# The Laffer Curve:
# A Survey and Reinterpretation

Yasuyoshi Kobayashi

## 1. Introduction

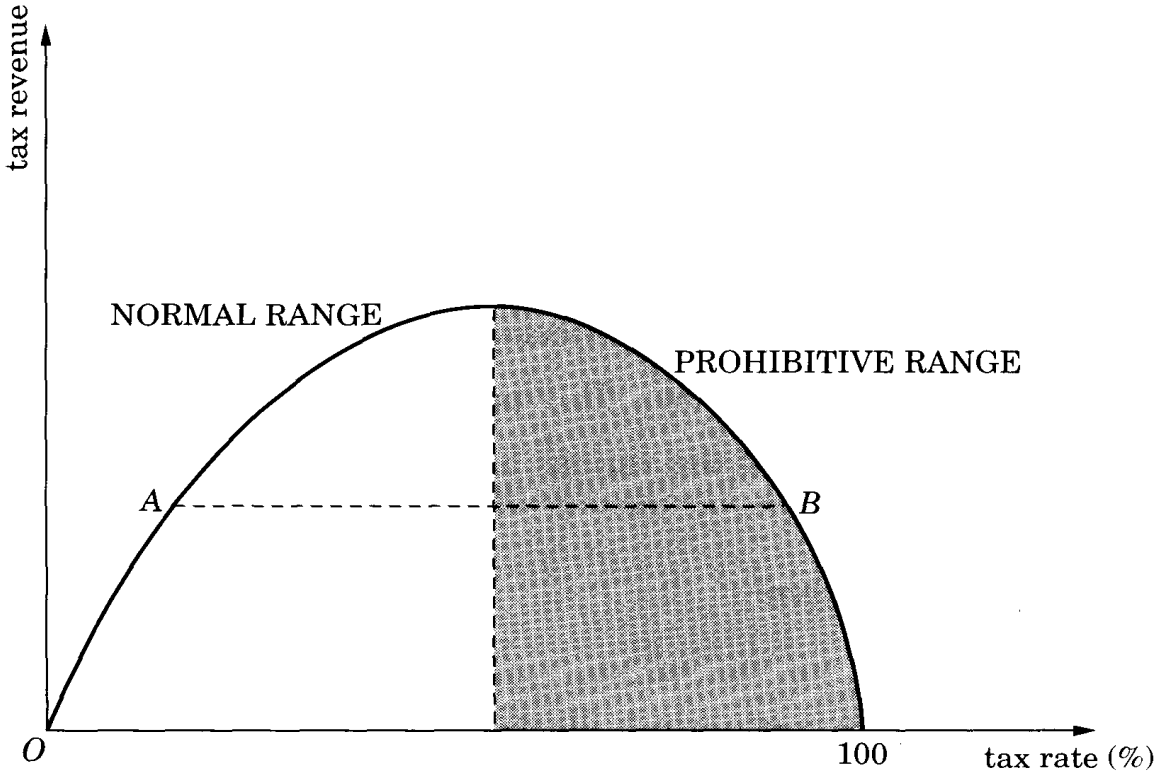
When a staff of the president of Ford questioned Arthur B. Laffer in a restaurant in Washington, D. C. in 1974, Dr. Laffer drew a simple curve to answer on a table napkin. Ever since then, this curve which is now well-known as 'the Laffer Curve' has been getting a lot of attention as a hot idea in economics. Therefore, there have been lots of talks and debates about the Laffer curve.[1] These discussion, however, often show a tendency to carry the issue far afield from its essence. Moreover, the discussions against the Laffer curve often do not get to the point.[2] This paper develops a brief review and a reinterpretation of the various argument on the Laffer curve.

## 2. The Laffer Curve

The Laffer Curve is one which illustrates the relationship between tax rates and tax revenues. As depicted in figure 1, obviously, tax revenues would be zero if the tax rates were zero. As tax rates increase from zero, tax revenues also increase. At some level of tax rates, however, tax revenues eventually reach a maximum, above this

point, further increases in tax rates may actually cause tax revenues to fall. And, when tax rates reach 100 percent, tax revenues would also be zero. Because at this tax rate, all of taxable economic activity will cease when the tax rate is 100 percent. The upward sloping portion of the curve is called the 'normal range' in which increase in tax rates cause tax revenues to increase. On the other hand, the downward sloping segment is called the 'prohibitive range' in which increases in tax rates cause tax revenue to fall.

