J. Socio . Res. Dev. 3(11) June 2006

ESTIMATING INFLATION TAX REVENUE FOR THE DEVELOPING NATIONS: A CASE STUDY IN BANGLADESH [FY 1976-77 - FY 1998-99]

H. HUSAIN[1]

ABSTRACT

The inflation Tax is a popular way of financing government in many developing countries, because of their inability to raise enough revenue by taxation and by borrowing from public. The article attempts to calculate the real inflation Tax revenue that can be obtained for government of Bangladesh from the fiscal year 1976 -1977 to fiscal year 1998-1999. In this purpose, the real money demand function is estimated to obtain the tax base and the inflation rate is used as the tax rate. While estimating the real money Demand function, two assumptions have been applied regarding the adjustment process in the money market, instantaneous adjustment and Partial or gradual adjustment. The analysis finds that, the Inflation – Tax ranging from **.8**% to **1**% of real G.D.P.,(FY, 76-77 to FY ,98-99) for instantaneous as well as partial (gradual) adjustment hypothesis on the money market clearing condition.

Keywords: Revenue , Inflation and Developing nations

INTRODUCTION

According to Friedman, M. (1969) ,It has become common to regard inflation produced by the issue of fiat money as a tax on cash balances. The implicit case arises when the government is the sole issuer of money & all money is non – interest rate bearing. In this case, the real yield from the tax in equilibrium , when holders of cash are fully adjusted to inflation , is typically taken to be equal to the rate of price rise times the real money stock of money, which product in turn is taken as equal to the real value of the new money issued. The rate of price rise is the rate of tax. The real stock of money is the base of tax. By strict analogy with an excise tax on a commodity, the yield is the product of the two .The yield is at maximum at the rate of tax at which the elasticity of Demand for real money balances with respect to the rate of Inflation is equal to Unity. For still higher rates of tax , the tax base declines by a larger percentage when the tax rate rises, so that the product declines. This analysis is entirely correct for the stationary economy with fixed real Income , but it is misleading for the growing economy for the growing economy. For such an Economy , the issuer of money obtains a yield from two sources; a tax on existing real cash balances & the provision of the additional real cash balances that are Demanded as Income rises.

---

[1] Lecturer , Department of Economics and Social Sciences, BRAC University, 66, Mohakhali, Dhaka – 1212. Bangladesh

This analysis so far been concerned entirely with government from money issue. It has not taken into account the Welfare Loss from Inflation, the loss to the holders of money because they are induced to hold less cash than they otherwise would. This loss can be interpreted as the cost of collecting the government revenue, From this point of view , the optimum rate of monetary growth is that which produces a rate of price decline roughly equal to the real interest rate.

Poterba, J & Rotemberg , J. (1990) find that , if governments minimize the deadweight loss from raising revenue through Inflation and Tax finance, there should be a positive contemporaneous association between inflation and the level of Tax burdens. The authors examine the empirical validity of this prediction using data from Great Britain, France, Germany , Japan and the United States. Inflation & tax rates are as likely to be negatively or positively correlated , so the results cast doubt on the empirical relevance of simple models in which governments with time invariant tastes choose monetary policy to equate the marginal deadweight burdens of Inflation and Taxes.

Barro (1979), argued that, an optimizing Government would set the rate of Tax derived from currency issue in such a manner as to equalize the marginal dead- weight loss from this and other sources of revenue. However, the empirical relevance of this proposition is questionable if it is taken to imply that revenue from inflation & other taxes will be correlated over time according to Poterba,J. & Rotemberg, J. (1990)

Aschauer, A David (1997) obtained that as a result of monetary stabilization in Ukraine as inflation dropped from over 10,000 % per annum in 1993 to around 40% per annum in 1996 , concurrently, the level of Seigniorage ,or inflation tax revenue ,dropped from 13% of gross domestic product to around 1% of G.D.P. The steady state revenue maximizing rate of money growth is found to be between 69 & 89% per quarter. The loss in Inflation Tax revenue is found to be on the order of 2% of output , a relatively small fraction of the total loss in seigniorage of some 13 % of output .

Leung, K. Charles & Zhang. J (1999) demonstrated that inflation introduces an upward bias in the calculation of the tax base . Thus a capital gains tax in the presence of Inflation can have a large welfare effect even though it's contribution to the government revenue is relatively small.

Christodoulakis, N (1994)showed that when tax payments take place with a considerable time lag, inflation erodes part of their real value, and this loss may be comparable or even surpass the well-known gains from Seigniorage, his findings demonstrated that for the economy of Greece, a reduction of inflation will actually raise the total sum of tax collection and seigniorage , thus easing and not aggravating the debt – accumulation process.

