ESTIMATION OF LAFFER CURVE: EVIDENCE FROM PAKISTAN

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Abstract. *Laffer curve is a tradeoff between tax cuts and tax revenues. The sketch of Laffer curve was drawn by Arther Laffer at a dinner with his friends on his napkin that reduction in taxes will increase tax revenues. Laffer curve explained that lower tax rate could encourage an additional output and it would increase income, which builds bigger tax base in an economy. In this research we have estimated the Laffer curve on the basis of Taxes on goods and services for Pakistan economy for the period of 1990 to 2016. Time series data have been collected from the world economic data base. Results explained that all the variables are significant and signs of coefficients are in accordance with the theory. Results confirm that Laffer curve is alive in Pakistan economy but its existence is in the prohibited area of Laffer curve. It is suggested that plans of taxation should be modified in such a way that maximum number of people could bring under the tax brackets. The taxation structure of the economy should ensure to lower the indirect taxes, encourage the progressive taxes and elasticity of taxation should be increased. Some sort of incentives such as relief in the income tax and higher bank deposit rates should be realized.*

Keywords: Laffer Curve, Taxes, Revenue, Multiple Regression, Pakistan

1. Introduction

This paper investigates the implication of Laffer curve in Pakistan. The Laffer curve basically is an association between tax cuts and increase in income Fullerton (1980). Papp and Takats (2008) also possess same set of words "tax

cuts boost up the tax revenue". The idea of the Laffer curve was given by Arthur Laffer in a dinner party in Washington Dc in 1974 invited by Don Rumsfeld and dick Cheney while discussing President Ford's WIN i.e. whip inflation now and the increasing taxation strategy. He draws a sketch of Laffer curve on his napkin that reduction in tax will increase income or we can say Laffer curve is a tradeoff between tax cuts and tax revenue Laffer, Martilla, and Watkinson (2012). The idea becomes so popular that it recognized against his name as he was a supply side economist. The idea of Laffer curve was firstly introduced with public by Wannisiki in a paper in 1978 and he amazed to see the popularity of the curve he wished in funny mode that if I was not out of mind I would introduce it with Wannisiki curve.

Laffer curve tells from where the taxation should be started (Bunescu & Comaniciu (2013). Furthermore progressive taxation will not increase revenue but Laffer curve will increase revenue (Holter et al., 2014). If for further accuracy we copy the exact words of Dr. Arthur Laffer to the Kansas House Tax Committee is "if you look at their performance over the last decade, those states without an income tax compared to the states with the highest income tax… the differences are huge. Those states without income taxes have grown much, much faster" TEF series (2012). It is evident from the Bunescu and Comaniciu (2013) statement that tax rate which is at specified level or upper fiscal limit enhances tax revenues.

Study such as Tatu (2014) recommend that Laffer curve can be used as to eliminate fiscal deficit as tools of taxation of Laffer curve serve as a guide line for the economists. Laffer curve shows his best fit also in the recession while when the fiscal tightness has his role over the economies (Isakov & Pekarski, 2016). Study like Chakraborty also favors the idea the idea that Laffer curve can be used an effective tool in the developing economies to get rid of the fiscal deficit. According to Papp and Takáts (2008) tax cuts can enhance tax revenue. Here more authentically we can counter their words that tax cuts up to a minimum possible level can be good as those who always try to avoid tax can be brought under the tax net.