Figure 1 The Laffer curve



## 3. Historical Antecedents of the Laffer Curve

Since when Arthur B. Laffer first drew his famous curve on a napkin, there have been lots of talks and debates about the possibility of an inverse relationship between tax rates and government's tax revenues. However, the idea that excessive tax rates may be counterproductive in raising tax revenues is not entirely new, the idea has been around for a long time. The earliest known reference to what could be called the Laffer curve comes from the fourteenth century Arabic philosopher Ibn Khaldun (1332-1406), who discusses this concept in *The Muqaddimah* in the chapter titled "Taxation and the Reason for High and Low Tax Revenues", a portion of which is excerpted below:

> It should be known that at the beginning of the dynasty, taxation yields a large revenue from small assessments. At the end of the dynasty, taxation yields a small revenue from large assessments....
>
> Often, when the decrease is noticed, the amounts of individual imposts are increased.... The costs of all cultural enterprises are now too high; the taxes are too heavy, and the profits anticipated fail to materialize.... Finally, civilization is destroyed, because the incentive for cultural activity is gone....[3]

Similarly, the soldier-engineer-economist Vauban stressed the importance of moderate taxation during the early eighteenth century. Of Vauban, Joseph Schumpeter wrote in his *History of Economic Analysis*:

> With Gladstonian vision he realized that fiscal measures affect the economic organism's right to its cells and that the method of raising a given amount of revenue may make all of the difference between paralysis and

prosperity.[4]

Also, in *The Wealth of Nations* (1776), Adam Smith could hardly be more explicit as follows:

> High taxes, sometimes by diminishing the consumption of the taxed commodities, and sometimes by encouraging smuggling, frequently afford a smaller revenue to government than what might be drawn from more moderate taxes.[5]

The same principle is involved in his discussion of a revenue tariff. Smith noted that tariff rates in England were so high in many cases that they were only encouraging smuggling and reducing revenue below what lower rates would bring in:

> The high duties which have been imposed upon the importation of many different sorts of foreign goods, in order to discourage their consumption in Great Britain, have in many cases served only to encourage smuggling; and in all cases have reduced the revenue of the customs below what more moderate duties would have afforded. The saying of Dr. Swift, that in the arithmetic of the customs two and two, instead of making four, make sometimes only one, hold perfectly true with regard to such heavy duties, which never could have been imposed, had not the mercantile system taught us, in many cases, to employ taxation as an instrument, not of revenue, but of monopoly.[6]

This view was shared by Smith's compatriot David Hume. He indicated that in certain circumstances, tax rate increases may lead to tax revenues were negatively related. He argues in his essay which was entitled "Of Taxes", for example, that, "...a duty upon commodities checks itself; and a price will soon find, that an increase of the impost is no increase of his revenue".[7] Moreover, in his essay,

"Of the Balance of Trade", Hume points out that exorbitant tax rates on foreign commodities can be counter-productive with respect to government revenues:

> As it is necessary, that imposts should be levied, for the support of gevernment, it may be thought more convenient to lay them on foreign commodities, which can easily be interpreted at the port, and subjected to the impost. We ought, however, always to remember the maxim of Dr. Swift, that, in the arithmetic of the customs, two and two make not four, but often make only one. It can scarcely be doubted, but if the duties on wine were lowered to a third, they would yield much more to the government than at present.....[8]

Jean Baptiste Say, the other famous classical economist, also recognized that tax rates and tax revenues were often negatively rather than positively related. Say, for example, wrote in his *Treatise on Political Economy* (1841) that "the best taxes, or rather those that are the least bad, are such as are the most moderate in their ratio" and that, "taxation, pushed to the extreme, has the lamentable effect of impoverishing the individual, without enriching the state....Thus, the taxpayer is abridged of his enjoyments, the producer of his profits, and the public exchequer of its receipts".[9] In other words, exorbitant tax rates would not yield bountiful revenues because of the adverse economic effects on the growth of the tax base. On these adverse effects, Say explained that:

> ...(were) the reason, why a tax is not productive to the public exchequer, in proportion to its ratio; and why it has become a sort of apophthegm, that two and two do not make four in the arithmetic of finance. Excessive taxation is a kind of suicide....[10]

Say documents his assertion with several examples of situations where tax rates were lowered (raised) and tax revenues increased (decreased).

