable: RGDP
b. Predictors: (Constant), RM2

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	5749076279,074	23627015602,905		,243	,809
	RM2	1,204	,118	,859	10,205	,000

a. Dependent Variable: RGDP

With the value of R^2=0.738 and the adjusted R^2= 0.731; where the t value is 10.205 and F value is 104.136 and for 1204, RM2 shows a significant standardized coefficient which is 0.859 which means monetary policy is pretty much effective of on out-put growth of Bangladesh. Now let's see the result of equation 2 from the regression:-

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1917779862050008000000000,000	1	1917779862050008000000000,000	257,692	,000[b]
	Residual	275358922180456000000000,000	37	7442133031904216000000,000		
	Total	2193138784230464000000000,000	38			

a. Dependent Variable: RGDP
b. Predictors: (Constant), RGE

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	13560077970,322	15742175764,638		,861	,395
	RGE	17,137	1,068	,935	16,053	,000

a. Dependent Variable: RGDP

With the value of R^2=0.874 and the adjusted R^2= 0.871 it looks that fiscal policy is more effective than monetary policy in Bangladesh having the t value 16.053; F value is 257.692 and the Standardized Coefficient is 0.935 of RGE for the value of 17,137; which is highly significant. So, Fiscal policy has more impact on out-put growth than monetary policy of Bangladesh.

Now let's see their combined regression outcomes for the equation 3, where I get the following results:-

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1996139213838329200000000,000	2	998069606919164600000000,000	182,389	,000^b
	Residual	196999570392134880000000,000	36	5472210288670413000000,000		
	Total	2193138784230464000000000,000	38			

a. Dependent Variable: RGDP

b. Predictors: (Constant), RM2, RGE

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-1120230360,144	14045273450,943		-,080	,937
	RGE	12,577	1,513	,686	8,311	,000
	RM2	,438	,116	,312	3,784	,001

a. Dependent Variable: RGDP

Here we have the combined results for both the RM2 and RGE as explanatory variables. With the R^2=0.910 and the adjusted R^2= 0.905 we can see a clear difference of the effectiveness of monetary and fiscal policy on out-put growth of Bangladesh case. For 12,577; RGE holds the

standardized coefficient 0.686 and for 438; RM2 holds the standardized coefficient 0.312 which is not as significant as Fiscal Policy here. So, Fiscal policy rather is significantly more effective than the monetary policy in Bangladesh. Our Beta value for RGE (0.686) is greater than the beta value of RM2 (0.312) as well and the t statistics of RGE is greater than t statistics of RM2. But one thing is cleared that monetary and fiscal policy all together (combined) has great effect on out-put growth in Bangladesh.

We can now, let's have a look on the trend bars for all these three variables of Bangladesh considering the same data that has been used for regression analysis:

RealGEinLCU
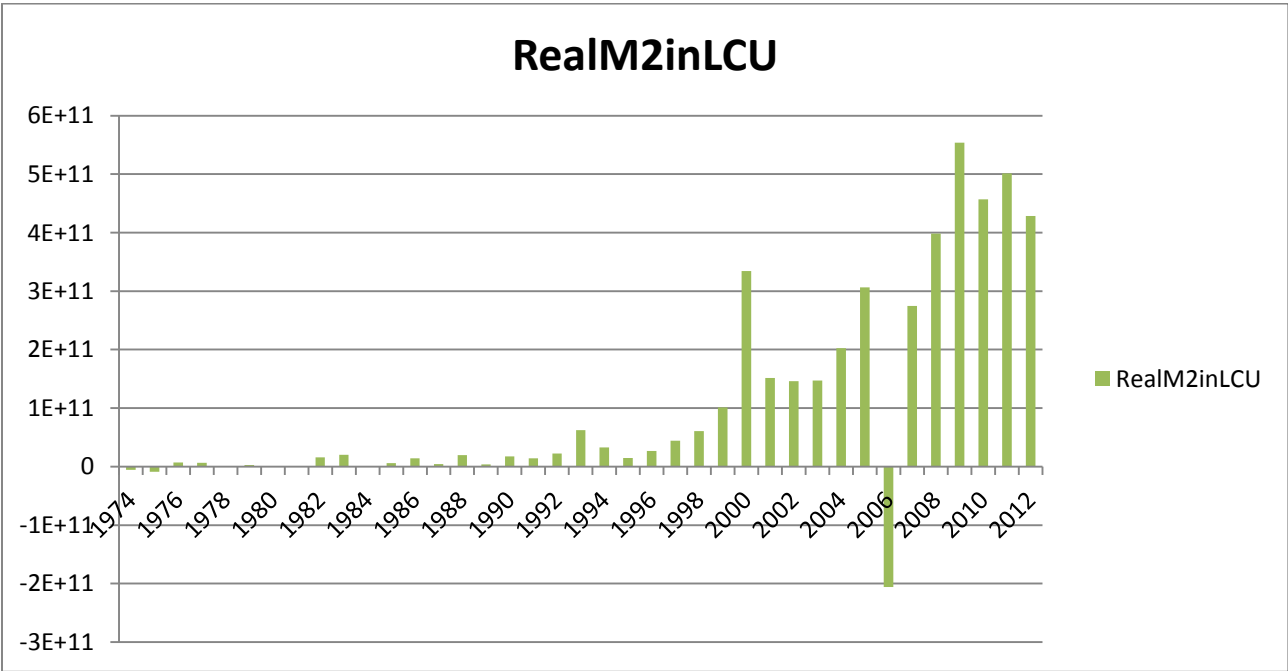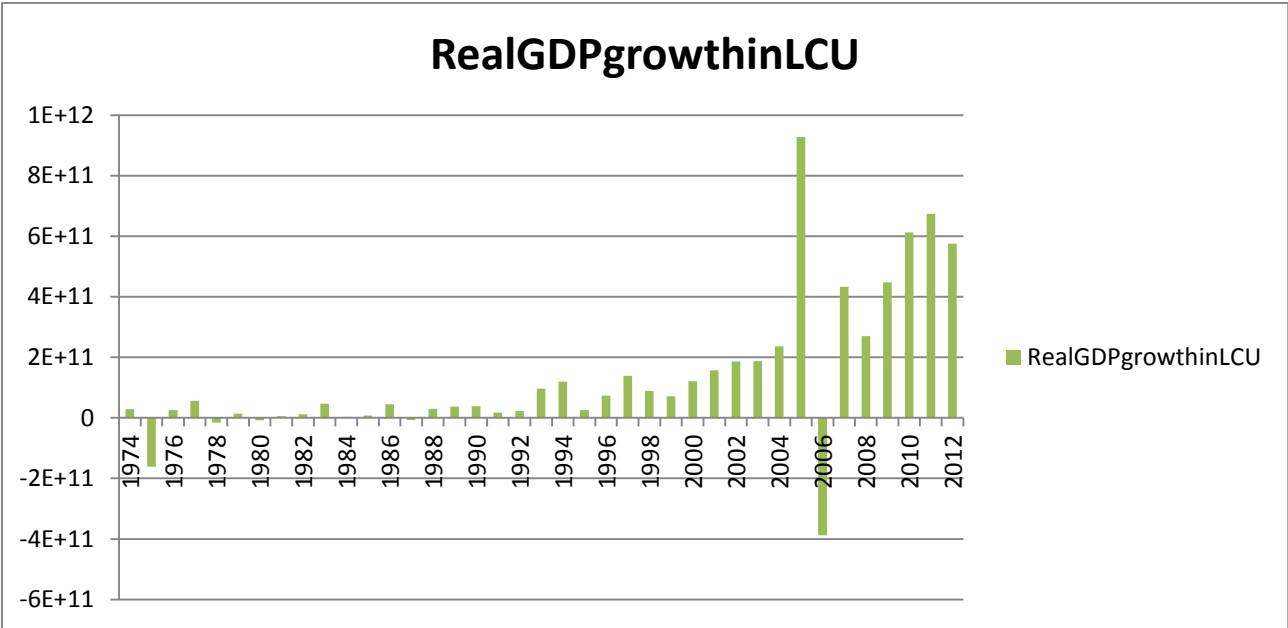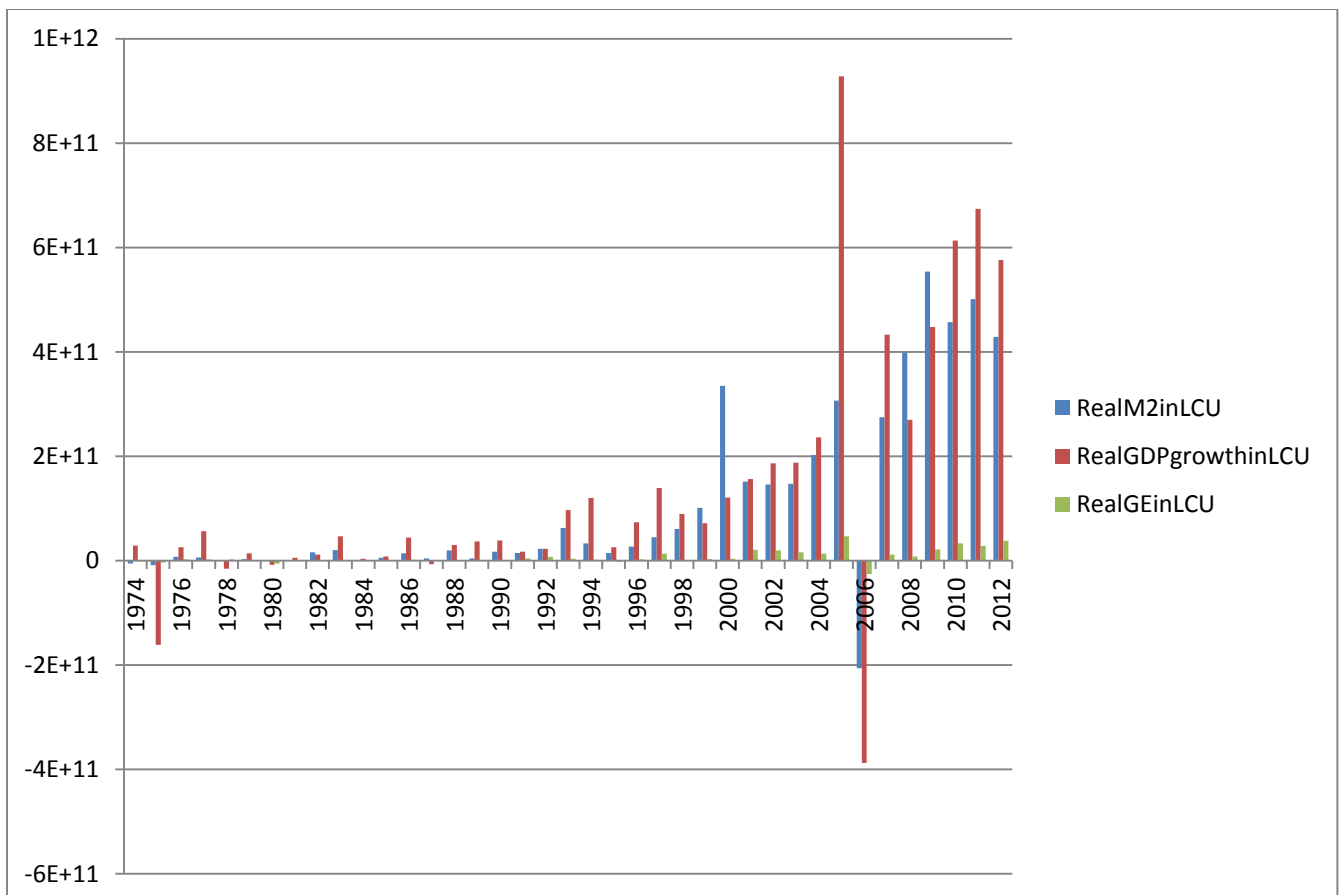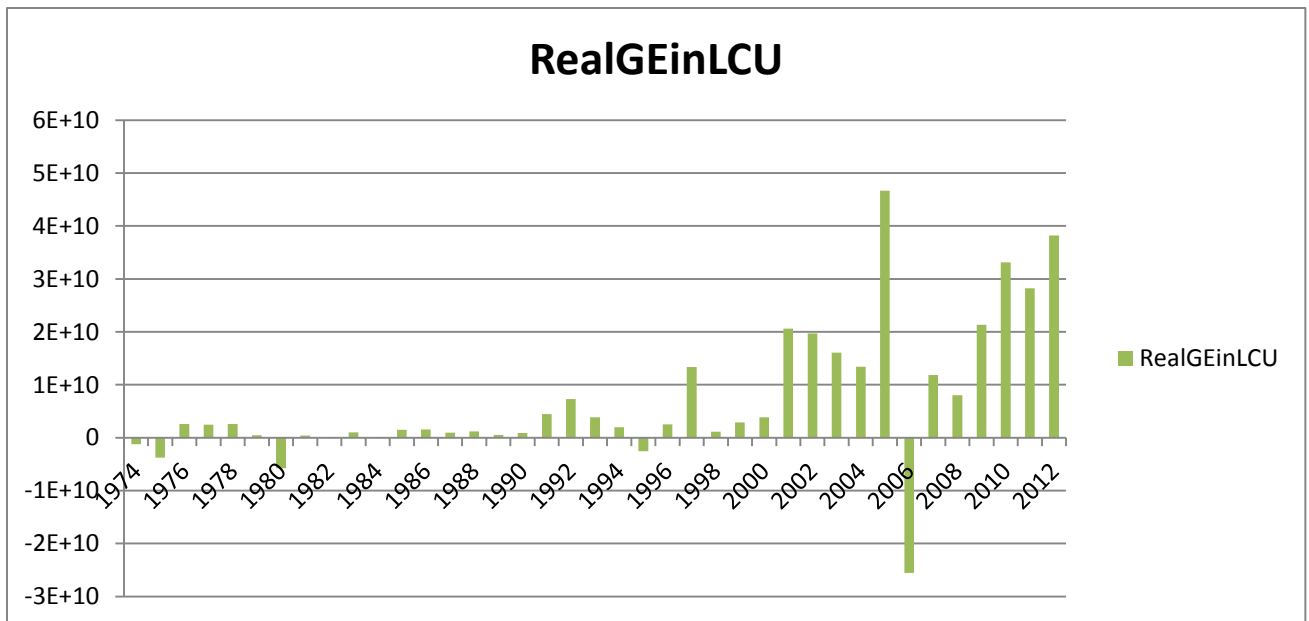
Here we can see a bit different scenario from our bar graphs. The RM2 (Real Money Supply) is quiet larger than the GE of more or less every year of last 39 years of data. Having less effectiveness of RM2 in comparison with RGE (Real Government expenditure) as well as Bangladesh does not have such huge sources of natural resources and having a lot of trade deficit it could not achieve the expected growth rate yet from both the monetary and fiscal

