Estimation of Inflation Tax Capacity in Iran

[1]Ahmad Jafari Samimi, [2]Moslemeh Ebrahimi and [1]Khosro Azizi

[1]Department of Economics,Firoozkooh Branch, Islamic Azad University, Firoozkooh, Iran
[2]Islamic Azad University Firoozkooh, Iran

Abstract: Laffer curve shows a nonlinear relationship between inflation rate and inflation tax. The present t research estimates Laffer curve function for the period 1974-2007 in Iran using the regression models under different scenarios for measuring the inflation tax. We have also used money demand function proposed by Aegnor and Montiel (1996). Our findings Indicate the justification of a bell shaped Laffer curve for the period under consideration in Iran. The inflation rate consistent with the maximum capacity of inflation tax is in the range of 22-78 percent in Iran.

Key words: Inflation tax $\cdot$ Laffer curve $\cdot$ Money demand function $\cdot$ Iran

INTRODUCTION

Almost all countries use seigniorage to finance some part of their expenditure needs. Excessive reliance on seigniorage results in higher inflation and sometimes in hyperinflation. Inflation is a tax. As a tax, it has the benefit of being source of revenue for the government and it has the cost of altering the behavior of private sector. The existence of benefit as well as cost side makes it imperative for policymakers to optimize when they set the size of seigniorage.Government's monopoly over the issue of high-powered money potentially provides a significant resource to finance its deficits among other financing means. It is often argued that, especially in the presence of high public deficits, the relationship between inflation and deficit becomes more apparent mainly due to government's intention for monetization.

It is also argued that revenue raising from money creation is a particularly attractive method in developing countries, where the traditional tax base is narrow and the tax system is generally inefficient and where the domestic financial markets are relatively thin to absorb the government debt.

This paper examines the relationship between seigniorage and inflation in Iran by using a money demand function constructed based on Aegnor and Montiel (1998) framework. In developed economies governments tend to resort little to seigniorage and rely, instead, on taxation and bond sales, or borrowing, to finance their expenditures Fischer, (1982). But it may be more important for countries which do not rely on bonds, such as Iran, or which have less well-developed tax systems. Since money creation is associated with inflation, it is important to examine the relationship between inflation and seigniorage whether a Laffer curve relationship exists between seigniorage revenue and the rate of inflation; and certainly the rate of inflation that maximizes seigniorage revenue; we estimates a function based on Jafari-samimi`s framework in Iran.

Hypothesis: The Laffer curve is a theoretical representation of the relationship between government revenue raised by taxation and all possible rates of taxation. as taxes increase from low levels, tax revenue collected by the government also increases. It also shows that tax rates increasing after a certain point (T*) would cause people not to work as hard or not at all, thereby reducing tax revenue. Eventually, if tax rates reached 100% (the far right of the curve), then all people would choose not to work because everything they earned would go to the government. The budget identity of the public sector states that the excess of public sector outlays over revenues is financed by printing money, Some economists regarded seigniorage as a form of inflation tax. As inflation rate increases to π* The response of velocity to the inflation rate also gives rise to what terms the 'seigniorage Laffer curve', in which the revenue from the inflation tax (seigniorage) first rises then falls with increases in the rate of inflation.
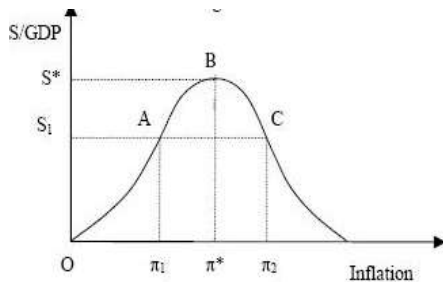

Corresponding Author: Ahmad Jafari Samimi, Department of Economics,Firoozkooh Branch,
Islamic Azad University, Firoozkooh, Iran.

Diagram 1: Laffer curve

(S\GDP: S is Seigniorage as a Percentage on GDP): The structure of the paper is as follows: Section two analyses a basic model of seigniorage and inflation. section three presents the micro foundation of the demand function for money constructed based on the Agenor-Montiel framework and also derives the seigniorage -maximizing inflation rate and focuses on the empirical analyses of seigniorage and inflation, using Jafari Samimi`s Laffer curve framework and section four concludes.

Empirical Model: We outline a simple framework used for the determination of the revenue-maximizing rate of inflation in the light of Rodriguez (1994) and Agénor and Montiel (1996). Consider a standard money demand equation of the form:

$$MV = pQ \qquad (1)$$

where M is the stock of money, V is velocity, p is price level and Q is GDP. Issuing money allows the government to finance its current expenditure amounting to(dM / dt)/ p. As a ratio of GDP, this revenue is equivalent to:

$$I_{tax} = \left[-(1/v)(dv/dt) + (\pi + g)P \right]/v \qquad (2)$$

where $tax\ I$ is inflation revenue, π is the rate of inflation and g is the rate of GDP growth.