The international trade literature, as exemplified by Caves and Jones, has reflected an understanding of the existence of a revenue-maximizing tariff.[11] This pre-Laffer edition contains a hump-shaped tariff revenue curve, which looks just like figure 1. With respect to internal taxes, Jules Dupuit in 1844 states:

> By thus gradually increasing the tax it will reach a level at which the yield is at a maximum.... Beyond, the yield of tax diminishes.... Lastly a tax [which is prohibitive] will yield nothing.[12]

As mentioned above, the idea that excessive tax rates may actually reduce tax revenues was explicitly recognized in the early economic literature.[13]

It should be emphasized that it is the tax or tariff *rate* which is critical, not its overall burden. As Henry George put it in *Progress and Poverty* (1879):

> The mode of taxation is, in fact, quite as important as the amount. As a small burden badly placed may distress a horse that could carry with ease a much larger one properly adjusted, so a people may be impoverished and their power of producing wealth destroyed by taxation, which, if levied another way, could be borne with ease.[14]

In the nineteenth century many public finance theorists suggested that tax rates could not be increased beyond a certain point. Johannes Heinrich Gottlob Justi said 25 percent was the maximum, Hock said 15 percent was the upper limit. Paul Leroy-Beaulieu

thought that when taxes reached 15 to 16 percent of national income they could not be increased. C. J. Bastable also thought there was a limit to taxation, but that it varied from country to country and with circumstances.[15]

This theme has been, still this century, dealt with many economists. Schumpeter indicates that the excess tax rates will result in adverse effect of a decrease in tax revenues, and specificaly he pays attension to the unfavorable effect of taxation to the entrepreneur's profits.[16]

Colin Clark, who is an econometorician of the late-fourties, put forth the proposion that when taxation exceeded 25 percent of national income any furth increase would be decrease savings and work incentives.[17]

## 4. A Brief Review of Current Literature

As suggested above, the idea that when tax rates exceeded at some point, the inverse relationship between tax rates and tax revenues exsists, is not novel but has been well known.

Laffer does not claimed to have invented the Laffer curve.[18] But, he make public the curve such depicted in figure 1 in the circumstances mentioned above, "it got its name from him, since he has made it the centerpiece of supply-side economics and its conception of incentive effects".[19]

After the introduction of the Laffer curve in 1974, it is increases intensity that the public debate about the possibility of the inverse relationship between tax rates and tax revenues. Jude Wanniski,

in his book *The Way the World Works* (1978), chronicles various fiscal catastrophes from the fall of the Roman Empire to the Great Depression and attributes each of them to some tax hike occurring within a few years in either direction. Also, he exemplifies that in either of nations, which are contained Third World nations, which accomplished high economic growth in post War era, the tax rates are low and the tax burden is light.[20]

For the opposition, Michael Kinsley claims that so-called the "prohibitive range" does not exist from the beginning.[21] A synoptic of his claim is that ① there is no logical necessity for revenues to be zero at 100 percent tax rates, due to nonmonetary incentives for work effort, ② if government revenues would not necessarily drop to zero even at a tax rate of 100 percent, there is no logical reason to assume without proof that the Laffer curve ever reverses direction at all, and ③ if the curve never turns back down, it is not possible to increase revenues by cutting taxes. There may be cases fit with a proposition ①, but it is impossible that government has been to tax at 100 percent tax rates in the long-run. A proposition ② and ③ are clearly incorrect, because they are short reasoning from a propositon ①.[22]

Donald W. Kiefer opposes to the Laffer curve. The first, he asserts that there is no tax rates for the overall economy which can be measured on the horizontal axis, and that "the Laffer curve represents a gross simplification of a major portion of macroeconomics into a single curved line".[23] These arguments are not compelling either in view of the large number of economic models which oversimplify in order to comprehend and convey economic phenomena.

The second, Kiefer point out that "the Laffer curve ignores the fact that within the relevant range of policy alternatives, tax rate changes induce two reaction, an income effect and a substitution effect, which tend to offset each other"[24]. A view of Richard and Peggy Musgrave, in their well-known public finance textbook[25], is an argument in favor of this assertion. But, By model different conclusions can lead, therefore indeed it is impossible to judge without empirical studies.

The third, Kiefer argues against overemphasis on the supply side, claiming that "by concentrating primarily on incentive and supply-side effects, the Laffer curve largely ignores the actual mechanism by which fiscal policy exerts its biggest and most immediate impact —— demand side effects"[26]. These antagonists appear to be using different models that are not comparable.