policy after passing 45 years from its independence. Lack of highly competitive labor and financial market as well as very low per capita income the tools of monetary policy are not so strong here. High exchange rate and bank rate cannot ensure to achieve a large amount of FDI and exports.

The country's budget deficit is recorded -73797712000 at LCU in the year 2011 which was -1.4% of total GDP and this is persistent of some recent years. Trade deficit is recorded at year 2013 is -10.8% of its total GDP. Bangladesh is borrowing a huge amount of money as loans every year to meet this deficit. The constructions of infrastructure, roads, highways, bridges, spending on power supply, etc. has a vast return in the long-run. So, spending to facilitate the FDI and domestic investment Bangladesh can gain higher growth rate by increasing Government Expenditure-GE [but at the same time policy makers should be very careful to control the inflation rate in a tolerable level]. RM2 is bigger than the GE as because the higher rate of persistent interest rate of Bangladesh which is recorded as the average from the year1990-2005 (16 years) is 10.46%. For this reason we can see the persistent high inflation rate as well which is recorded as average 7.54 from the year 2002-2013 (12 recent years).

[Here RGDP= Real GDP growth; RM2= Real Money Supply (broad money); and RGE= Real Government Expenditure]

5 b) Norway Part (A brief description of the Economy of Norway):

On the other hand the economy of Norway is a listed developed economy by UNO and a member country of OECD, with state-ownership, the economy of Norway has shown a robust growth since the twentieth century just after the few years of 2nd world war. Shipping, fish and fish products manufacturing and heavy industrial raw materials has long been a support of Norway's export sector, but much of Norway's economic growth has been fueled by an abundance of natural resources, including petroleum exploration and production and hydroelectric power. The oil-related industries have boomed up after 1970s, and the public sector is started to become the largest in the world (as most of the oil and gas fields are public owned or has a maximum shares of it) as a percentage of GDP. Norway has a very high standard of living compared with other European countries, and has a strongly integrated welfare system in the world. Norway's modern manufacturing and welfare system rely on a financial reserve produced by exploitation of natural resources, particularly the oil, gas and hydroelectricity. Fishing and shipbuilding are still two large sector of it.

The highest monetary authority of Norway- Norges Bank, serves as the central monetary control authority of Norwegian Economy since 1816 just after two years of the separation from Denmark and the union with Sweden (1814). Apart from having traditional central bank responsibilities such as financial stability and price stability, it manages the Government Pension Fund of Norway, a stabilization fund that may be the world's largest sovereign wealth fund. Norges Bank Investment Management (NBIM), which is a part on Norges bank on behalf of the ministry of finance of Norway, is the highest authority to manage the Government Pension Fund earned by the huge natural resource stock of Norway. The

Norwegian Ministry of Finance said the fund reaches NOK 4.3 trillion ($717 billion) by the end of 2014 and will be NOK 6 trillion by the end of 2019. In a parliamentary white paper in April 2011 the Norwegian Ministry of Finance also forecasts that, at the year 2030 this figure would be NOK 7.4 trillion. Literally hundred years before the formal independence of Norway in the year 1905 Norway started some reformation about the industrialization and income equality with some social reforms. During the 2nd world war Norway was occupied by Germany and joined NATO in the year 2045 but the industrialization has been started here around the year 1840.

With a large amount of pension fund and huge surplus of trade balance (Exports = $162.7 billion and import = $84.78 billion in the year of 2012) Norway is the 2nd highest per-capita income earning country and 2nd best high peace loving country of the world with a high wage rate and a high standard of living. It is recorded in the year of 2012 the 3.1% of GDP growth rate and only 3% of unemployment rate Norway has a stable and strong financial market with perfect competitions. (Source: CIA Hand Book 2012 and Wikipedia).

► **A Linear regression model and its analysis (Norway Part):**

By using the same Regression equations of Bangladesh section, I run the regression for Norway using the data from 1961 to 2012 (52 years) and get some empirical results of it. For equation 1 in section 5a, I get the following regression results here:

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	60612413433125700000000,00	1	60612413433125700000000,000	36,147	,000[b]
	Residual	72103626963064040000000,00	43	1676828534024745000000,00		
	Total	132716040396189740000000,000	44			

a. Dependent Variable: RGDP
b. Predictors: (Constant), RM2

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	7692378506,716	6816469708,231		1,128	,265
	RM2	1,217	,202	,676	6,012	,000

a. Dependent Variable: RGDP

With the value of R^2=0.457 and the adjusted R^2= 0.444, t value for RM2 is 6.012, F statistics is 36.147 and for the value of 1217, RM2 holds the standardized coefficient (beta value) is

0.676 that means that Monetary Policy is very much effective on out-put growth in Norway. For the equation number 2, I get the following results:-

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	36060097351766460000000,000	1	360600973517664600000,000	16,042	,000[b]
	Residual	96655943044423280000000,000	43	2247812628940076400000,000		
	Total	132716040396189740000000,000	44			

a. Dependent Variable: RGDP

b. Predictors: (Constant), RGE

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2730530523,435	9137864730,915		,299	,767
	RGE	4,955	1,237	,521	4,005	,000

a. Dependent Variable: RGDP

With the value of R^2=0.272 and the adjusted R^2= 0.255; the t value is 4.005, the F statistics is 16.042 and for the value of 4955, RGE holds the standardized coefficient is 0.521 which is not so high. So, Fiscal policy of Norway rather is not very important as monetary policy. For these values of RM2 and RGE from these regression results I can say that Monetary Policy is more effective than the fiscal in Norway but before reaching the final conclusion let's see the combined regression results of these two policies. For the equation 3 using the same data for Norway, I get the following results:-

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	61297995897164010000000,000	2	30648997948582007000000,000	18,024	,000[b]
	Residual	71418044499025730000000,000	42	1700429630929184000000,000		
	Total	132716040396189740000000,000	44			

a. Dependent Variable: RGDP

b. Predictors: (Constant), RM2, RGE

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	5118406498,023	7971878604,016		,642	,524
	RGE	,950	1,496	,100	,635	,529
	RM2	1,092	,284	,606	3,853	,000

a. Dependent Variable: RGDP

With the value of R^2=0.462 and the adjusted R^2= 0.436. t value for RGE is 0.635 and the t value for RM2 is 3.853 and the combined F statistics for both the variables is 18.024. For the value of 950, RGE holds the standardized coefficient 0.10 which is not significant at all and at the same time for the value of 1092, RM2 holds the standardized coefficient 0.606 which is pretty much significant. From this combined results it is now more cleared that monetary policy of Norway is more effective than the fiscal policy.

Now, let's have a look on the bars graphs for all these three variables of Norway considering the same data that has been used for regression analysis.