Correa, I. & Teles, P. (1997), determined the second best rule for the Inflation-Tax for monetary general equilibrium models where money is dominated in rate of return. The results in the literature is somewhat inconsistent across the different monetary environments . They derive and compare the optimal Inflation – tax solutions across the different environments and find that the Friedman's policy recommendation of a zero nominal interest rate is the right one.

Garcia. F Valerino. (1997) states that, Large Budget Deficits financed by money creation are widely believed to be the primary force sustaining prolonged high Inflation Processes. His analysis introduced the basic analytical framework and discussed the dynamics of the model under a lagged adjustment in the money market. It is argued that, hyperinflation is an unstable process triggered by the Government's attempt to obtain inflation –tax in excess of the revenue maximizing seigniorage.

Bhattacharya, J. & Haslag, J. (2002) that, using a pure exchange overlapping generations model in which money is valued because of a legal restriction , a benevolent Government may make some use of Inflation – Tax in conjunction with a lump-sum tax on the young but not if lump-sum taxes on the old are available and the Welfare maximizing monetary policy may deviate from the Friedman rule (contract the money supply so as to equate the real return on money and other competing source of value in either case.

Theoretical Structure of the model:

The standard presentation of the inflation Tax model is completed with the specification of the money demand function in order to analyze the inflation Tax or government revenue from printing money, it is necessary to estimate the demand for money function for Bangladesh. The money Demand function is assumed to have the following log – linear form, Khan .S. Mohsin & Knight. Malcom (1982)

$$\text{Log } m_t^d = \alpha + \beta \log y_t + \gamma g_p^t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

The interest rate is excluded from the money demand function in view of the fact that in most developing countries, such as Bangladesh, the absence of suitable financial assets and government control over interest rates, make this variable less important as a determinant of money holdings than would be the case in advanced countries. One of the fundamental sources of money, i.e, 'Narrow Money' (M_1) [defined as the sum of currency and Demand Deposit] has been used in the estimation of the money demand function. In the above equation 'β' is the elasticity of real money balances with respect

to real income, since $\beta = \frac{d\log m_t^d}{d\log y_t}$ and 'γ' is the semielasticity of real money balances with respect to the inflation rate, since $\gamma = \frac{d\log m_t^d}{dg_{pt}} = \frac{dm_t^d}{dg_{pt}} \cdot \frac{1}{m_t^d}$

It is a priori that the 'γ' coefficient in the model is expected to be negative because, in the context of the developing countries the demand for real money balances is expected to be negatively related to the actual inflation rate. The public reduces the money holdings when the inflation rate rises in order to reduce the burden of the inflation Tax. In order to estimate the money demand function two assumptions have been made,
Gujarati.N .Damador (1994)

1. Instantaneous adjustment in the money market.
2. Partial adjustment in the money market.

If m_t^* is the desired level of real money demand, the partial adjustment mechanism is represented by : $m_t - m_{t-1} = \delta\ (m_t^{*d} - m_{t-1})$…….(2). Where 'δ' (lies between 0 to 1) the coefficient of adjustment or the speed of adjustment. $m_t - m_{t-1}$ is the actual change in the money supply and $m_t^{*d} - m_{t-1}$ is the desired change. According to equation (2) the actual change in the money supply during any period t is some fraction δ of the desired change. If δ = 1, the actual change in the money supply equals to the desired change , so actual change adjusts to the desired change instantaneously. From equation (2), substituting δ =1 ,

$$m_t - m_{t-1} = m_t^{*d} - m_{t-1}$$
$$\text{or,}\quad m_t = m_t^{*d}$$

Under instantaneous adjustment the desired level of real money demand m_t^{*d} is , therefore, the same as that shown in the equation (1). If the money market does not clearly instantaneously, it is assumed to adjust partially or gradually according to the following equation:

$$\frac{m_t}{m_{t-1}} = \left[\frac{m_t^{*d}}{m_{t-1}}\right]^{\delta} \qquad \text{…….. (3)} \quad 0 < \delta \leq 1$$

This equation states that a constant fraction of the discrepancy between the actual and desired real cash balances is eliminated within a single period. In log form this may be expressed as , $\log m_t - \log m_{t-1} = \delta\ (\log m_t^{*d} - \log m_{t-1})$ …….. (4), substituting $\log m_t^{*d}$ from equation (1) we obtain,

$$\log m_t = \alpha\beta + \beta\delta \log y_t + \delta\gamma\, g_{pt} + (1-\delta) \log m_{t-1}$$

Or, $\log m_t = a_o + a_1 \log y_t + a_2\, g_{pt} + (1-\delta) \log m_{t-1}$. Where $a_o = \alpha\beta$, $a_1 = \beta\delta$ & $a_2 = \delta\gamma$

This money demand function is relevant when the money market does clear instantaneously.