Now if we consider the case of Pakistan taxation system it is not as effective as developed countries. Laffer curve can be used as an effective tool for increase in income. Pakistan economy is facing a high Deficit to budget ratio locally and loans from World Bank, Asian development bank and IMF on high interest rate abroad. This phenomenon also distorts the attention of foreign investors also. Taking the situation granted Laffer curve can be used as tool to decrease the tax net up to a desired level and bring the elites and tax avoider's under tax net. It will increase tax revenue and the way of deficit financing will also be blocked.
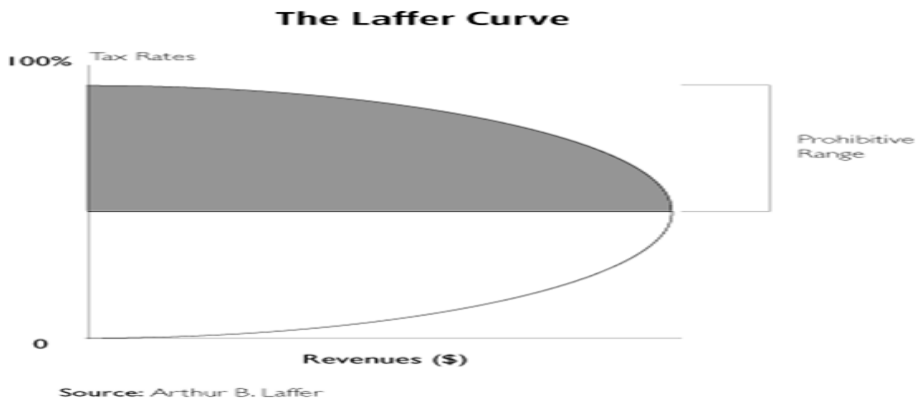
Figure 1   Source: Arthur Laffer http://www.heritage.org/

Graphical representation of the Laffer curve for the euro zone by Bunescu and Comaniciu (2013) showed that tax system take changes by itself over a long period of course. The best possible point from where taxation should be started is to look at a Laffer curve that is what should be maximum possible tax rate for the economy although taxation varies along the member countries. While Holteret et al. (2014) recommend that progressive tax system will create low income because the individual households vary along by studying the American and European society Laffer curve of seven percent would be better to enhance the income. The concept of no debt can also be overcome with formulated approach with the help of Laffer curve that debt can be recover through a tax culture. The tax revenue can be used as a key to expenditures for the public and then tax again by opting an ideal rate of the tax. In times of depressions Laffer curve can serve as income generator for the economy study such as Isakov and Pekarski (2015) favored the idea that although it cannot be good for the labors and spending for shows positive results for tax and revenue increases. In depression the economic activity is down and the debt has huge cost of interest rate in that case Laffer curve tactically paves the way for upward movement.

Furthermore if the tax rate not necessarily down to specified limit then we can be in the prohibited area of the curve as shown in the graph. Study such as Oliveira and Costa (2015) also favored the earlier saying. They workout data for the period of 1995-2011 for the selected 27 European countries and found that high rate of VAT lied the economy in the prohibited zone. The supply side economists are considered very important in the Laffer curve analysis. By reckoning the words of Lucas (1990) they considered it a free lunch and we should have to follow their guideline.

2. Literature Review

Trabandt, Riksbank and Uhlig (2011) found the 15 selected countries of the European Union i.e. EU-15 has best fit to Laffer curve than the United States. Tax incentives results much more than United States in earlier case and they considered it there is no free lunch as the notion of free lunch comprises that tax declined will enhance revenue but even it was not observed in the Reagan administration case when tax was down on advice of Laffer.

For the maximum tax revenue the government may adopt the Laffer strategy and should increase tax in labor tax and decrease capital tax, study such as Nutahara (2013) who analyzed the implication of Laffer curve to the Japanese economy. Japan that has a high debt to GDP to ratio and tax is increasing on regular basis which is quite for the public so by implying Laffer curve techniques it can yield sound results. The issue of high debt has hampered the economic condition of the countries over years. Pakistan also facing high deficit ratio in budget study like Bachvarova (2008) and Isakov and Pekarski (2015) which measures dimension for the Pakistan economy also same sort of study carried by Bachvarova (2008). Data was analyzed for the said purpose on 127 developing and small countries by for 1990-2005It was found that Laffer curve helps in debt overhang situations because most of the countries have not as much resources to invest. Furthermore the political and financial condition of the countries also distorts the way.