RealGovt.Exp.inLCU

RealMoneySupplyInLCU
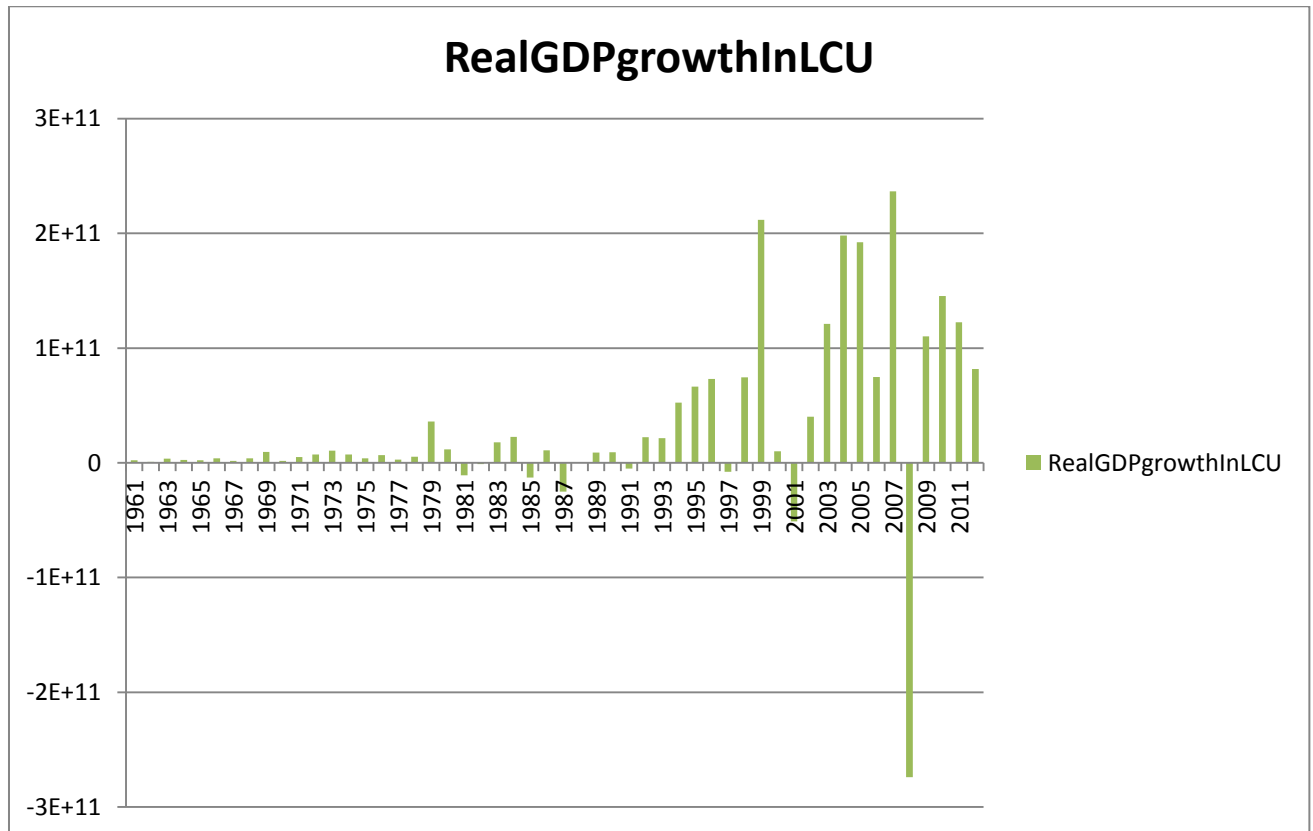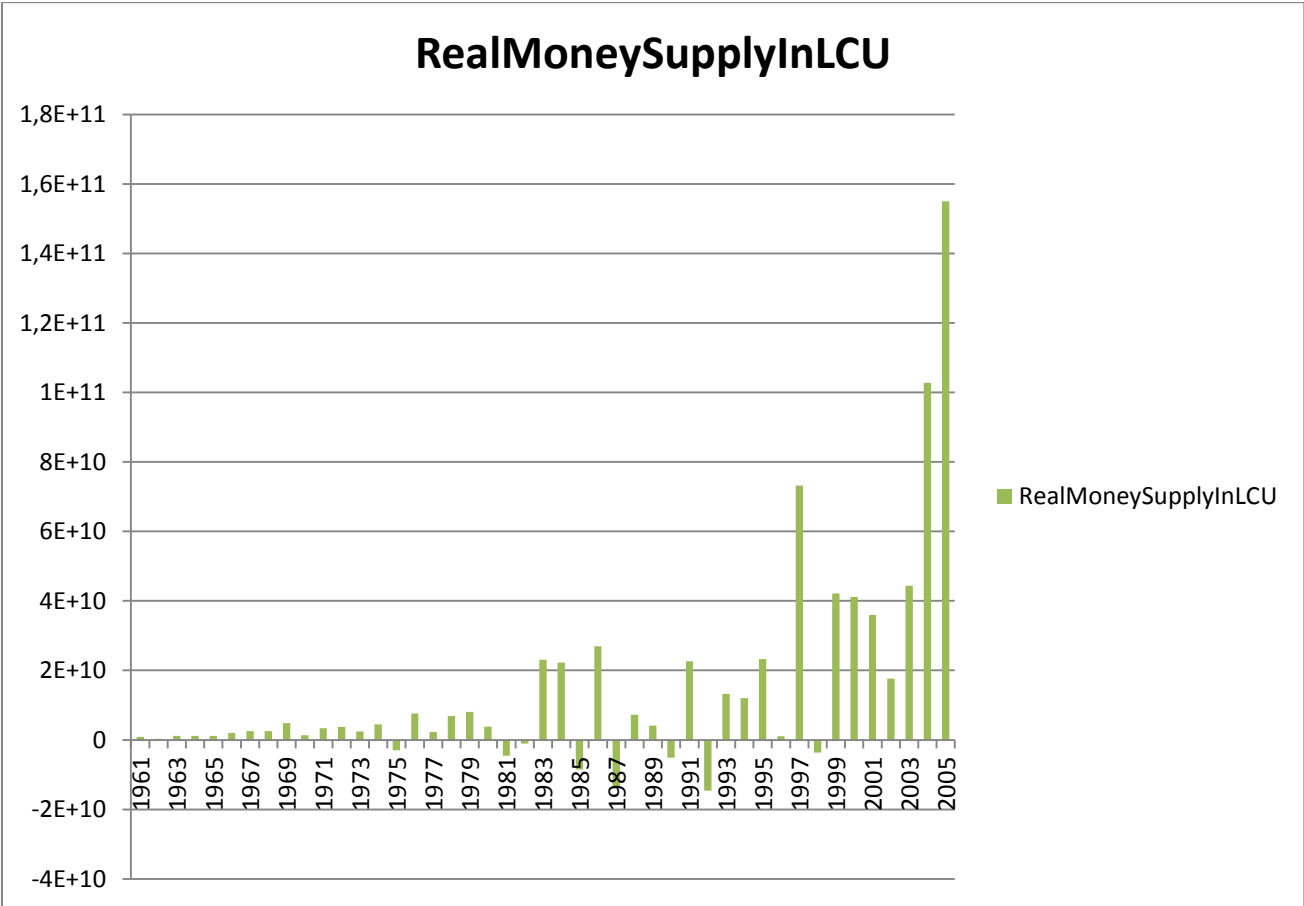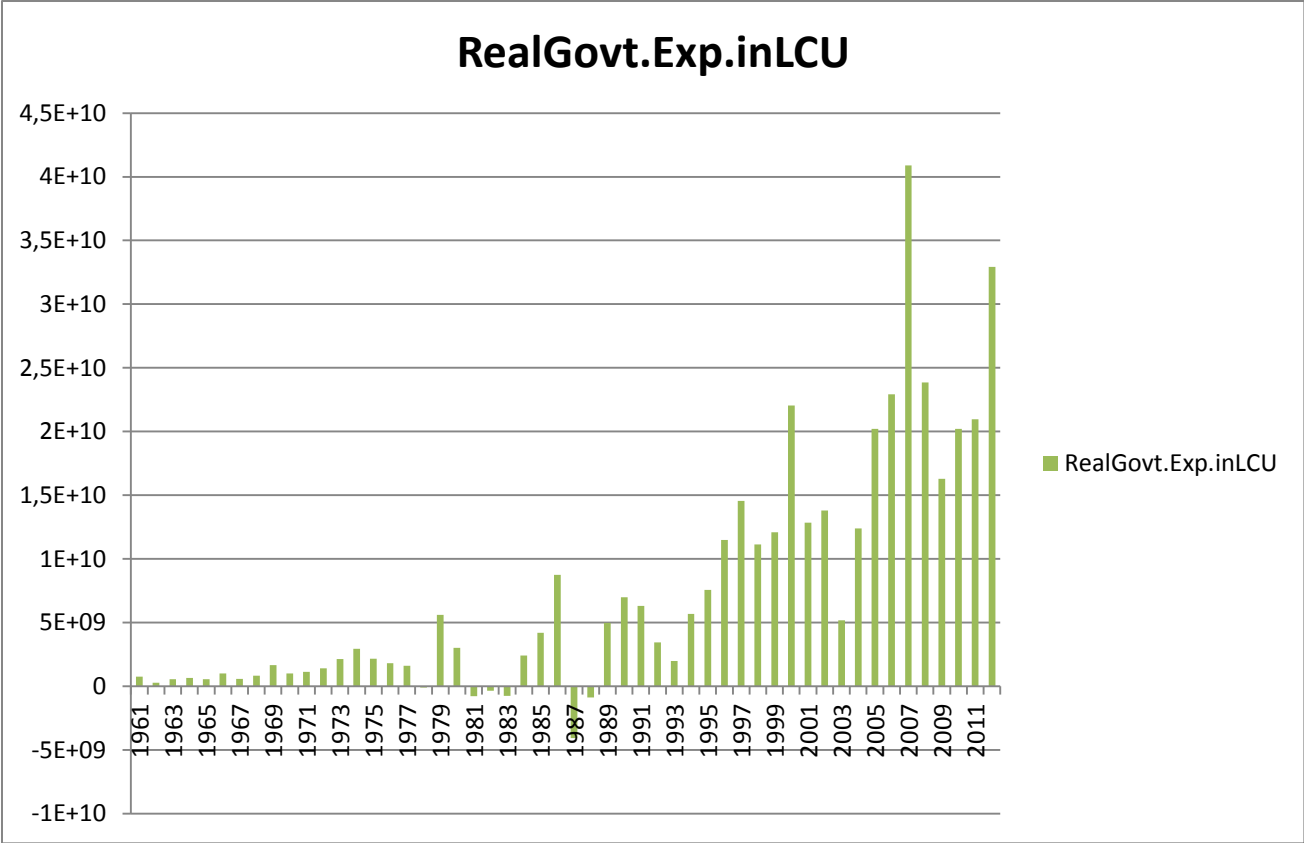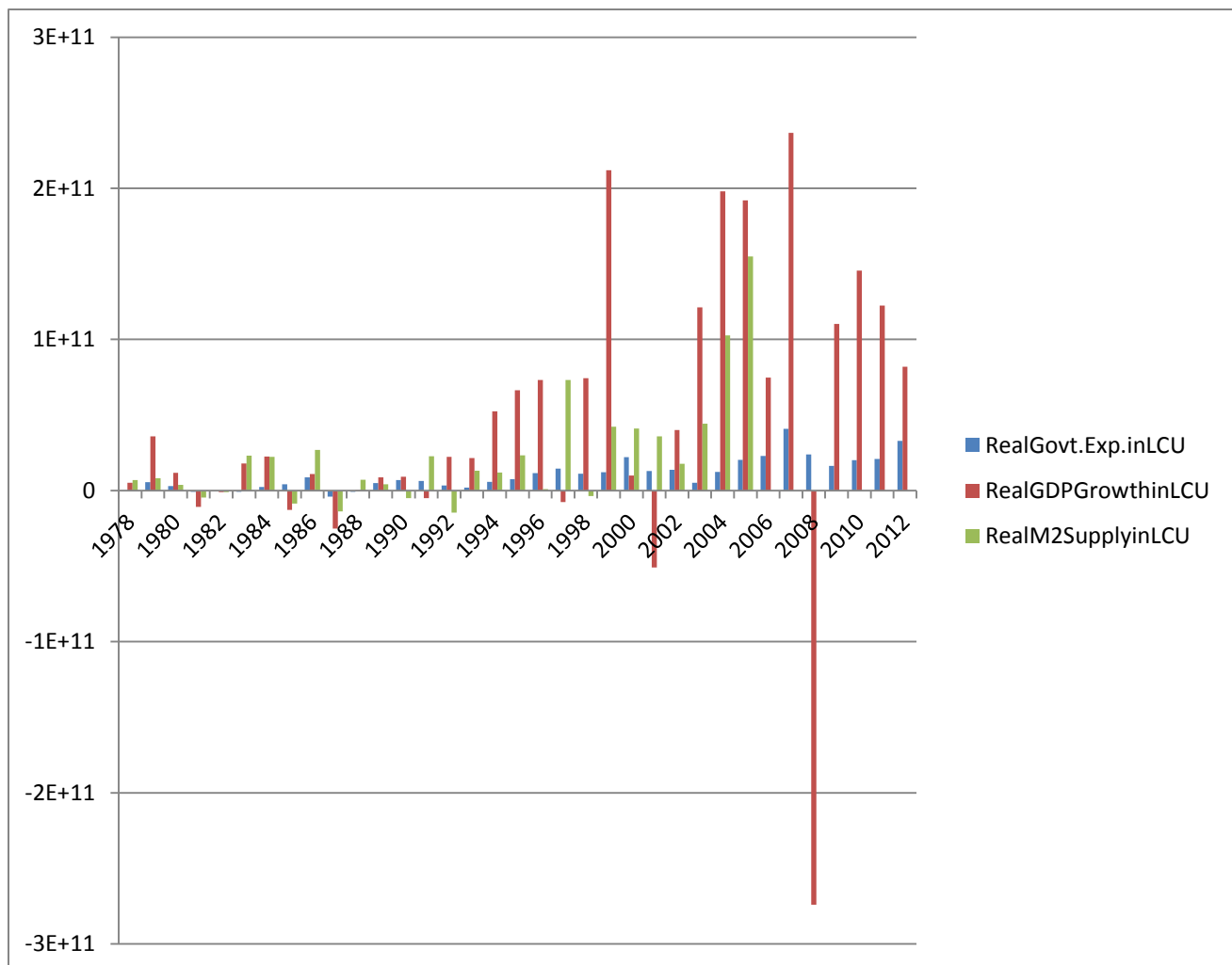
We can see here the RM2 is comparatively high than the RGE over the years of Norway. As because from the year 1982-1998 (data of this sector is not available before and after this periods) the interest rate of Norway is recorded as the average of 8.405% in real term which is pretty high. From the fixed exchange rates during the years 1960-1970 (11 years is only available which was 7.14) Norway launched the flexible exchange rate from the year 1971 (Before that it has fixed exchange rate in some years). All the empirical evidences here go for the decision, as the monetary policy is more effective than the Fiscal policy in a developed economy like Norway. Having two/three bad economic years (2008-2009) Norway has a persistent policy schedule and high rate of growth over the years. Due to the unavailability of data for RM2 after the year 2005 we can't compare with RGE but before this period money supply was stronger than the government expenditure except some bad years. In the year 1987 and in the year 1993 growth rate was negative as both the money supply and real government expenditure was negative. Some internal and external shocks can be the main reasons behind it.