The calculation of Inflation Tax Revenue:

The inflation Tax is the product of the estimated demand for real money balances (which is the tax base) and the corresponding inflation rate (the Tax rate). Thus we obtain,
Inflation Tax $= m_t^{\wedge d} \times g_{pt}$.

$m_t^{\wedge d}$ (the estimated value) will be obtained (from the estimated money demand function) under the two assumptions of adjustment (Partial as well as instantaneous) in the money market.

METHODOLOGY:

We have used the data of Bangladesh Economy for the last twenty – five years covering the period 1974- 75 to 1998 – 99. Main sources of data are Bangladesh Bank and Bangladesh bureau of Statistics. In the estimations 'm' (The regressand) is the narrow money deflated by the consumer price index. 'y' (the regressor) is the real G.D.P. (gross domestic product). The real G.D.P. for each year is obtained as follows:

$$\text{Real G.D.P.} = \frac{\text{Nominal G.D.P.}}{\text{Consumer Price Index}} \quad [\text{Base of C.P.I } 1973 - 74]$$

The another regressor in the the money demand function is the inflation rate g_{pt} , (which is calculated on the basis of the percentage change in C.P.I. , the base of price index is 1973 – 74). The narrow money and real G.D.P. both are measured in crore taka. We have emphasized on sequential time series type of regression , we have estimated coefficients following:

a) The elasticity of real money balances (narrow money in real terms) with respect to real income.
b) The inflation semielasticity of real money balances.
c) The speed of adjustment in the money market (in case of partial adjustment hypothesis.

The income elasticity as well as the inflation semielasticity of real money balances both are estimated in case of two possible adjustment mechanism in the money market. Processing of Data for regression purpose: As our money demand function is in log – linear form we modify the data series in each variable.

First we multiply the 'm_t' (the nominal narrow money divided by the corresponding consumer price index) with 100 ,and take the logarithm (natural log with base 'e') as $\ln (m_t \times 100)$. In the similar way we multiply 'y_t' (the nominal gross domestic product divided by the corresponding price index) with 100, and take the logarithm (natural log

with base 'e') as ln($y_t \times 100$). Thirdly, the inflation rate is taken as proportion rather than as percentage. For the inflation tax revenue calculation for the economy of Bangladesh, we use the estimated money demand functions (under partial and instantaneous adjustment in the money market) of real money holdings (based on narroe money). To get the estimate of inflation Tax revenue of government for each year, we substitute the value of the independent variable (for each year) in the fitted money demand function sequentially from the period 1976-77 fiscal year to 1998-99, thus obtained the estimated value of real money holdings for each year in it's log form ($\ln m_t^{\wedge d}$). Then we take the antilogarithm of the $\ln m_t^{\wedge d}$ to obtain the estimated value of real money holdings $m_t^{\wedge d}$ for each year, this gives the estimated tax base. Finally, multiplying this estimated real money holdings with the corresponding rate of inflation (which is the tax rate) gives us the real inflation tax revenue of the government for the respective year. We have dropped the first two fiscal Years (FY -74/75 & FY – 75/76), because of unusual inflation rates.

Analysis of the estimated Regression:

Under instantaneous adjustment assumption in the money market, we obtain the following estimated money demand function:

$$\mathbf{\ln m_t^{\wedge d} = - 4.56 + 1.238 \ln y_t - .383 g_{pt}}$$

t = (- 7.171) t = (18.359) t = (-2. 583)
S.E. (.636) (.0674) (. 1484)
R square = .953 , Adjusted R square = .946 , F = 227.094
Durbin – Watson statistic = .61770 S.E. (Standard Error)

Analysis:

The high R square and the adjusted R square value, which indicates that the overall goodness of fit of the above estimated function to our set of data is very high. The value shows that around 94 % of the variation of the dependent variable is explained by the regressors . Thus the estimated function fits the data very well. The 't' statistics (to test the individual significance of the estimated coefficients) for all the estimated coefficients exceed the critical 't' at the 5% level of significance, as well as at the 2% level of significance. The estimated coefficients are individually statistically significant. The computed 'F' statistic is 227.0949 , which exceeds the critical F statistic at the 5% level of significance, as well as , at the 1% level of significance. This indicates that all the estimated coefficients are simultaneously statistically significant at the 5% & 1 % level of significance. The computed 'd' statistic is .617 , this value is lower than the Durbin – Watson lower limit at 5 % level of significance . Thus the lower value of the 'd' statistic indicates that the estimated model involves the problem of 'Auto – correlation'. The estimated 'β' coefficient is 1.23 , which is the estimated elasticity of the real money balances with respect to real income. This is the proportionate change in real money demand due to proportionate change in real income. So that the income elasticity of real cash balances is found to be 'elastic'. The 'inflation semi elasticity of demand for real