Laffer curve can be used in multidimensional ways e.g., as tradeoff between tax cuts and tax revenues Laffer (2012); between wealth and retirement behavior (Hairault, Langot & Sopraseuth, 2005); between debt overhang and revenues (Isakov & Pekarski, 2015; Bachvarova, 2008). Furthermore Hairault et al. (2005) analyzed data for the French economy and found that government should force the public to delay their retirement by receiving handsome amount of allowances from the government or to locate minimum amount of pensions after retirement. This can be inculcated as Laffer curve for the minimization deficit which is to be given them in the form of pensions.

Tax cuts significantly affects the rate of revenue in United States, Russia, japan, Europe and in many other developing and small economies studies like Laffer (2012) and Papp and Takats (2008) and Nutahara (2013) and Bachvarova (2008) also suggested same idea.

Furthermore Chakraborty (2015) analyzed the Indian economy with the help of Laffer curve and found that in recent times Indian economy is experiencing debt ratio significantly high because the state is now focusing on giving social security and basic necessity of life to the public. The Laffer curve

can be used for the proper functioning of the economy. Pakistan economy receives a high amount of foreign aid. Foreign aid has a huge amount of payback interest rate which at times or most of the times taken out all the output of the economy and run is taken into granted for more aid or loan to fulfill the earlier ones. The idea of aid Laffer curve can be used as a tool to the aid level that is aid Laffer curve.

3. Research Methodology and Model Specification

In this research we have estimated the Laffer curve on the basis of Taxes on goods and services for Pakistan economy for the period of 1981 to 2018.Time series data have been collected from the world economic data base.

The initial model which we have used in this research is mentioned as below:

$$\frac{REV_t}{GDP_t} = \alpha * TAX_t + \beta * TAX_t^2 + \varepsilon_t$$

Where REVt is the tax revenues percent of GDP, GDPt is the gross domestic product, billions of U.S. dollar, TAXt is taxes on goods and services, percent of total revenue, Tax2 is the square of taxes on goods and services, percent of total revenue at year t while et is the error term of the model.

Further 1st lag of the dependent variable has also included in the model in order to capture the autocorrelation problem and trend variable has also been introduced in order to de-trend the present time series. The adjusted model may be written as:

$$\frac{REV_t}{GDP_t} = \alpha * TAX_t + \beta * TAX_t^2 + \gamma * TREN + \delta * \frac{REV_{t-1}}{GDP_{t-1}} + \varepsilon_t$$

Here all the other variables are the same, explained in basic model in addition trend variable and lag one of dependent variables has been included.

Taxes on goods and services in Pakistan include general sales and turnover or value added taxes, selective excises on goods, selective taxes on services, taxes on the use of goods or property, taxes on extraction and production of minerals and profits of fiscal monopolies. Tax revenue refers to compulsory transfers to the central government for public purposes. Certain compulsory transfers such as fines, penalties, and most social security contributions are excluded. Refunds and corrections of erroneously collected tax revenue are treated as negative revenue (World Bank).