Canto, Joines, and Laffer built a simple equilibrium model with one output, two factors of production, and offer a theoritical formulation of the Laffer curve[27].

Buchanan and Lee discuss the political equilibrium with the concepts of the short-run and the long-run Laffer curve[28]. And also, Wanniski suggests the application of the Laffer curve theory to a public choice approach. He said, for example, that "politicians who understand the curve will find that they can defeat politicians who do not, other things being equal. Electorates all over the world always know when they are unnecessarily perched along the upper edge of the "Laffer curve", and will support political leaders who can bring them back down"[29].

Peter M. Gutmann come up with "the Gutmann curve", but the curve is essentially similar to the Laffer curve, and the Gutmann

curve's equivalent of the Laffer curve's proposition is that a reduction in tax rates can increase the amount of revenue collected from the legal economy.[30]

In empirical work, Victor Canto, Douglas Joines, and Robert Webb report empirical evidence on the effect of the Kennedy tax cuts in the early 1960s —— this is a typical instance of broad-based tax cuts policy. These three scholars concluded that the 1962 and 1964 cuts in tax rates caused only a small decrease in tax revenues, but they did not correct for any of the other factors that would have expanded the tax base at the same time, such as tariff cuts and the coming of age of the baby-boom generation.[31]

Grieson et al. find the possibility of an inverse relationship between tax rates and revenue for local government in New York. They conclude that "the inclusion of state taxes lost when economic activity leaves both the city and state would... raise the possibility of a net revenue loss as a result of an increase in business income taxes".[32] And also, They find that the nonmanufacturing sector has fewer alternatives to the New York City location and should be taxed more heavily relative to the manufacturing sector, whose response to tax is more elastic.

Grieson find that "Philadelphia may have been at or very close to the revenue maximizing point... before the recent income tax increase, which raises the possibility of it having been in excess of the socially optimal one",[33] and he suggested that the income tax rate in Philadelphia is already in 'prohibitive range'.

Charles Stuart uses a two sector model to clarify marginal tax rates on labor income in 'prohibitive range' for Sweden. He esti-

mates that "total tax revenues in Sweden would be maximized at a tax rate of roughly 70 percent, i. e. 10 percent less than the rate prevailing today".[34]

Don Fullerton was successful in showing a shape and form of the Laffer curve for the U. S. economy, using a general equilibrium taxation model. His simulation suggests that if labor supply elasticity is 0.15, the tax revenue maximizing tax rate on gross labor income is 71.8 percent.[35]

Fainally, Ross Healy and Verne Atrill apply the Laffer curve to an analysis of Tronto stoke market.[36]