cash balances (the estimated ' γ' coefficient) is -.383. The coefficient has the predicted sign, that is negative. Since , $\frac{dlogm_t^d}{dg_{pt}} = -.383$ this indicates that , if dg_{pt} is positive [inflation rate increases] the proportionate decline in real money balances is expected at the rate of .383. The inflation semielasticity of real balances is found to be 'inelastic'.

Analysis of the estimated function based on first difference of each variable:

The previous estimated log – linear , money Demand function involves the problem of 'Auto correlation'. Thus we estimate the regression based on first difference as the following:

$\Delta \log m_t^d = \alpha + \beta \Delta \log y_t + \gamma \Delta g_{pt}$, where $\Delta \log m_t^d = \log m_t - \log m_{t-1}$
$\Delta \log y_t = \log y_t - \log y_{t-1}$ & $\Delta g_{pt} = g_{pt} - g_{p\,t-1}$

The estimated function is the following :

$\Delta \log m_t^{\wedge d} = 9.24997E-04 + 1.188\ \Delta \log y_t - .326\ \Delta g_{pt}$
t = .046 t = 3.644 t = -3.601
S.E. = .0201 S.E. = .3260 S.E. = .0906
R square = .53 , Adjusted R square = .49 , F = 12.30
Durbin Watson statistic = 1.655 , Standard Error = .06981

Analysis : The R square and the adjusted R square value are lower in case of first difference regression. The overall goodness of fit is reduced. The value (adjusted R square) shows around 49 % of the variation of the dependent variable is explained by the regressors.
The 't' statistics (to test the individual significance of the estimated coefficients)for both the estimates of elasticity coefficients exceed the critical 't' at the 5 % level as well as 1 % level of significance. Thus the elasticity coefficients are individually statistically significant at the 1 % level. The computed F statistic is 12.30, which is lower than the critical F statistic at the 5 % level as well as at the 1 % level of significance . This implies that all estimated coefficients are not simultaneously statistically significant . The computed 'd' statistic is 1.655. The value is higher that the Durbin –Watson upper limit (for our given sample size equal to 24) at the 5% as well as at the 1% level of significance. This implies that the estimated function is free from auto- correlation problem. The estimated 'β' coefficient is 1.18 (approximately, this estimated value of income elasticity of real money balances is found to be closer with the previous fitted regression where the value was 1.23. Thus after taking the first difference of each variable in the money demand function , the estimated income elasticity remains nearly unchanged. The value is elastic. The 'γ' coefficient , (which is the inflation semi-elasticity of real cash balances) is -.326. The coefficient shows it's predicted sign, and the value indicated that the inflation semielasticity of real money demand is 'inelastic'.

This estimated value is approximately closer to the estimated coefficient of regression with no difference.

Estimation of the money demand function when the money market does not clear instantaneously:

Under partial adjustment or gradual adjustment hypothesis , the following money demand function is estimated.

Log m_t = a_0 + $a_1$log y_t + (1- δ) logm_{t-1} …….. (X), δ is the coefficient of adjustment in the money market . Since the adjustment to the desired level of Demand for real balances is likely to be incomplete because of rigidity and inertia etc, the above money demand function may be treated as the short – run demand function for money. Here δ is expected to lie between 0 to 1. 'a_1' & ' a_2' are the short-run income elasticity & inflation semielasticity for real money balances respectively. We know that $a_1 = \beta\delta$, $a_2 = \gamma\delta$, if we divide the short- run demand function through by δ and drop the logm_{t-1} term , we obtain the long –run demand function [as the value of δ is assumed to be 1 (comlete adjustment) in the long –run .] Thus we find $\beta = \frac{a_1}{\delta}$ and $\gamma = \frac{a_2}{\delta}$, then β implies the long- run income elasticity of real cash balances & γ, the long –run inflation semielasticity of real cash balances. Under the gradual adjustment hypothesis we estimate the money demand function. As shown in the equation (X) and obtain the following fitted regression function:

Log $m_t^{\wedge d}$ = - 1.0359 + .4573 log y_t - .8585 g_{pt} + .566 log m_{t-1}
t = -1.47 t = 2.06 t = -2.623 t = 3.419
S.E. = .701 S.E. = .222 S.E.= .327 S.E. = .1655
R square = .96 , Adjusted R square = .95 F = 154.52
Durbin – Watson statistic = 1.869