4. Results and Discussions

In diagram 4.1 taxes on goods and services and tax revenues has been presented for the Pakistan economy. The rough sketch of this diagram could suggest that apart from the other influences, the Laffer effect is present in Pakistan in the case of goods and services and tax revenue from the year 1981 to 2018 but in the opposite direction. Opposite direction means prohibited area of Laffer curve can be seen here in this diagram where tax revenues are decreasing as the taxes on goods and services increasing.
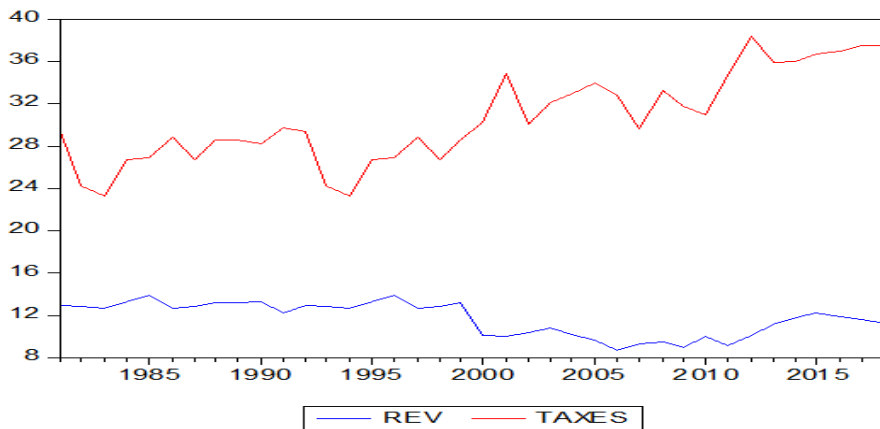

Figure 2 Taxes on Goods and Services and Tax Revenue in Pakistan

Further in accordance to the theory of Laffer curve, existence of Laffer curve could be confirmed in an economy if both the parameters (α and β) of taxes are significant and both the parameters must have appropriate signs. Accordance to the theory of Laffer curve, In order to obtain the bell shape of the Laffer curve the parameter α should be positive sign and parameter β should have the negative sign and both the parameters might be significant.

Table 1 *OLS Estimation of Initial Model*

Variable	Coefficient	Sd. Error	t-Statistic	Prob.
TAX	0.08	0.003	8.51	0.000
TAX2	-0.000	0.000	-7.25	0.000
R-squared	0.583		Mean dependent var	0.142
Adjusted R-squared	0.565		S.D. dependent var	0.09
S.E. of regression	0.059		Akaike info criterion	-2.75
Sum squared resid.	0.084		Schwarz criterion	-2.651
Log likelihood	37.727		Hannan-Quinn criter.	-2.720
Durbin-Watson stat	0.699			

The results from the initial equation presented above have been presented in the above table 1. Although both the variables are significant and their signs are in accordance with the Laffer theory but the 1st order serial correlation has been indicated by the Durbin-Watson stat. That is the reason the value of R-square is relatively low. In order to capture the correlation problem, this research presented another adjusted model in which lag dependent variable has been introduced as an independent variable, result of which has been presented in table 2. Here all the variables are significant as both the probability values of Tax and Tax2 are less than 5 percent level of significant and the signs of coefficients are in accordance with the theory of Laffer curve. The R2 value is 0.910, which is quite high, shows that almost 91 percent fluctuations of dependent variable has been explained by the independent variables incorporated in the research. Durbin-Watson stat which is 2.1 shows that residuals of the adjusted model are not serially auto correlated.

Table 2   *OLS Estimation of Adjusted Model*

Variable	Coefficient	S. Error	t-Statistic		Prob.
TAX	0.007	0.003	2.436		0.023
TAX2	-0.000	0.000	-2.214		0.038
REV(-1)/GDP(-1)	0.067	0.008	8.592		0.000
R-squared	0.910		Mean dependent var		0.134
Adjd R-squared	0.902		S.D. dependent var		0.082
S.E. of regression	0.026		Akaike info criterion		-4.371
Sum squared resid	0.0146		Schwarz criterion		-4.225
Log likelihood	57.638		Hannan-Quinn criter.		-4.331
Durbin-Watson stat	2.166				

Table 3   *Breusch-Godfrey Serial Correlation LM Test*

F-Statistics	2.670917	Prob.F (2,20)	0.0937
Obs* R-squared	5.269686	Prob. Chi-Squared(2)	0.0717

Table 4 *Breusch-Pagan-Godfrey Test of Heteroskedasticity*

F-Statistics	0.640548	Prob.F (3,21)	0.5974
Obs* R-squared	2.095883	Prob. Chi-Squared(3)	0.5527