[Here RGDP= Real GDP growth; RM2= Real Money Supply (broad money); and RGE= Real Government Expenditure].

6. The Economic Performance of an LCD country (Bangladesh as proxy from LCD group) and Economic Performances of an OECD country (Norway as proxy from OECD group):

Let's have a look on some recent economic indicators of both Bangladesh and Norway here-

6.a) Bangladesh part:
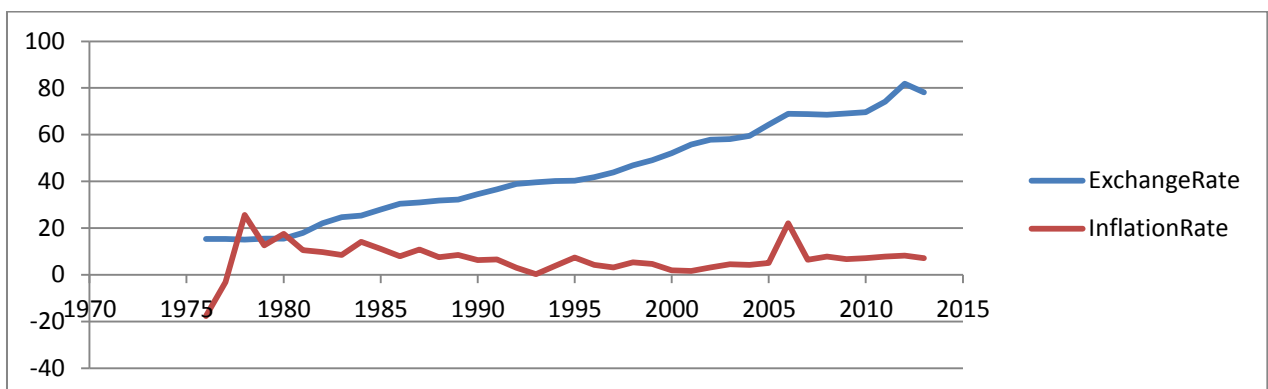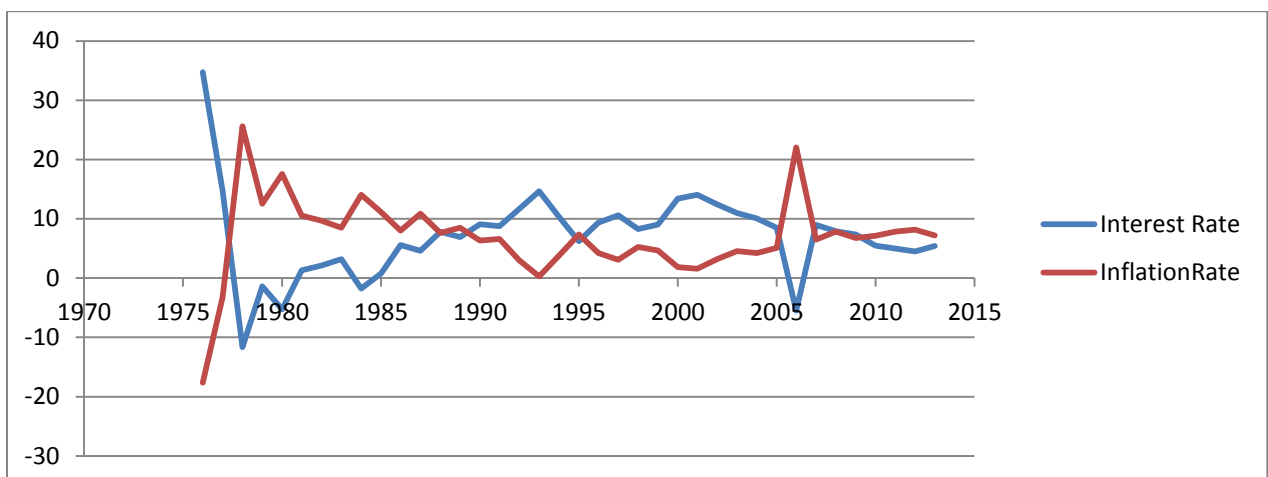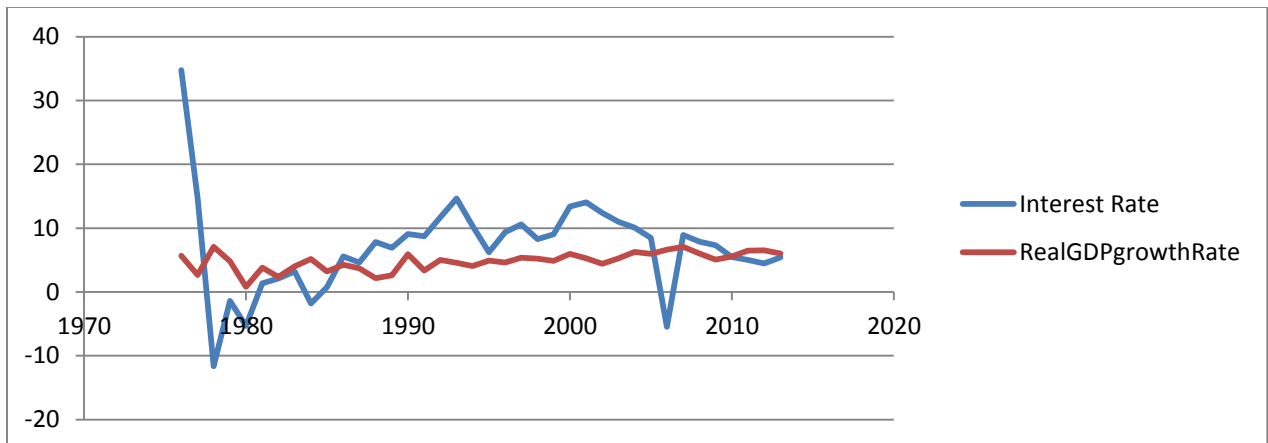
PerCapitaIncome

Data have been used here (Bangladesh Part) Source: World Bank:

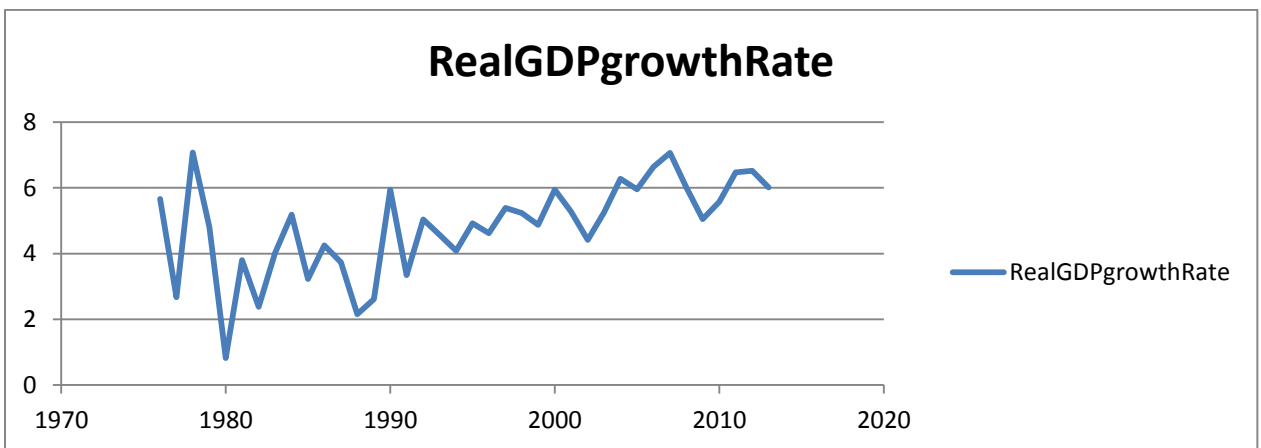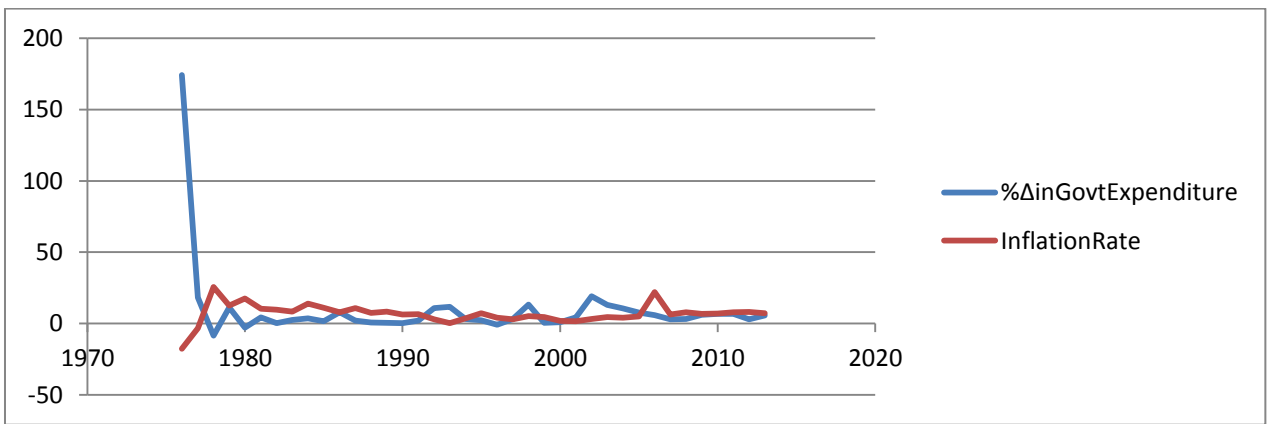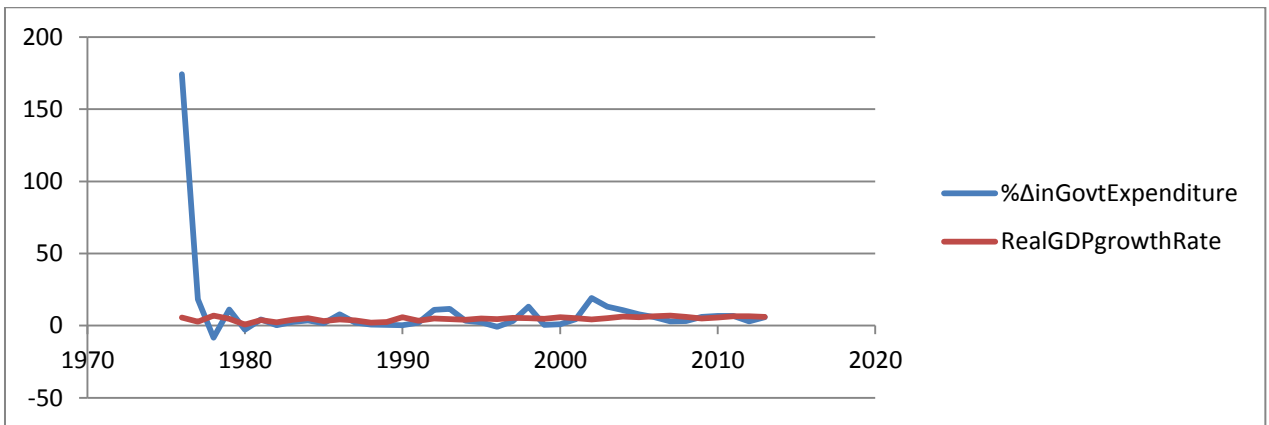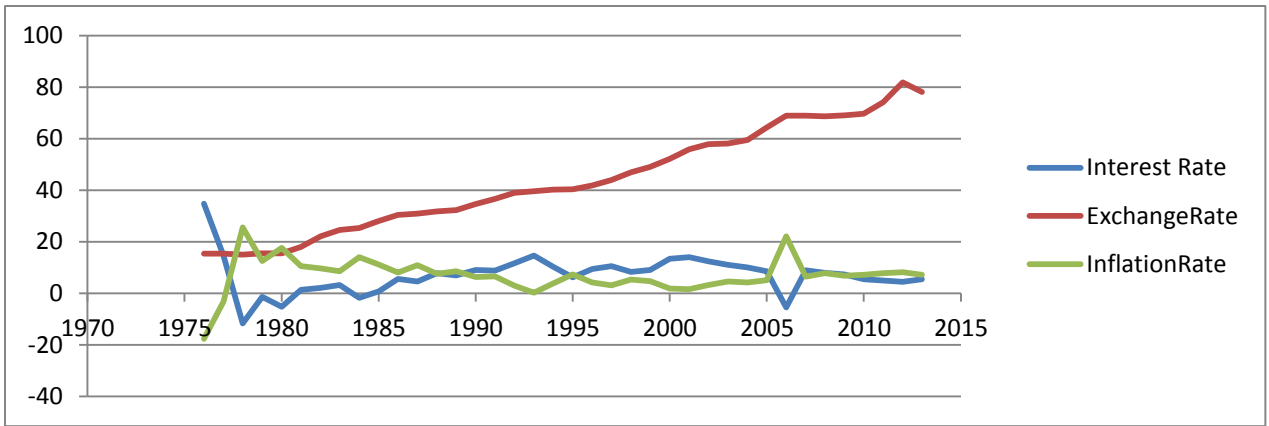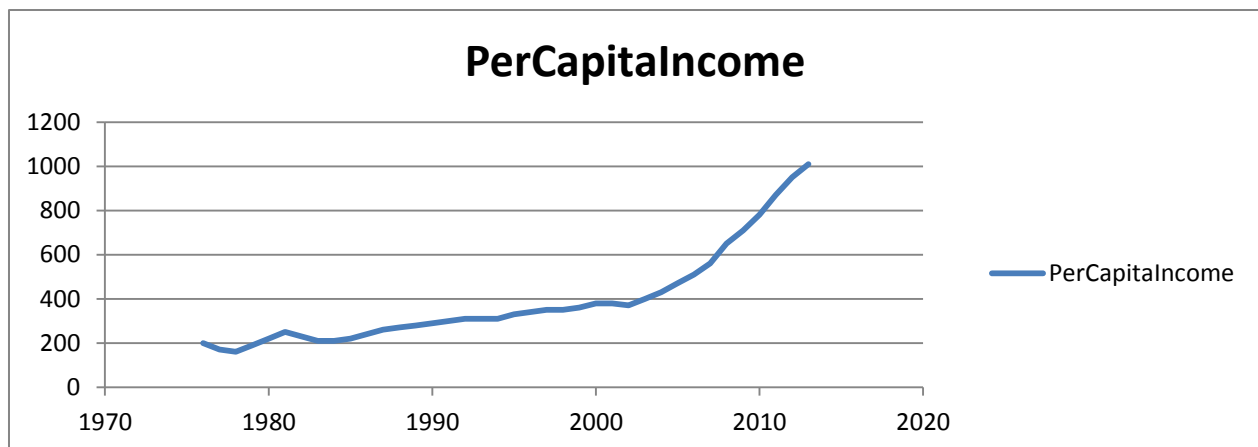| Year	%ΔinGovtExp.	Interest Rate	ExchangeRate	RealGDPgrowthRate	InflationRate	PerCapitaIncome
1976	174,1248991	34,75848614	15,3991686	5,661361201	-17,63041929	200
1977	18,35363386	14,68145348	15,3751	2,67305605	-3,210155929	170
1978	-8,416457275	-11,63749027	15,01611667	7,073837733	25,61888559	160
1979	11,28179785	-1,389875055	15,551925	4,801634601	12,56450599	190
1980	-2,858537818	-5,292612144	15,45405833	0,819141869	17,55506709	220
1981	4,411697488	1,331857471	17,98669167	3,801998047	10,52792557	250
1982	0,310292471	2,108262777	22,11788333	2,376466818	9,687499282	230
1983	2,483436471	3,21128474	24,615425	4,016088039	8,515265828	210
1984	3,724793388	-1,794773773	25,35393339	5,180672298	14,04688355	210
1985	1,646922838	0,765043244	27,99459167	3,223280625	11,14965706	220
1986	7,922520862	5,554399998	30,4069	4,248570453	8,00118233	240
1987	2,045001411	4,617553968	30,94983333	3,732263725	10,88005368	260
1988	0,783540025	7,806011931	31,7332486	2,159202312	7,600678221	270
1989	0,643910302	6,912222266	32,27	2,612351809	8,5002234	280
1990	0,416496966	9,088586573	34,56880833	5,941307142	6,335597191	290
1991	2,078142546	8,743677947	36,59618333	3,339355541	6,59623516	300
1992	10,89994098	11,67610613	38,95075833	5,039133114	2,976369773	310
1993	11,70120498	14,6709289	39,5672575	4,574375557	0,28696994	310
1994	3,331288699	10,33823248	40,21173917	4,084703528	3,771827249	310
1995	2,300658749	6,19930804	40,27831833	4,925052181	7,345332191	330
1996	-0,817303869	9,368775251	41,79416833	4,62196797	4,234503622	340
1997	3,2520991	10,58288151	43,89211583	5,387551733	3,090097166	350
1998	13,24526957	8,28846945	46,90565167	5,227531388	5,27436631	350
1999	0,568632891	9,048017969	49,0854	4,869230207	4,655730682	360
2000	0,921851593	13,39130625	52,14166667	5,944506768	1,859660872	380
2001	4,471671035	14,02557796	55,80666667	5,274014115	1,585394614	380
2002	19,1615645	12,4081383	57,888	4,415410923	3,195375137	370
2003	13,18603125	10,975443	58,15004	5,255994272	4,527629597	400
2004	10,67177221	10,08204912	59,51265833	6,270502901	4,240428764	430

| 2005	7,813355338	8,494216846	64,327475	5,955468296	5,074725008	470
2006	5,96380847	-5,482591768	68,93323333	6,629347416	22,02337695	510
2007	3,057603994	8,949588732	68,874875	7,058591814	6,471260103	560
2008	3,186548233	7,89350676	68,598275	6,013770394	7,860985795	650
2009	6,102818643	7,339197003	69,03906667	5,045125716	6,764353749	710
2010	6,825888997	5,464904106	69,64929167	5,571803243	7,144647746	780
2011	6,736268983	4,997758932	74,1524	6,464384945	7,859444956	870
2012	3,082250621	4,470431183	81,86265833	6,521451559	8,16457702	950
2013	5,791087496	5,435080516	78,103235	6,013610592	7,174954908	1010

After the war of independence at the year 1971 Bangladesh was needed to reform all the sectors of socio-economic structures without having significant earning sources and natural resource. It was just like- creating something without anything. After 44 years of its independence Bangladesh is gaining some consistent growth rate after 90s having a lot of political and social unrest. Remittances, RMG (Ready-Made Garments) export, ship buildings, faster growth of agricultural productions pushes this economy to achieve this GDP growth rate. The Foreign Direct Investment (FDI) increases at a mentionable level of last couple of decades, which reduces unemployment significantly. Remittance is helping this economy to maintain the reserve ratio of CB as well as it is balancing the foreign account (creating the capacity to pay the import expenditures and helping to pay the foreign debt).