Analysis:
The R square & the adjusted Rsquare value shows that around 95% of the variation of the dependent variable is explained by the regressors. The overall goodness of fit of the estimated regression to our set of data is quite high. The 't' statistics for the estimated 'a_1' coefficient exceeds the critical 't' at the 10 % level of significance . The 't' statistic for 'a_2' coefficient exceeds the critical 't' at the 55 level of significance as well as at the 2% level of significance. The estimated coefficient associated with the term logm_{t-1} is statistically at 1% level of significance. The computed F statistic exceeds the critical F at 5% & 1% level of significance. This indicates that all the estimated coefficients are simultaneously significant. The computed Durbin-Watson statistic is 1.869, which is larger than the Durbin- Watson upper limit (for our given sample size). Our sample size is 24, at 5% level of significance the Durbin- Watson upper limit 1.656 and 1% level of significance the upper limit is 1.407. We can conclude that the estimated function is free from the 'auto-correlation' problem.The estimated short-run income elasticity of real money balances ($a_1^{\wedge}$) is .457 , which is inelastic . The estimated short-run inflation semielasticity of real balances ($a_2^{\wedge}$) is -.8585 , which is inelastic.

The estimated money demand function under gradual adjustment assumption in the money market, where the estimated coefficient of the term log m_{t-1} is .566. Thus 1- $\delta^{\wedge}$ = .566 , $\delta^{\wedge}$ = .434 . The estimated value of the coefficient of adjustment or the speed of adjustment in the money market is .43, which implies that about 43% of the discrepancy between the desired and actual real cash balances is eliminated in a year. The long run income elasticity of demand for money $\beta^{\wedge}$ equals to $\frac{a_1^{\wedge}}{\delta^{\wedge}}$, here $\beta^{\wedge}$ is $\frac{.457}{.434}$ = 1.05 , we see that the long run income elasticity of money demand ($\beta^{\wedge}$) is larger than the corresponding short-run income elasticity ($a_1^{\wedge}$). Similarly , the long-run inflation semielasticity of real cash balances $\gamma^{\wedge}$ equals to $\frac{a_2^{\wedge}}{\delta^{\wedge}}$, here $\gamma^{\wedge}$ is $\frac{-.8585}{.434}$ = -1.97, the value is found to be greater than the corresponding short-run inflation semielasticity.

The comparison of the estimated coefficients (income elasticity $\beta^{\wedge}$ & inflation semielasticity $\gamma^{\wedge}$) of the money demand functions under instantaneous & partial adjustment hypothesis in the money market. There is a change of the estimated elasticities across the two money demand functions under different assumptions on adjustment in the money market. In case of instantaneous adjustment the income elasticity was found to be 1.23 which seems to be more elastic than the value of income elasticity found under the partial adjustment , where the value is 1.05. the inflation semielasticity is found to be more 'responsive' & ' elastic' in case of gradual adjustment assumption. Under instantaneous assumption the value was less responsive and inelastic (-.383). Thus in case of gradual adjustment , if the inflation rate increases (decreases), the proportionate decline (increase) in real money balances is expected to be at the larger rate. On the other hand, the proportionate change in real money balances due to proportionate change in real income is more responsive in case of instantaneous adjustment assumption.

Calculation of Inflation Tax revenue:

We calculate the inflation Tax revenue from the fiscal year 1976-77 to fiscal year 1998-99. The revenue is calculated on the basis of the fitted money demand function under instantaneous adjustment hypothesis. We obtained the following estimated function:

$\mathbf{lnm_t^{\wedge d} = -4.56 + 1.23\ lny_t - .382g_{pt}}$ based on this fitted regression function, the following table shows the inflation tax revenue (measured in crore taka) series.

[The data source and the secondary data have been presented at the end in Appendix]

Fiscal Year	Estimated Real Money Balances	Inflation Rate (Proportion)	Real inflation Tax (estimated real money	Real G.D.P. (Nominal G.D.P. divided by	Real Inflation Tax as a percent of real G.D.P.