Assuming constant velocity consistent with the actual level of inflation and assuming that actual and expected inflation are identical equation (2) gives the steady-state level of inflation tax as:

$$I_{tax} = (\pi + g)/v \qquad (3)$$
$$Lnv = v \circ + b\pi \qquad (4)$$

If velocity is of the standard form:
where b is the inflation semi-elasticity of demand for money, we derive the optimal level of inflation tax by substituting (4) in (3) and maximizing with respect to π.

We have:

$$d(I_{tax})/d\pi = e^{(-v_0 - b\pi)}$$
$$I_{tax} = (\pi + g)e^{(-v_0 - b\pi)} \Rightarrow -b(\pi + g)e^{(-v_0 - b\pi)} = 0 \qquad (5)$$

Solving for π in equation (5) yields the maximum level of inflation, which is equal to:

$$\pi^* = (1/b) - g \qquad (6)$$

Estimation of the Semi-elasticity of the Demand for Money: Agénor and Montiel (1996) propose an equation of money demand expressed as a partial adjustment mechanism of actual to desired

Levels of the Stock of Money: We estimate a model including inflation and the lagged values of real money(Rodriguez (1994) estimates a similar model for Argentina

$$m_t = \alpha_0 + \Sigma b_i \pi_{t-i} + \Sigma C_i m_{t-j} + e_t \qquad (7)$$

where $t\ m$ is the log of the stock of money, $\pi +$ is the expected rate of inflation for period $t + k$, which proxies for the opportunity cost of holding money, e is a disturbance term. The expected level of inflation is proxy by the actual inflation rate measured as the change in CPI.

This analysis will use the model developed by Ahmad Jafari-Samimi in "Relationship Between Inflation and Seigniorage in Developing Countries: An Estimation of the Laffer Curve." The Jafari-Samimi model uses a quadratic equation to demonstrate the relationship between inflation and seigniorage. This equation is:

$$R = \alpha_0 + \alpha_1 \pi + \alpha_2 \pi^2 \qquad (8)$$

R is seigniorage as a percentage on GDP(excluding oil), π is the inflation rate and the ái's are the coefficients, where, in order to produce the usual shape of the Laffer curve, á0 should be positive, á1 should be positive and á2 should be negative. For the purposes of statistical modeling, this equation will be used, except that an error term U should be added to the equation.

The Empirical Evidence: The data are annual over the 1973 - 2007.series were collected from the statistical books of the Central Bank of Iran.

As we know exactly because the war erupted, we have a crash in macro economy variable,it consist of two parts, when revolution erupted and during war so we use

Table 1:

t stat	Coefficient	Variable
8.165301	5.990082	C
0.842210	3.17	M(-1)
0.526509	3.14	M(-2)
-1.252323	-6.47	M(-3)
-1.871	-0.020383	Inflation
3.94	2.7	D57
2.97	1.21	D59
$\overline{R^2} = 0.78$	$R^2 = 0.83$	DW=0.78

Source: Authors findings

Table 2: Laffer curve estimation(1973-2007)

T stat	Coefficient	Variable
1.380608	44.93951	C
3.4815003	3.643235	INF
-2.364208	-0.0204823	INF^2
6/293542	0/788870	AR(1)
1.872078	4247708	D80
DW:1.78	R^2=0.76	$R^2\square$

Source: Authors findings

$\overline{R^2} = 0.76 \quad R^2 = 0.79$

two dummy variables. The first is a level dummy variable that takes value zero in1989-1990,the time when the war ended and zero otherwise. This variable measures the.crash. effect in the variable. The second dummy is a level variable taking value zero before the 1991 and 1 afterwards. Data are obtained from time series Central Bank of Iran.

Empirical Findings
Money Demand: To compute the maximum rate of inflation tax, we first estimate the parameter *b* in equation (6) from a money demand equation based on money in circulation. Firstly we should determine optimal lag using akaike-schwartz criteria which is 3 for money and zero for inflation. Secondly estimate the money demand based on equation (7).

Inflation coefficient approves the macroeconomic hypothesis implies the negative relation between inflation and money demand. Because of undeveloped financial and monetary markets besides constant official interest rate in such a long time so it could be considered as opportunity cost of holding money. Inflation causes people decrease money demand

Moreover transfers it to any kind of assets which holds its value.