Let's focus on some economic performance indicators recorded by the World Bank: Economic Development indicators' of Bangladesh and discuss them in light of the effectiveness of monetary and fiscal policy. We can see the high rate of increase in government expenditure and lots of devaluation of local currency in terms of dollars in the preceding data table over the years. For an example, in the year 1976 RGE was 174.12% of total GDP, which reduces in the year 2012, is only at 3%. The exchange rate is recorded as only 15.39 BDT equal to 1 US dollar, which is recorded at the year 2012, is 81.86 BDT but this rate was only 7 (1 dollar = 7 BDT) in the year 1975. So, huge amount devaluation has been under-taken during last 38 years and experienced huge inflations as well over those years. On the other hand, as the main tools of monetary policy, the interest rate, was more or less high in Bangladesh throughout last 3 decades. In the year 1976 the interest rate is recorded as around 35% and as a result of it the inflation rate was 25.62% in year of 1978 as well as some more consecutive years while the growth rate was recorded as average (from 1977-1982) is only 3.59% which is very low. Another example here we can get- in the year 2000 to 2005 the average rate of real interest rate was 11.56% and the rate of inflation in the year 2006 was 22% while the growth rate was around 5% (2000-2003) which is also very low and another example of low effectiveness of monetary policy in Bangladesh. We can see these changes in trend lines of my preceding trends curves (under this section) where in table number 2 we can see the exact opposite directions of trend lines of interest rates and rate of inflation where the growth rate has hardly any effect from these monetary tool. We can consider now another trend curve table which is number 6; under this section where the trend line shows the growth path of real government expenditure and the rate of inflation and it is clear from it that an expansionary fiscal policy hardly has any harmful effect on inflation rate
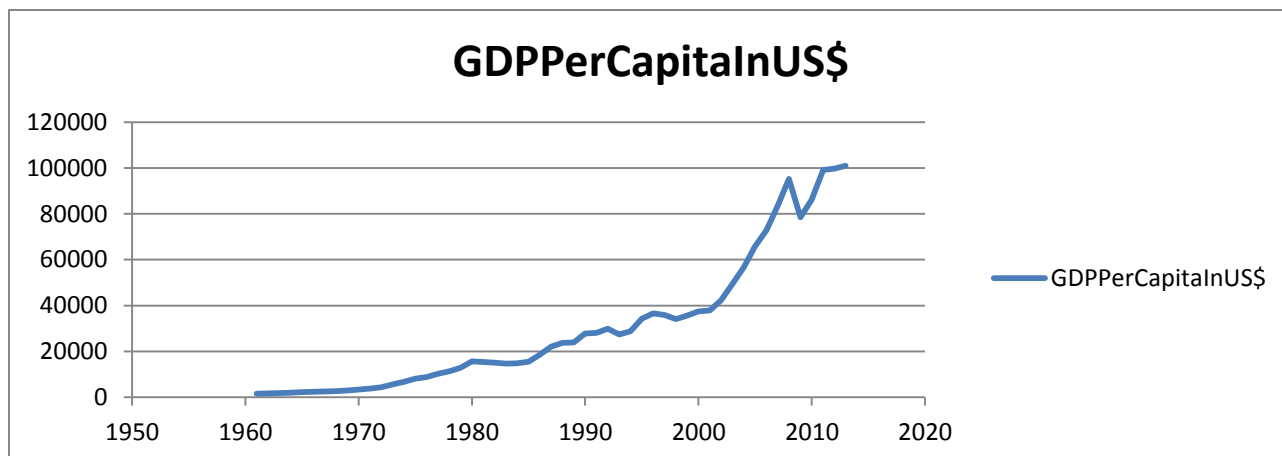
in Bangladesh rather it has a positive effect on the out-put growth (table 6 shows the relationship between these two). So, increasing interest rate (so called bank rate) and continuous devaluation cannot ensure the high growth rate in Bangladesh rather it creates a lot of harmful inflation.

6.b) Norway Part:
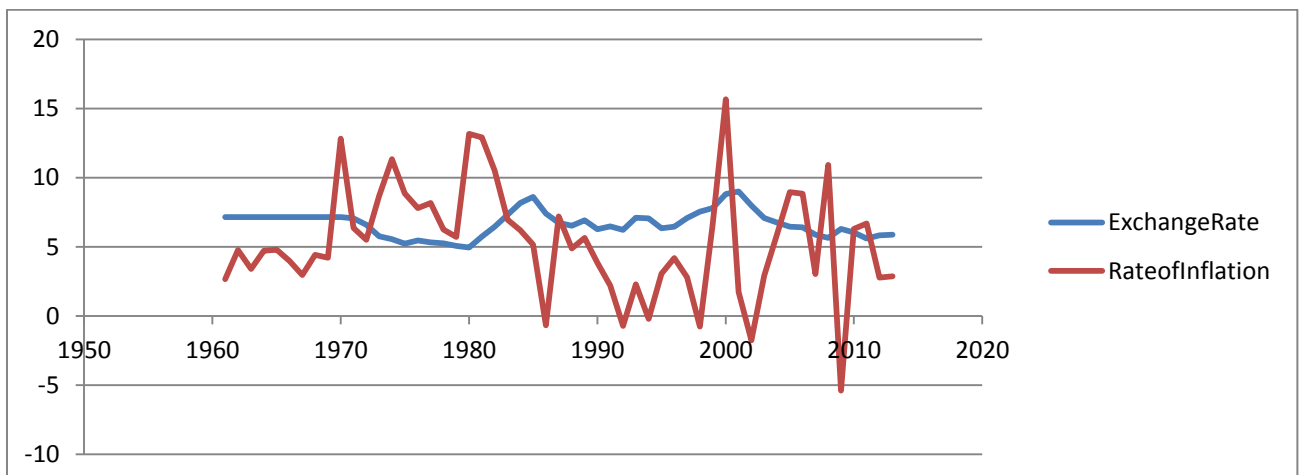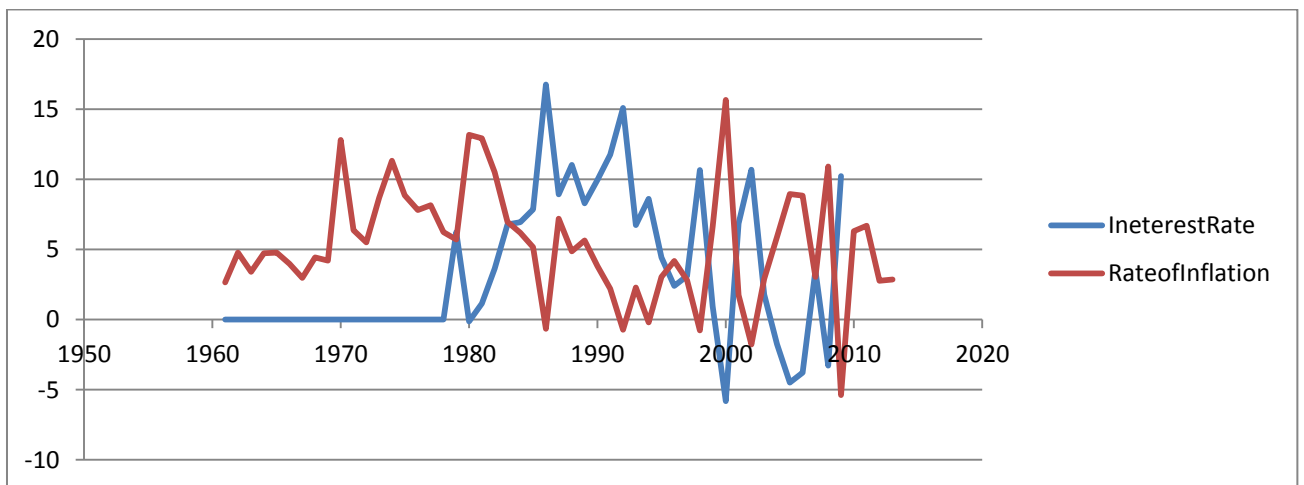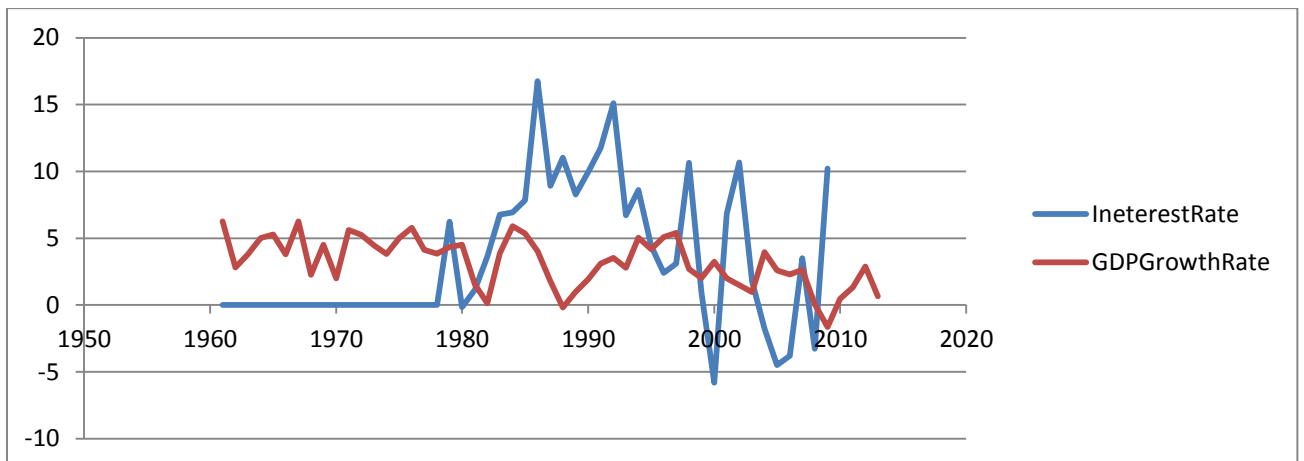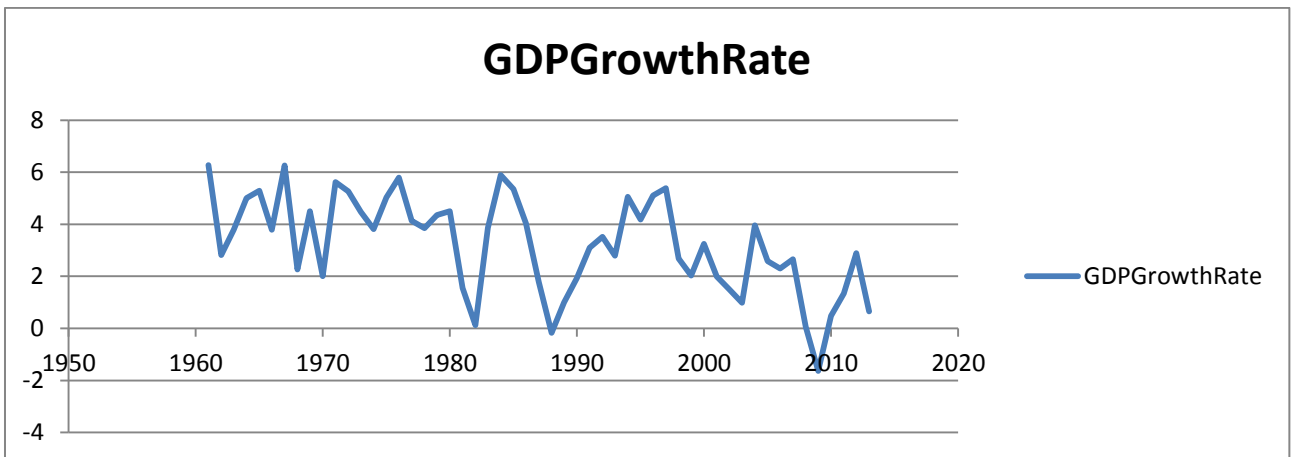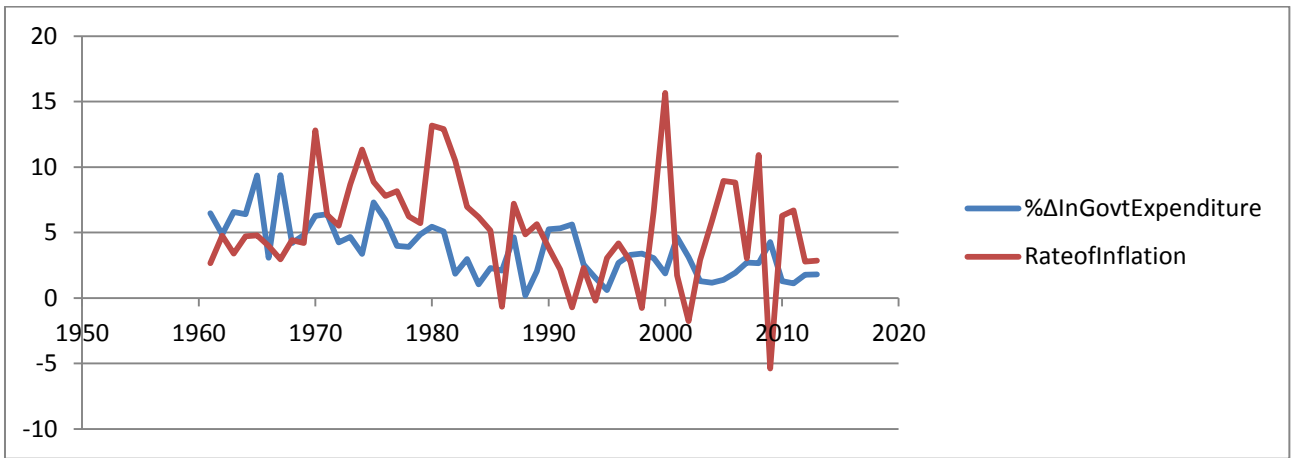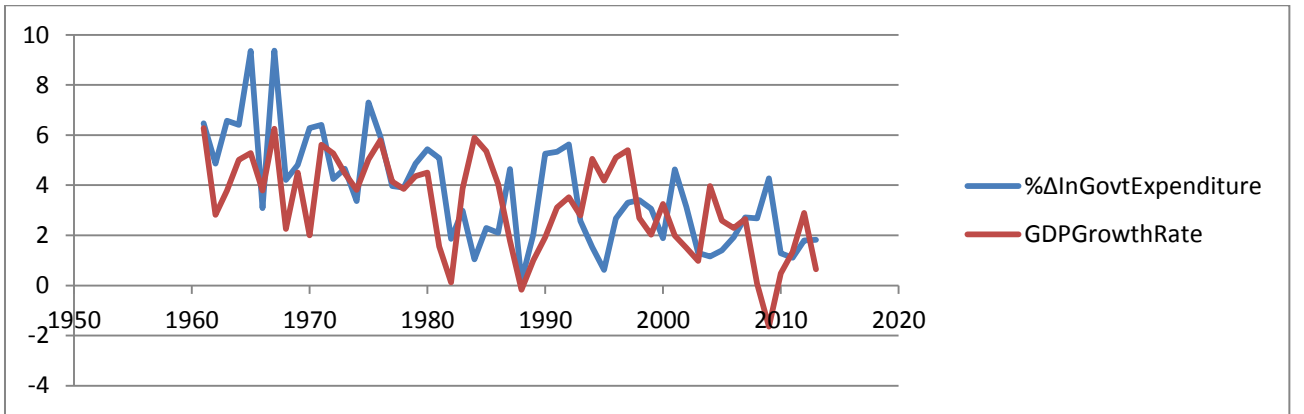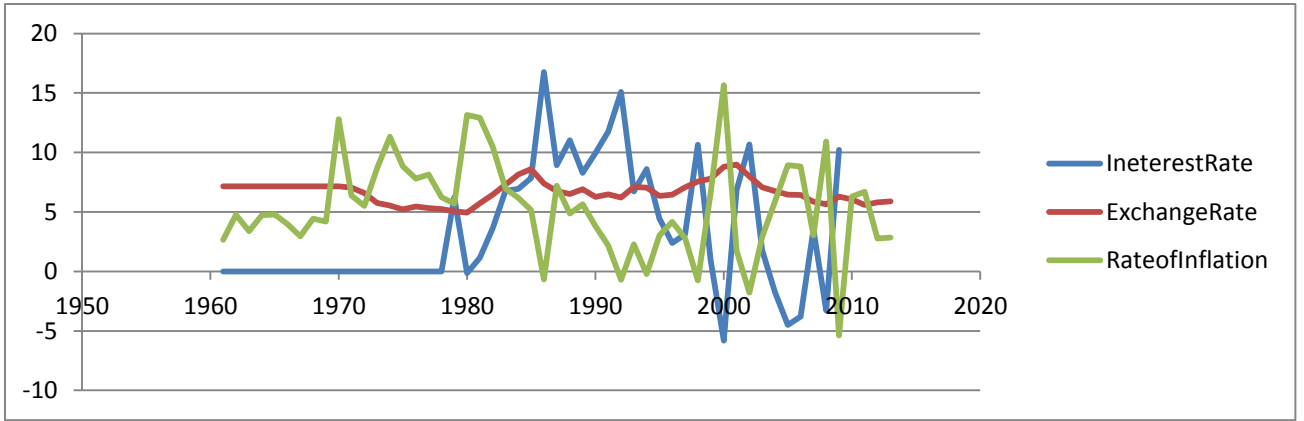
GDPPerCapitaInUS$