	(in crore Taka) $M_t^{\wedge d}$		balances × inflation rate	C.P.I.) Real G.D.P. is measured in crore taka.	
1976-77	558.38	.0242	13.40	70.24	.2
1977-78	720.61	.1262	90.94	84.12	1.08
1978-79	834.35	.0824	68.75	93.42	.73
1979-80	745.07	.1846	137.53	87.99	1.56
1980-81	840.27	.1254	105.37	95.21	1.1
1981-82	793.99	.1629	129.34	92.01	1.4
1982-83	803.24	.0993	79.76	91.07	.87
1983-84	902.54	.0967	87.27	99.98	.87
1984-85	982.08	.1094	107.44	107.46	1.0
1985-86	996.72	.0995	99.17	108.42	.91
1986-87	1031.92	.1035	106.80	111.64	.95
1987-88	1027.48	.1142	117.33	111.62	1.05
1988-89	1098.09	.08	87.84	116.54	.75
1989-90	1158.37	.0930	107.72	122.17	.88
1990-91	1237.92	.0894	110.67	128.76	.85
1991-92	1301.96	.0509	66.26	132.53	.5
1992-93	1416.69	.0133	18.84	140.25	.13
1993-94	1558.90	.0183	28.52	151.75	.2
1994-95	1641.54	.0520	85.36	159.87	.53
1995-96	1626.97	.0407	66.21	158.17	.4
1996-97	1810.80	.0389	70.44	172.36	.4
1997-98	1943.00	.0413	80.24	182.59	.4
1998-99	2093.26	.0740	154.90	195.88	.7

On average the estimated inflation Tax revenue (in real terms) is about .8 percent of the real G.D.P., where the inflation Tax is calculated on the basis of the estimated money demand function based on the instantaneous adjustment assumption in the money market.

Calculation of the inflation Tax revenue on the basis of the estimated money demand function , based on the gradual adjustment hypothesis in the money market:

The following estimated demand function for real money stock, where the actual money stock adjusts to the desired money stock by gradual adjustment. The revenue is calculated on the basis of actual real money stock (or actual real money balances). The estimated money demand function is the following:

$$\mathbf{lnm_t^{\wedge d} = -1.035 + .4573ln\ y_t - .8585g_{pt} + .566\ lnm_{t-1}}$$

<u>The following Table shows the inflation Tax revenue series from fiscal year 1976-77 to 1998-99.</u>

Fiscal - Year	Estimated Real Money Balances (In crore Taka) $m_t^{\wedge d}$	Inflation Rate (Proportion) g_{pt}	Real Inflation Tax revenue .($g_{pt} \times m_t^{\wedge d}$) (Revenue in crore Taka)	Real G.D.P. [Nominal G.D.P. divided by C.P.I.] (Real G.D.P. is measured in crore Taka	Real Inflation tax as a % of real G.D.P..
1976-77	749.48	.0242	18.14	70.24	.25
1977-78	801.35	.1262	101.13	84.12	1.2
1978-79	963.99	.0824	79.43	93.42	.85
1979-80	858.41	.1846	158.46	87.99	1.8
1980-81	902.89	.1254	113.22	95.21	1.2
1981-82	928.72	.1629	151.28	92.01	1.6
1982-83	897.05	.0993	89.70	91.07	.98
1983-84	1003.08	.0967	96.99	99.98	.97
1984-85	1146.43	.1094	125.42	107.46	1.2
1985-86	1186.67	.0995	118.07	108.42	1.1
1986-87	1208.25	.1035	125.05	111.64	1.1
1987-88	1132.64	.1142	129.34	111.62	1.2
1988-89	1149.25	.08	91.94	116.54	.78
1989-90	1175.55	.0930	109.32	122.17	.89
1990-91	1271.44	.0894	113.66	128.76	.88
1991-92	1379.82	.0509	70.23	132.53	.52
1992-93	1535.12	.0133	20.42	140.25	.14
1993-94	1678.57	.0183	30.72	151.75	.2
1994-95	1865.68	.0520	97.17	159.87	.6
1995-96	1983.50	.0407	80.72	158.17	.51
1996-97	2108.01	.0389	82.00	172.36	.47
1997-98	2147.42	.0413	88.68	182.59	.48
1998-99	2175.84	.0740	161.01	195.88	.82

On average the estimated inflation Tax (in real terms) is about .85 percent of the real G.D.P. , where the inflation tax is calculated on the basis of the estimated money demand function, based on the gradual (partial) adjustment assumption in the money market.