We can calculate optimal rate of inflation using equation (6). There's a special optimal rate of inflation for each year. The average rate during 1973-2007 equals to 28/22652.During this period inflation had 27 observant lower than optimal rate, besides 6 ones upper.

Laffer Curve: Inflation tax is calculated by equation (3). Estimation of Laffer curve for 1973-2007 resulted into:

In table coefficients are significant. As the values for both á1 and á2 are both significant at 5 percent and have the expected sign, while the model with the intercept appears to be only slightly significant (as the value for á1 is significant at five percent, but all coefficients have the expected signs).D80 takes the value 1 for 1980-1988 and 0 otherwise. Revolution besides war affected inflation tax increasing uncertainty, budget deflect and drying up foreign aids.

Optimal Inflation Tax: Foc(first order condition) for maximizing Laffer curve is:

$$\pi^* = \frac{-\alpha_1}{2\alpha_2} \tag{9}$$

This equals to 0.78 for the studying period. All inflation rates up to now are lower than Seigniorage maximizing rate of inflation. So government could consider it as a revenue source, however it .

Soc(second order condition) is consistent. ($2\alpha_2$ is negative)

CONCLUSION

Seigniorage is an attractive source for government finance in Iran. There is an inefficient tax system and collection costs are high, there is no advanced financial market and the proportion of oil revenue in the government revenue is very high and volatile. Moreover, it should be pointed out that the oil price and the amount of oil exports of Iran are exogenously determined in the world market and OPEC, respectively. Consequently, the government uses seigniorage to smooth its spending, which demonstrates the link between fiscal and monetary policy. we approved relation between inflation and inflation tax revenue in a quadratic equation. So for some time in this case, the government can generate considerable seigniorage revenue through. The Iranian economy was dominated by movements in exogenous factors such as the oil price and various other shocks and government interventions. However, although the government was able to earn revenue through seigniorage by accepting a higher rate of inflation, higher inflation

resulted in higher uncertainty in the economy and affected the effectiveness of government policies. Seigniorage has increased both GDP and inflation tax. Government could get revenue permanently because (as estimated) this revenue increases up to a special point then falls when inflation is still increasing (wrong side of the Laffer curve).

REFERENCES

1. Ashworth, J. and L. Evans, 1998. " Seigniorage and Tax Smoothing In Developing Countries", Journal of Economic Studies, 25(6): 486-495

2. Chani Mohammad Irfan, Pervaiz Zahid, Ahmad Jan Sajjad, Chaudhary Amjad Ali, Chaudhary Amatul, 2011. " Poverty, Inflation and Economic Growth: Empirical Evidence from Pakistan" World Applied Science J., pp: 1058-1063.

3. Elbadwi, A.E. and K. Schmidt-Hebbel, 2005. "The demand for money around the end of civil wars" World Bank.

4. Easterly William, R., 1995. Paolo Mauro and Klaus Schmidt-Hebbel" Money demand and seigniorage-maximizing inflation" J. Money Credit and Banking, 27: 2.

5. Ezazi Mohammad Esmail, Salehi Mahdi and Mohammad Donyaei, 2011, " A Survey on transaction costs: Some Evidence from Iranian OTC Market " Middle East J. Scientific Res., pp: 562 -565.

6. Jafari Samimi ahmad, S.H. Zarroki and A. Hadizadeh, 2009." Tax Capacity and Tax Effort: Evidence from Islamic Republic of Iran" World Applied Science J., pp: 1413-1423.

7. Hono han, Patrik, 1996." Does it matter how seigniorage is measured?" Applied Financial Economics, 6(3): 293-300.

8. Hummel, R. Jefferey, 2007. " Death and Taxes, Including Inflation: The public Versus Economists" Econ Journal Watch, 4(7): 46-59.

9. Janvier D. Nkrunziza, 2004." how long can inflation tax compensate for the lose of government revenue in war economies? Evidence from Brundi" center for the study of African Economies.

10. Ize, A., 2007. " Spending Seigniorage : Do Centeral Bank Have A Goverence Problem " IMF Staff Papers. 54: 3.

11. Mohd Faud, M.J., A.B. Junaidi, A. Buang, S. Selvadorai, A.C. ER and L. Lyndon, 2011. " Ethnic Attitudes, political preferences and the Politics of Stability" World Applied Science J., pp: 34-38 .

12. Mueller, J., 2007. "Inflation and seigniorage studies in Africa" A thesis for MA in Missouri-Colombia University.

13. Kiguel, Miguel, A. and Andres Neumeyer, 1995. "Seigniorage and inflation: The case of Argentina" Journal of Money, Credit and Banking, 27(3): 672-682.

14. Wray L. Randall, 1998. " Seigniorage or sovereignty" University of Missouri, Kansas city, pp: 21-37.