Data have been used here (Norway Part) Source: World Bank:

Year	%ΔInGovtExp.	IneterestRate	ExchangeRate	GDPGrowthRate	RateofInflation	GDPPerCapitaUSD
1961	6,465861037	..	7,142860006	6,27333551	2,647625239	1560,324931
1962	4,866040869	..	7,142860006	2,813945138	4,766422313	1667,24743
1963	6,570747086	..	7,142860006	3,785043084	3,392698463	1775,582655
1964	6,401936347	..	7,142860006	5,009650987	4,722132717	1937,884614
1965	9,358107509	..	7,142860006	5,285608801	4,774634855	2164,468823
1966	3,084567363	..	7,142860006	3,786513255	3,977081718	2317,194884
1967	9,369556242	..	7,142860006	6,256079006	2,964975426	2514,043772
1968	4,202539002	..	7,142860006	2,259875528	4,423876853	2662,117492
1969	4,807081182	..	7,142860006	4,504611456	4,195537622	2875,235844
1970	6,275617463	..	7,142860006	2,001343342	12,80786233	3284,438089
1971	6,408761556	..	7,055905471	5,617602796	6,360272339	3708,969835
1972	4,245294095	..	6,588249172	5,26806937	5,50857286	4378,263072
1973	4,653537454	..	5,765833332	4,478812535	8,682264724	5641,025341
1974	3,362580442	..	5,539708332	3,818579956	11,32508119	6743,810213
1975	7,296250538	..	5,226941666	5,025384901	8,859346962	8126,631705
1976	5,949439147	..	5,456516666	5,792476436	7,796640745	8836,163007
1977	3,970497549	..	5,323499999	4,139181302	8,152728986	10157,73005
1978	3,908131027	..	5,242249999	3,853969847	6,238352295	11337,52862
1979	4,858681707	6,23613166	5,064066666	4,357742492	5,707915231	12903,01256
1980	5,436622147	0,143968199	4,939224999	4,504151636	13,16291862	15594,7853
1981	5,080127796	1,141715673	5,739508332	1,547504937	12,9108788	15334,60796
1982	1,860256953	3,62723124	6,454033332	0,124994701	10,49219267	15031,3091
1983	2,982038044	6,769512579	7,296366666	3,866900718	6,959371866	14722,29013
1984	1,045304247	6,936784418	8,161458333	5,894130524	6,184228951	14757,75641
1985	2,292952704	7,851089623	8,597233333	5,353984461	5,154245911	15474,28114
1986	2,097980537	16,75109803	7,394741667	4,037629052	-0,669028424	18525,63077
1987	4,644111146	8,921888338	6,73745	1,779998612	7,196084994	22080,22208
1988	0,184776903	11,03253918	6,516983333	-0,172934526	4,870158655	23769,41839

1989	2,037599816	8,275184929	6,9045	0,997592425	5,647475989	23840,28204
1990	5,26196873	9,94658997	6,259741667	1,92681685	3,823138154	27731,80167
1991	5,335726969	11,75040524	6,4829425	3,105451717	2,183074638	28077,17764
1992	5,625641425	15,09309079	6,214500833	3,523157054	-0,715152217	29931,6322
1993	2,567601222	6,726119429	7,094129167	2,786587677	2,289861736	27404,58806
1994	1,527644309	8,606551132	7,057584167	5,051426354	-0,208598035	28713,47793
1995	0,61473063	4,424802587	6,335156667	4,186341617	3,040654456	34162,32136
1996	2,678915177	2,400480053	6,449808333	5,099772978	4,179199106	36554,67179
1997	3,305130337	3,113083542	7,073400833	5,392622834	2,799757663	35917,68944
1998	3,399486179	10,6511239	7,5450975	2,682743633	-0,769195889	34105,91848
1999	3,05512907	0,933121065	7,799171667	2,025787768	6,615151563	35645,08916
2000	1,88702158	-5,811587911	8,801841667	3,253582443	15,65116938	37472,67167
2001	4,632361705	6,839462034	8,991654167	1,990101287	1,732073459	37867,14222
2002	3,134515792	10,67267864	7,983778833	1,50204078	-1,773408455	42291,82522
2003	1,294684949	1,778991981	7,080216667	0,980879421	2,899427438	49263,51315
2004	1,162184588	-1,749793045	6,740833333	3,961030511	5,892906717	56627,65738
2005	1,395687538	-4,495818488	6,4425	2,58893558	8,937638492	65767,01961
2006	1,919132994	-3,791171868	6,413333333	2,298781923	8,825772055	72959,73009
2007	2,708746187	3,512962498	5,861666667	2,653026191	3,028009262	83556,29682
2008	2,671983554	-3,277861174	5,64	0,067619366	10,9145968	95189,86593
2009	4,277102185	10,22125962	6,288333333	-1,634933111	-5,390302777	78457,38019
2010	1,281858498		6,044166667	0,478112087	6,289197536	86096,13602
2011	1,110542617		5,604607307	1,341200873	6,685966866	99091,0945
2012	1,790740649		5,8175	2,896294367	2,772467091	99635,87453
2013	1,815163573		5,875	0,646705221	2,857970526	100898,3615

With impressive per-capita income and high social security Norway has reached on top as the welfare state in Europe. Huge natural resources (oil, gas and hydro-electricity) boost the economy up during last 4/5 decades. Stable financial market with highly competitive labor market and high rate of labor wage (per-hour) helps Norway to introduce as a developed country. Experiencing around 10% of inflation after the huge discovery and exploration of oil and gas in year 1970-1979, Norway establish an example for her use of efficiency of natural resources for the other oil enrich countries.

It achieved a smooth and steady growth rate over the decades and manages the pension money in proper ways. With very low rate of interest rate and more or less stable exchange rates Norway gains sustainable growth rate controlling the inflation and maintaining the full employment level (Current unemployment rate of Norway is only 3%). In the year 1961 the per-capita of GDP was only 1560 US Dollar which reaches around 100900 US Dollars in the year 2013 that is a huge change in comparison with some other developed countries. Having a very high wage rate, high price level with high social security, monetary policy in Norway is highly effective than the fiscal policy. The reason behind this is first of all the Economy of Norway is not so large and having a certainty of highly competitive investment market (with only normal risk), if the domestic interest rate increases a bit, it increases a huge amount of

investment for the production. On the other hand if the authority devaluates domestic currency a bit it also increases a huge amount of FDI (Foreign Direct Investment) as well as increases exports.