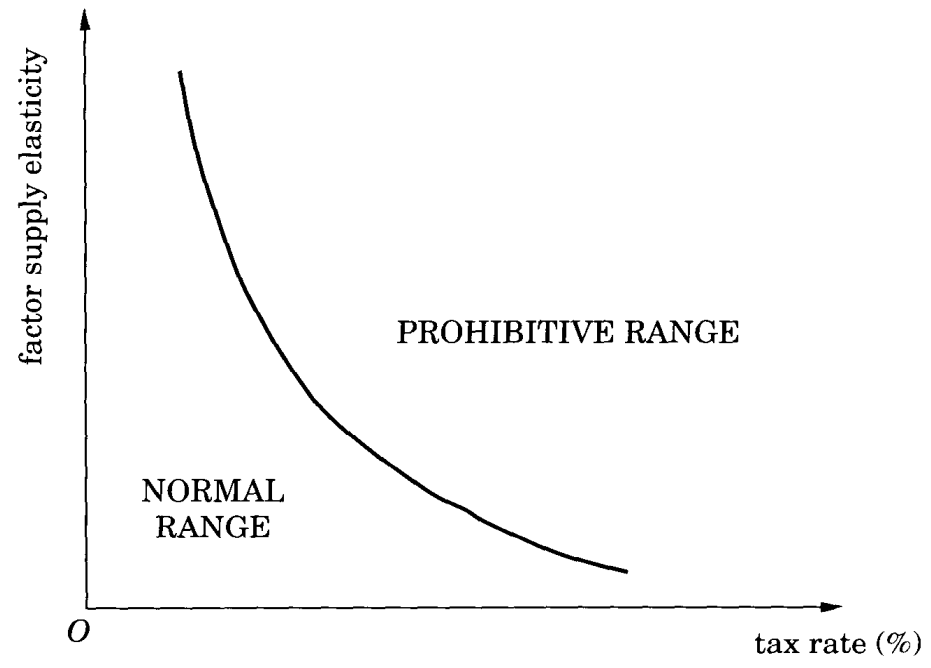
## 5. The Key Point of the Debate

The key point of the various arguments and the complicated arguments on the Laffer curve is factor supply elasticities. The offsetting income and substitution effects pointed out by Kiefer merely imply that the relevant supply elasticity might be low or negative, that is, the relevant factor supply may increase very litte or even decrease in response to an increase in the net-of-tax wage rate. The emphasizing the large incentive effect of tax cut by supply-siders imply that the relevant elasticities are large. As mentioned above, The entire debate can reduce to a single spectrum such as the values of factor supply elasticity.

The optimum tax rates which are maximized tax revenues depend on the supply elasticity of the factor being taxed. If that elasticity were low, the total revenue maximizing point would be at a higher tax rate for that factor, and conversely. Although the Laffer curve

illustrated in a second dimension of the tax rate-revenue space, in addition to the space, One can imagine a third dimension on that diagram giving different elasticity values. That is, if one made the total revenue axis perpendicular to the page, the diagram's hill would be converted into a mountain range, with the total revenue peaks occurring at points running from a low tax rate and high elasticity combination to a high rate and low elasticity pair. This series of peaks is plotted in figure 2. Everything to the southwest of that curve signifies the 'normal range', where raising rates increase revenue, and northeast of the curve is the 'prohibitive range', where raising rates decrease revenue. Each point on the curve shows the tax rate that maximizes total revenue for a given elasticity.[37]

Figure 2 Elasticities, tax rates, and the Laffer curves



From this description, we can place all the advocates on a single spectrum: those who find an inverse relationship between tax rates and tax revenues must believe that the relevant elasticity is high, that relevant tax rate is high, or both. Those who find a normal range must believe that one or both of these is low. Finally, those who deny the existence of an inverse relationship at any tax rate might really just believe that the uncompensated supply elasticity is zero or negative. In summary, the debate can reduce to the empirical matter of determining the relevant parameter values.

## 6. The Effect of the Tax Rates Changes

According to Laffer, the changes in the tax rates have two effects on tax revenues.[38] These effects are the arithmetic effect and the economic effect. The arithmetic effect is the one that assumes no change in the tax base, and in this effect tax revenues will be change by the amount of change in the tax rate multiplied by the tax base.

On the other hand, the economic effect is the one take the changes of the tax base into consideration through people's incentive for economic activity. For example, higher tax rate decreases the tax base by people's lower incentive for economic activities. By contraries, lower tax rate increases the tax base by people's higher incentive, moreover it brings people's income from the tax schelter. Therefore, the changes in the tax reveunes are not the same as the original tax base multiplied by the tax rate changes in both cases.

It should not be neglected that people's incentives for economic activities are influenced by tax rates, *ceteris paribus*, due to *doubling*

the tax per unit *guadruples* the welfare cost of taxation. The economic effect takes this point into consideration, and the curve showing this effect is so-called the Laffer curve.

## 7. The Formulation of the Laffer Curve

As mentioned above, the Laffer curve has two range, that are normal range and prohibitive range, across the optimal tax rate where the largest tax revenue is achieved. What the Laffer curve means is formularised as follows.

Assuming tax revenue is $T$, output is $Q$, and tax rate is $t$, the tax revenue is expressed as:

$$T = tQ \tag{1}$$

And a change of the tax revenue in a change of the tax rate is puts as:

$$\frac{dT}{T} = \frac{dt}{t} + \frac{dQ}{Q} \tag{2}$$

According to the economic effect, when $dt$ is a positive (negative) $dQ$ is a negative (positive). It means that as a tax base is a negative function of the tax rate. Therefore, in the normal range,

$$\frac{dt}{t} > \frac{dQ}{Q} \tag{3}$$

So

$$\frac{dT}{T} > 0 \tag{4}$$

On the other hand, in the prohibitive range,

$$\frac{dt}{t} < \frac{dQ}{Q} \tag{5}$$

Therefore,

$$\frac{dT}{T} < 0 \qquad (6)$$

In short, the Laffer curve representing relation between tax revenues and tax rates implicates that the tax base is a negative function of tax rates. This point can be explained in terms of two concepts of elasticity.