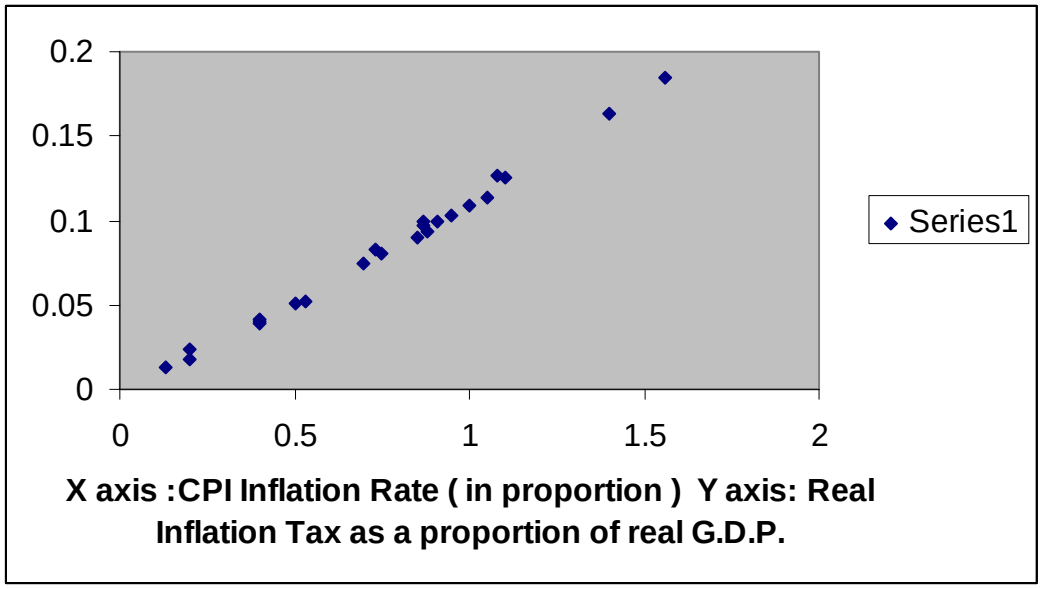
The inflation Tax 'Laffer curve':

We plot the real inflation Tax (as a proportion of real G.D.P.) in the vertical axis and the C.P.I. inflation Rate (in Proportion) in the horizontal Axis. The scatter shows the positive relation between the inflation rate and the Tax revenue. The "LAFFER' curve is obtained for the inflation Tax, calculated on the basis of the estimated real money

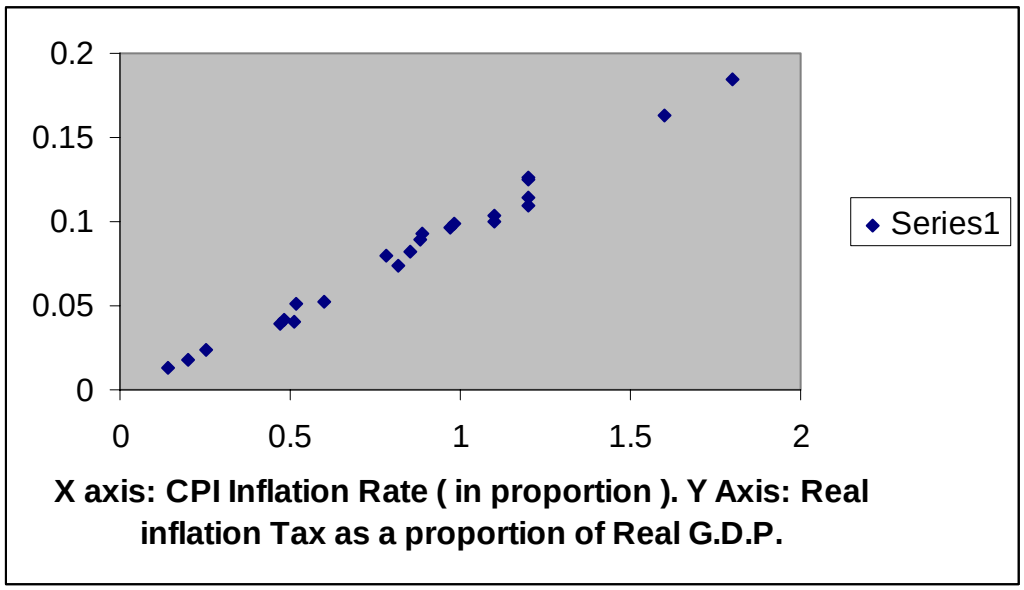
balances based on the fitted money demand function, under the 'Instantaneous' & 'Gradual' adjustment assumption in the money market.