But fiscal policy is not so effective here as expected. The first reason behind it, as we know the economy of Norway is not so big (on the basis of population: 5.5 million at the year 2013) and the effectiveness of fiscal policy highly depends on the size of the economy (Nina Larsson Midthjell; 2011). Secondly, having a small economy (based on population) the effect of any fiscal expansion through the multiplier process is also small here. With 3% of unemployment Norway hardly has important fiscal expansionary effects on out-put growth as the economy has already been reached at the full employment level (some scholars argued that 5-7% unemployment is not an unemployment rather it's an effect of frictional, structural and cyclical effects of unemployment).

7. Brief Discussion of my findings:

From section 5a and 5b we see that Fiscal policy has stronger effect on out-put growth than the monetary policy in Bangladesh but this scenery is completely contrasting in the case of Norway as it shows that the monetary policy has stronger effect on out-put growth than the fiscal policy. Section 6a and 6b also evidences for the claims of section 5a and 5b respectively in their different point of views. On the basis of different policy instruments and economic indicators, section 6 indicates the claims of section 5 for both the Bangladesh and Norway. Taking into account of some data of economic performances and empirical analysis at section 6 we can see this truth in both cases. I've drawn some trend curves in section 6a and 6b to have a look at these evidences clearly on the basis of economic indicators and policy instruments that these two countries have been widely used. Except the data of the years 2008-2010, the economic indicators of all other years (which is only considered here) are supporting my claims in section 5 as because in those two/three years the world has experienced international crisis (The US Dollar market collapse as well as the high oil price).

I find under the section 5a, for the Bangladesh case, Fiscal policy is significantly more effective on out-put growth than the monetary policy which is clarified under the section 6a in details using some recent economic indicators and discussions. On the other hand, under the section 5b I find monetary policy is significantly more effective on out-put growth than fiscal policy in the case of a developed economy like Norway which is also clarified under the section 6b with some recent indicators of Norway. I've used here the secondary data which is collected from mainly World Bank (development index), IMF, OECD, Norges Bank and Bangladesh Bank. For Bangladesh case, I found 39 years (1974-2012) of data at LCU and for Norway I found 52 years data (1961-2012) and I calculated them in real term and considered for the final regression analysis. For both the cases (Bangladesh and Norway) I used RM2 is the real money supply as the measure of monetary policy effect; RGE is the real government expenditure as the measure of fiscal policy effect (As explanatory variables) and RGDP is the real Gross Domestic Product growth as the measure of out-put growth effect.

My findings claim, the strong effects of Fiscal policy on Bangladesh than monetary policy. Some reasons behind it I can mention here based on my literature studies. First of all the economy of Bangladesh is larger than Norway (on the basis of population) as well as it is a developing structural economy and the developing economy has a bigger expected long-run return of government expenditure, spending for the development of infrastructure, highways, educations, building of bridges and roads, open a new public bank etc. For an example, Athanasios Tagkalakis (2008) said **, "**in a recession period- fiscal policy is highly effective than the monetary policy on an economy, it also increases the long run Consumption, employment rate and the long run investment". On the other hand monetary policy has less effect on out-put growth of Bangladesh as because- high interest rates cannot ensure the expected amount of domestic investment due to the low-income level. It also cannot ensure the significant amount of FDI due to the lack of necessary social security, the lack of sufficient international re-payment capability as well as the lack of proper foreign policy. Devaluation of domestic currency also does not have a significant effect to increase the exports and reduce the imports. Due to the week effectiveness of monetary instruments, monetary policy rather less effective on out-put growth of Bangladesh.

On the other hand, the scenario is totally different in the case of a developed economy like Norway. Under the section 5b as discussed above, I find the evidence that monetary policy is more effective on out-put growth in Norway and fiscal policy is not effective at all. Various indicators may be the reason behind it. I can see from the section 6b, fiscal policy is not as effective as monetary policy; having a stable and strong financial market and banking system with a high social security of Norway, if the domestic interest rate increases a bit, it attracts a huge amount of investment from both the private and public sectors (both foreign and domestic). On the other hand if the central authority devaluates the domestic currency a bit, it also increases a huge amount of FDI and protect outflows of domestic currency in dollars as well as it helps to increase exports immensely. And of course it is also the sign of a stable and highly competitive economic structure that actually Norway has.

As we now know from the section 3.1 and 3.2 (Mundell-Fleming-Tobin model) that under fixed exchange rate, Fiscal policy is more effective than the monetary policy on out-put growth if the interest rate is fixed. Lorenzo Forni , Libero Monteforte, Luca Sessa (2009) claims the same as, "Fiscal policy has stronger effect on output growth in EURO area if the real interest rate is fixed". On the other hand monetary policy is more effective than fiscal policy on out-put growth under floating exchange rates (Section 3.2). This standard case is true for any economy (according to Mundell-Fleming-Tobin model) but in the recession period, Fiscal policy is more effective than the monetary policy whether it is fixed or floating exchange rates it does not matter (Bruck , Zwiener – 2006), these writers found and analyzed the German economy under recession and conclude as, "under SGP debt bindings, 3% of GDP, Germany faces some recessionary shocks in international trade balance and economic growth but it has some crucial long run positive effect on controlling inflation, increasing private consumption, investment and sustainability of the policies that the policy maker took, rather they suggest to use expenditure target than the deficit target by the government to overcome this situation which also evidences that in the recession period Fiscal policy is more

effective than the monetary policy". But in my case these arguments are not quite true for the case of Bangladesh, having the floating exchange rate with high Bank rate, monetary policy in not significantly effective on out-put growth in comparison with fiscal policy. And having fixed and high bank rate and a huge devaluation, Fiscal policy rather highly effective on out-put growth in Bangladesh. On the other hand in the case of Norway, having fixed bank rate with floating exchange rate monetary policy is more effective than fiscal policy on out-put growth in Norway.

8. Concluding Remarks:

The debate has been worked out over some recent years about the effectiveness of Monetary and fiscal policy on out-put growth in underdeveloped and developed countries among the scholars. From the traditional Mundell-Fleming-Tobin model as we can see in section 3 that it entirely depends on the nature and the size of the economy as well as the exchange rates and the types of growth that the economy is needed. They found the strong policy effects on the out-put growth as well as on the unstable equilibrium and their tools in different situations of the economy. So, it's totally ambiguous to say something about the effectiveness of monetary and fiscal policy without knowing the structure of the economy. Nina Larsson Midthjell (2011) said "Fiscal policy leeway is highly depends on the Government debt and the size of the economy. If the government debt is high then it has a negative impact on this multiplier process but if the size of that economy is really big then the impact is much bigger on the GDP". In another paper of Nina with Steiner Holden (2013), "They claim with their findings here and conclude that, "government expenditure reduction cannot be good alternative rather increasing taxes on out-put growth". Means, higher government expenditure still has higher expected out-put growth having stable monetary policy, even in any developed economy. In another paper Mr. Buitter (1977) said that, "a big amount of government expenditure by borrowing has nearly no effect to increase the total output in the long run for crowing-out effect as it decreases the private investment and consumption. It is all about the crowding out effects of a large amount of government expenditure through borrowing does not have so much effect on output growth if there is a lot of crowding out problem in the economy rather it can decrease the private investment and consumption in the long run". So, the relative effectiveness of monetary and fiscal policy on any economy is subjective as it depends on hundreds of economic factors.

For the developing economic point of view the degree of effectiveness of monetary and fiscal policy is bit different. On the basis of some related papers I get quiet contrasting findings and claim by different scholars. A. R. Choudhury (1986) analyzed and claimed as, "fiscal policy is more effective than the monetary policy in developing countries like Bangladesh in comparison with some developed countries". Mr. Latif and Mr. Choudhury (1998) used OLS method and found that Fiscal Policy is more effective than monetary policy on developing and underdeveloped economy like Bangladesh. Md. Habibur Rahman (2005), this author used VAR approach, found and described as, "fiscal policy is more effective over monetary policy in Bangladesh". And as a final statement he said, "if there is high crowding out effect on the

economy then fiscal policy has less effectiveness on out-put growth as expected, rather it can push up the inflation rate" (The same claim I find in Buiter-1977). He also said that, -"the inter-relationship between monetary and fiscal policy actions, the findings of this paper imply that there is some degree of relationship between these two policies. Therefore, coordinated policy actions are required to extract expected outcome in terms of low inflation and high output growth from the long-run macroeconomic policy in Bangladesh". But a renowned researcher of Bangladesh Bank- Sayera Younus (2011) used VEC approach and claimed that "Monetary Policy has stronger effect on out-put growth of Bangladesh than fiscal policy". She used logarithmic forms of all dependent and independent variables here, ran the regression and described as, "monetary policy is more effective on out-put growth than the fiscal policy in Bangladesh". She included Y as the real GDP (dependent variable), 'r' as the real interest rate, 'm' as the real money supply and 'g' as the real government expenditure as explanatory variables.

My findings for Bangladesh case is quiet similar with the claims of A R Choudhury (1986), Mr. Latif and Mr Choudhury (1998) and Mr Rahman (2005) but it is highly contrasting with Sayera Younus (2011); may be as because she included real interest rate (r) as another explanatory variable in her regression model, I'm not entirely sure about it why she took it as another explanatory variable having RM2 as the proxy of monetary policy. It is not quite clear to me that inclusion RM2 and real Interest rate (r) at the time in a same regression model creates any problem of inclusion an extra explanatory variable in that model as r is a tool of monetary policy. Inclusion of broad money supply, Government expenditure and Real Interest rate (Sayera Younus- 2011) or broad money supply, government expenditure and net export (A R Choudhury- 1986) as explanatory variables to explain their effects on real out-put growth is really a problem (problem of inclusion of an extra variable) or not, a further study may find the answer of it.

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10. Appendixes and Reference Websites:

10a Appendix A (data and variable description):

Some weakness of calculating data and constructing variables:

I had to rely on the secondary data of various sources. Initially I downloaded them and calculated into my required format. I calculate them in the following ways: the form of $\Delta Mt = \Delta M/M - \Delta P/P$ and $\Delta Gt = \Delta G/G - \Delta P/P$ where $\Delta M = M_1 - M_0/M_0$ and the same form has applied to calculate ΔG and ΔP for both the cases to get-

$$\Delta Yt = \delta_t + \beta_t \Delta Gt + \alpha_t \Delta Mt + \varepsilon_t.$$

I've followed the OLS (Ordinary Least Square) method to calculate all the preceding equations applying my data of Bangladesh and Norway.

Variables: I considered ΔY - the nominal out-put growth as the dependent variable, RM2 is the real broad money supply (total deposits; both of private and public sector) as the proxy of Monetary Policy and RGE is the total Government expenditure in real term as the proxy of the Fiscal Policy. All explanatory variables I've taken into the real term to avoid the inflationary effect.

10b Appendix B (sources of data):

a) World Bank-World Development Indicators; 2013 (http://data.worldbank.org/)

b) IMF- International Monetary Fund, (http://www.imf.org/external/data.htm)

c) OECD- Organization for Economic Co-operation and Development: StatExtracts; (http://stats.oecd.org/ and http://www.oecd-ilibrary.org/statistics)

d) Norges Bank; Statistics 2015 (http://www.norges-bank.no/en/statistics/historical-monetary-statistics/)

e) Bangladesh Bank; Monetary policy tools; 2015 (http://www.bangladesh-bank.org/econdata/) and the writer's own calculation.

g) SPSS and MS Excel software has been used for calculations and regression analysis.