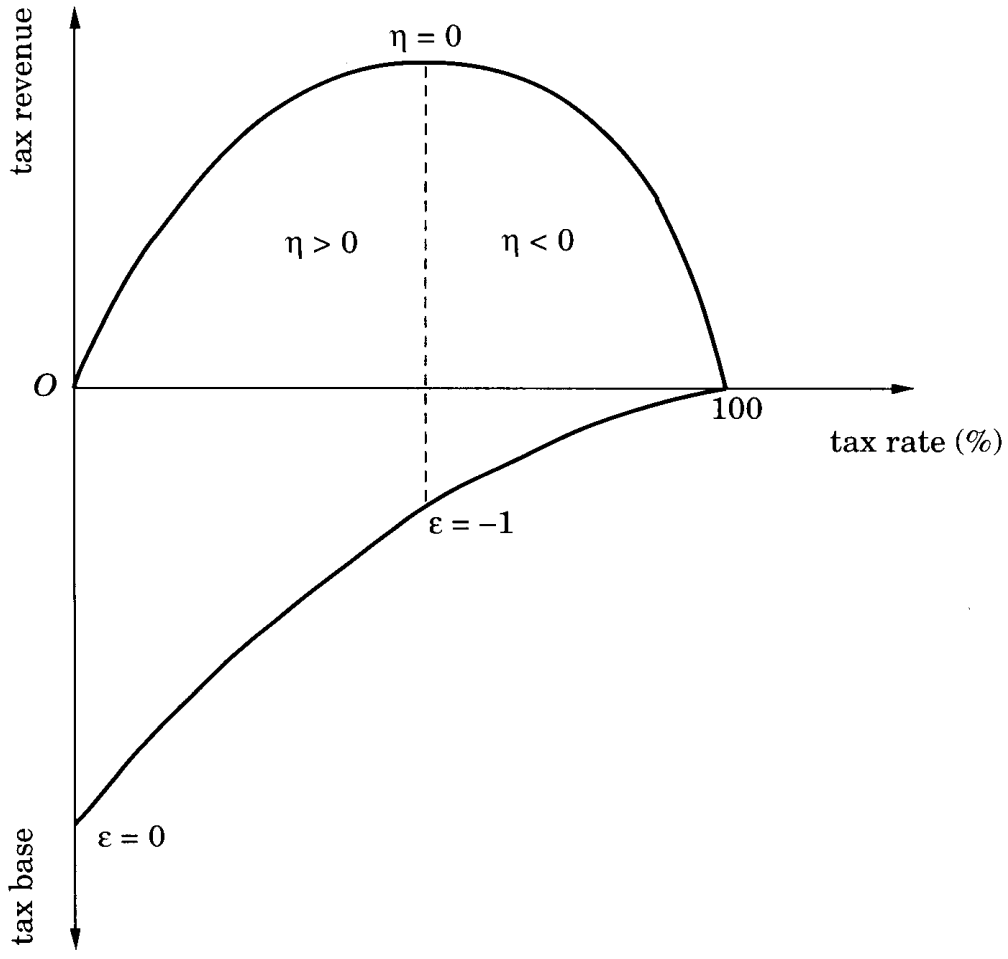
Supply-siders think that the supply of factor of production depends on after tax real rate of return and tax base which is people's income decreases when tax rate goes up. So, $\varepsilon\ (=(dQ/Q)/(dt/t))$ which is the elasticity of tax rates on the tax base is a negative as long as tax rates are a positive. On the other hand, $\eta\ (=(dT/T)/(dt/t))$ which is the elasticity of the tax rate on the tax revenue changes as follows when the tax rate changes. When the tax rate is zero percent, the tax revenue is also zero. As the tax rates increase from zero, the tax base begin to decrease. At the same time higher tax rate will mean the increases tax rate per unit of taxable income. In the normal range on the Laffer curve, higher tax rates raise tax revenues ($\eta > 0$), because an increase of the tax revenue causes by higher tax rate is larger than a decrease of tax revenue caused by smaller tax base.

On a certain rate which is optimal rate, a positive revenue effect of the tax rate increase and a negative revenue effect of the tax base decrease become the same. Beyond this point, a decrease of the tax revenue starts to overwhelm increase of the tax revenue and the tax revenue begins to decrease ($\eta < 0$).[3.9] When the tax rate reaches 100 percent, economic activities generating the tax base completely stops

and the tax revenue goes down to zero.