Inflation- Tax LAFFER Curve for Bangladesh. (Fiscal Year 1976/77 - 1998/99)

Laffer curve is obtained from the estimated money Demand function, based on the instantaneous adjustment assumption in the money market.
Number of observation = 23



Inflation- Tax LAFFER Curve for Bangladesh. (Fiscal Year 1976/77 - 1998/99)
Laffer curve is obtained from the estimated money demand function, based on the gradual adjustment assumption in the money market.
Number of observation = 23



CONCLUSION:

The results of our empirical work on Inflation Tax imply that the government of Bangladesh can obtain the real inflation tax revenue around .85 percent of real G.D.P. The actual relationship between inflation rate (the tax rate) and the inflation Tax revenue (from fiscal year 1976/77 to fiscal year 1998/99) is reflected by the ' LAFFER CURVE'. Which shows that there is a moderate positive relation between inflation rate and the inflation tax. There is a cluster of observations from 7% to 12 % range of inflation rate (for instantaneous as well as for partial adjustment hypothesis on the money market clearing condition.) , with the inflation Tax ranging from .8% to 1% of real G.D.P.

The Inflation Tax revenue obtained in other countries of the world:

Inflation Tax, Average 1983-1988 (percent)		
Country	$\frac{Tax}{G.D.P.}$	Peak Year Tax G.D.P. ratio
Argentina	3.7	5.2
Bolivia	3.5	7.2
Brazil	3.5	4.3
Chile	0.9	1.1
Colombia	1.9	2.0
Mexico	2.6	3.5
Peru	4.7	4.5

Source: M. Selowsky , The World Bank 1989.

Thus the hyperinflating countries government obtain a significant amount of the revenue from money creation. However, indefinite increases in the rates of inflation in these countries are not successful in securing more inflation tax revenues, once inflation exceeds the 'revenue maximizing' level.

For the less developed countries like Bangladesh, inflation tax revenue cannot be considered a major source of revenue for government. If the government wants to have the revenue from money creation, the rate of inflation will start to accelerate, real money balances will be falling (which is evident from our estimated money demand function, where the inflation semielasticity of real cash balances was negative) and the economy will eventually experience hyperinflation which is not desirable for the economy of Bangladesh, because the generation of inflation Tax revenue of the inflationary finance of the budget Deficit is possible only if it generates a fairly high rate of inflation. In our estimated money Demand function the income elasticity of real money balances was found to be positive which reflects the fact that real income growth increases real money

holdings , hence the inflation tax base increases if real income rises and in this situation the government can raise revenue from issuing money.

In a more general sense , the main factors that prevent a government from adopting policies that may lead to accelerating inflation are the well documented adverse effects that a sustained period of high and variable inflation has on the other variables such as economic growth, income distribution, the balances of payments etc. It is obviously necessary to take account of the adverse effects as well as positive effects of revenues from monetary expansion.

REFERENCES

1. Garcia. F. Valerino, (1997), " The Demand for base money & the sustainability of the public debt", *Policy Research Working Paper*, The world Bank, June 1997.

2.Gujarati. N . Damador (1994),"Basic Econometrics" 3rd edition, The Mcgraw Hill.

3. Poterba, James & Rotemberg , Julio (1990), " Inflation and Taxation with Optimizing Governments". *Journal of money, credit and Banking,* vol.22, Issue 1, pages 1 – 18.

..

4. Aschauer, A. David (1997), " The Seigniorage loss from monetary stabilization in Ukrain". *Economics working paper Archive* at WUSTL.

5. Leung. K . Charles & Zhang, J. (1999), " Capital gains and Inflation Taxes in a life – cycle Model", *Working papers from Bank of Canada*.

6. Christodoulakis, M. Nicos, (1994), " Tax collection Lags and the Revenue Maximizing Inflation: The case of Greece". *Empirical Economics*, vol – 19, Issue 3, pages 329 -42.

7. Correia, Isabel and Teles, pedro, (1999), "The optimal inflation Tax". *Review of Economic dynamics*, vol : 2, Issue : 2, pages 325 – 346.

8. Khan, S. Mohsin and Knight, malcom ,(1982), " Unanticipated monetary Growth and inflationary finance". *Journal of Money, credit & Banking*, vol: 14 Issue:2

.

9 Friedman, Milton.(1969) "Government Revenue from Inflation" , *Journal of Political Economy.*

10. Bhattacharya, J. & Haslag, J, (2002), " On the use of the Inflation – Tax when non-distortionary taxes are available", *Economics working paper, Iowa state University*.

11. Barro. R.J. (1979), " On the determination of the Public Debt", *Journal of Political Economy*, Vol: 87, Pages :940-971.

Data Source:

1. Bangladesh Bank Annual Report Volume : 1973 – 80

Separate volumes, from 1980-81 to 1998-99.

2. " Economic Trends" (Bulletin), publication from Statistical Department of Bangladesh Bank. Volume : 1977, 1988, 1994, 1996. 1999.
3. Bangladesh Statistical Year Book, Publication from Bangladesh Bureau of Statistics.
4. Volume : 1977 -83 , 1986,1989,1991, 1993, 1998, 1999.