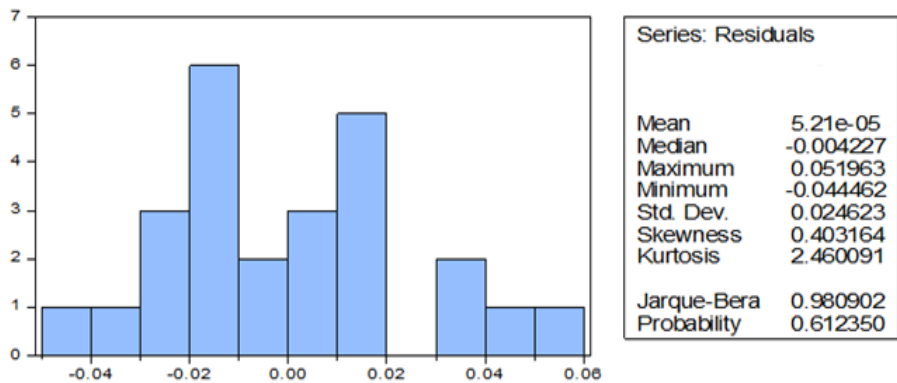| Series: Residuals	
Mean	5.21e-05
Median	-0.004227
Maximum	0.051963
Minimum	-0.044462
Std. Dev.	0.024623
Skewness	0.403164
Kurtosis	2.460091
Jarque-Bera	0.980902
Probability	0.612350

Figure 3 Residual Normality Test

Table 3 possesses the important information regarding serial correlation. Literature on the auto correlation or serial correlation stated that the corresponding probability of observed R-square value may be more than five percent to confirm that residuals of the model are not auto-correlated. In this study corresponding probability of observed R-squared value is 0.0937 which is more than five percent and desirable. Hence there is no auto correlation. Similarly table 4 tells about the homoscedasticity or heteroskedasticity in variance of residuals.

Literature on the OLS stated that homoskedastic variation of residuals is desirable. So in this research corresponding probability of observed R-squared value is 0.5527 which is again more than five percent and acceptable. Hence variation of residuals in this study is homoskedastic. Further normality of residuals may also be confirmed with the figure 3 of normality test statistic where the corresponding probability value of Jarque-Bera statistic is 0.612 which is more than five percent shows that residual are normally distributed.

4. Conclusion & Policy Implication

In this research we have estimated the Laffer curve on the basis of Taxes on goods and services for Pakistan economy for the period of 1981 to 2018. Time series data have been collected from the world economic data base. Results explained that all the variables are significant and signs of the coefficients are in accordance with the theory. Results confirm the existence of Laffer curve in Pakistan economy but its existence is in the prohibited area of Laffer curve. Taxes on goods and services are very high in Pakistan due to this tax revenues are decreasing. taxes on goods and services and tax revenues has been presented for the Pakistan economy. The rough sketch of this diagram could suggest that apart from the other influences, the Laffer effect is present in

Pakistan in the case of goods and services and tax revenue from the year 1981 to 2018 but in the opposite direction. Opposite direction means prohibited area of Laffer curve can be seen here in this diagram where tax revenues are decreasing as the taxes on goods and services increasing. Taxes on goods and services in Pakistan include general sales and turnover or value added taxes, selective excises on goods, selective taxes on services, taxes on the use of goods or property, taxes on extraction and production of minerals and profits of fiscal monopolies. Tax revenue refers to compulsory transfers to the central government for public purposes. Certain compulsory transfers such as fines, penalties, and most social security contributions are excluded. Refunds and corrections of erroneously collected tax revenue are treated as negative revenue. It is suggested that plans of taxation should be modified in such a way that maximum number of people could bring under the tax brackets. The taxation structure of the economy should ensure to lower the indirect taxes, encourage the progressive taxes and elasticity of taxation should be increased. The pattern of taxation should be encouraged after introducing some sort of incentives such as relief in the income tax and higher bank deposit rates should be realize.

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