Figure 3 shows the relationship among tax rates, tax bases, and tax revenues. The Laffer curve should be viewed in term of this relationship. In other words, the Laffer curve is nothing else but a function showing the economic effect by the tax rate changes. This point can be more clear through examining the relationship between tax rates and tax revenues in the Keynesian model. Appendix in this paper deals with this point.

Figure 3 Tax base, tax rate, and the Laffer curve



## 8. Concluding Remarks: A Connotation of the Laffer curve

When we tries to consider tax burdens, it is very important to distinguish between the 'direct cost' and the 'welfare cost' of a tax. The former is the direct burden as measured by tax revenues that is reflected in the withdrawal of resources from the private sector. The latter is so-called the 'deadweight loss' of a tax that is reflected in a misallocation of resources by it. Suppose an excise tax is levied on some goods, and the tax rate is set at such a high level that the output of the goods falls to zero. In this case, tax revenues would be zero and so 'direct cost' would be zero. However, even if there is no tax revenues, there is a misallocation of resources, and 'welfare cost' exists obviously.

The Laffer curve represents that in general there are two tax rates which achieve any level of tax revenues. For example, the point *A* in figure 1 represents a combination of a big tax base (active economic activities) and low tax rate (a small welfare cost). On the other hand, the point *B* in the figure represents a combination of a small tax base (inactive economic activities which reflect an expansion of the underground economy) and high tax rate (a big welfare cost). Yet they both yield the same tax revenues to the government. Thus, both direct cost are same level. But, we must pay attention that their contents are quite different.

Therefore, if tax rates are in the prohibitive range on the Laffer curve, it is irrelevant to allege that the economy bears low tax burdens because tax revenues is low and/or the proportion of output or GNP taken in taxes is relatively low.

## Appendix The Relationship between Tax Rate and Tax Revenue in the Keynesian Model

Since the Keynesian model does not take account of the economic effect of the changes in the tax rates, cutting (raising) tax rate always will decrease (increase) the tax revenue and the prohibitive range on the Laffer curve does never exist. This appendix will clarify this point with the simplest the Keynesian model which postulates a closed economy. A model is represented by the following system of equations:

$$\begin{cases} Y = C + I + G & (7) \\ C = a + cYd & (8) \\ I = \overline{I} & (9) \\ G = \overline{G} & (10) \\ Yd = Y - T & (11) \\ T = tY & (12) \end{cases}$$

Where $Y$ is national income, $C$ is consumption, $I$ is investment, $G$ is government expenditure, $T$ is tax revenue, $Yd$ is disposable income, $a$ is the amount consumed a zero income, $c$ is the marginal propensity to consume ($0 < c < 1$), and $t$ is the proportional income tax rate ($0 \leqq t \leqq 1$).

The equilibrium level of national income can be expressed as:

$$\mathrm{Y} = \frac{1}{(1 - c + ct)} \cdot (a + \overline{I} + \overline{G}) \qquad (13)$$

At the same time, the government expenditure multiplier can be represented as:

$$dY / dG = 1 / (1 - c + ct) \qquad (14)$$

When a proportional income tax is absent ($t = 0$), the multiplier is $1/(1 - c)$, but when it exists ($0 < t \leqq 1$), the multiplier will reduce to $1/(1 - c + ct)$. Raising a proportional tax rate lowers the multiplier by the extent of expressed as:

$$\frac{1}{1-c} - \frac{1}{1-c+ct} = \frac{ct}{(1-c)^2 + ct(1-c)} \tag{15}$$

The lower multiplier of government expenditure by raising proportional income tax rate decreases the effectiveness of discretionary fiscal policy because the bigger the multiplier is, the more effective discretionaly fiscal policy is. Therefore, cutting proportional income tax will improve the effectiveness of discretionaly fiscal policy by raising multiplier. The effect of the changes in the proportional income tax rates on the multiplier is:

$$dm/dt = \frac{-c}{(1-c+ct)^2} = -cm^2 \tag{16}$$

Where $m$ is the multiplier and equal in the present case to $1/(1 - c + ct)$.

When $D$ represents the budget deficit, we can write as:

$$\Delta D = \Delta G - \Delta T \tag{17}$$

Given a proportional income tax rate $t$, one obtains:

$$\Delta T = \Delta Y t \tag{18}$$

$$\Delta Y = \Delta G m \tag{19}$$

Thus, from equations (17), (18), and (19), gives us:

$$\Delta D = \Delta G - \Delta G m t = \Delta(1 - mt) \tag{20}$$

By the way rasing proportional income tax lowers the effect of the increase in national income per unit of government expenditure by lower multiplier as a equation (16) indicates. On the other hand,

raising tax rate will increase tax-collecting rate per unit of income. Therefore, the change in the tax revenue by raising proportional income tax rate depends on a relative impact of the these effects. The effect of the change in the proportional income tax rate on the budget dificit is given by:

$$d\Delta D / \Delta t = \frac{d}{dt}\Delta G\,(1 - mt) \tag{21}$$

Eliminating $\Delta G$ for simplicity, this equation can be expressed as:

$$\frac{d}{dt}(1 - mt) = -\frac{dm}{dt} \cdot t + \frac{dt}{dt} \cdot m \tag{22}$$

From the equation (16), since we already know the value of $dm / dt$ to be $-cm^2$, we can rewrite the equation (22) as:

$$\frac{d}{dt}(1 - mt) = ctm^2 - m = m\,(ctm - 1) \tag{23}$$

Because of the value of marginal propensity to consume is previously assumed $0 < c < 1$, a change of the budget deficit ($\Delta D$) is defined as $\Delta G - \Delta Gmt$, the value of $mt$ has to be less than one. Therefore, a equation (23) is a negative. This means that the raising proportional income tax rate always reduces the extent of the budget deficit with given government expenditure. In other words, the positive effect on tax revenues by raising tax rates always exceeds the negative effect of lower multiplier by raising tax rates. This can be expressed as:

$$T = tY \tag{24}$$

$$Y = mE \tag{25}$$

Where $E$ represents the sum of all autonomous expenditure.

Substituting equation (25) for equation (24), we can obtain:

$$T = tmE \tag{26}$$

From the equation (26), the effect of the changes in the proportional income tax rate on tax revenue is:

$$\begin{aligned}\frac{dT}{dt} &= \frac{dt}{dt} \cdot m + \frac{dm}{dt} \cdot tE \\ &= [m - ctm^2]\, E \\ &= [m\,(1 - ctm)]\, E\end{aligned} \tag{27}$$

Since $[m\,(ctm - 1)]$ is a negative in a equation (23), $[m\,(1 - ctm)]$ is a positive in a equation (27) for any positive value of $E$. The equation (27) shows that raising (lowering) tax rates will increase (reduce) tax revenues when the autonomous expenditures are a positive.

In the Keynesian model, thus, it is clear that there is no possibility of an inverse relationship between tax rates and tax revenues. This means the prohibitive range does never exist in the model.

## Acknowledgements

The author expresses my gratitude to Prof. Hideo Sato (Keiai University) who has given many valuable comments on English expressions, words, usage etc.

## Notes

1) The debates and the discussion on the Laffer curve and the issues that are presented by the supply-siders, for example, are found in Hailstones [24], and Laffer and Seymour [34]. And also, for Arthur Laffer and the Laffer curve, for example, See [1]; Meadows [36]; idem [37].

2) Remember readers essays in mas media when supply-side

economics with the 'Laffer curve' was introduced into our country about 1980. At that time most people thought that supply-side economics was equivalent to the Laffer curve, and still at the present day a considerable number of people do. For the scheme of characteristics of supply-side economics and the supply-side model, for example, see Kobayashi [31].

3) [39], as quoted from Khaldun [28].
4) Schumpeter [43], p.204.
5) Smith [44], p.835.
6) *Ibid.*, pp.832-833.
7) Hume [27], p.86.
8) *Ibid.*, p.70.
9) Say [41], bk. 3, p.196.
10) *Ibid.*, p.197.
11) Caves and Jones [14].
12) Dupuit [17], as quoted from Fullerton [18], p.143. Within [ ] is added by author.
13) It does not mean, however, that this idea was universally accepted by economists of the period. Indeed, Ricard [40] openly disagreed with Say over this very point (pp.155-156):

> "If a tax, however, burdensome it may be, fall on revenue, and not on capital, it does not diminish demand, it only alters the nature of it. It enables government to consume as much of the produce of the land and labour of the country as was before consumed by the individuals who contribute to the tax, an evil sufficiently great without overcharging it. If my income is £1000 per annum, and I am called upon for £100 per annum for a tax. I shall only be able to demand nine-tenths of the quantity of goods which I before consumed, but I enable government to demand the other tenth".

14) George [20], p.409.
15) Bastable [4], pp.136-137; Leroy-Beaulieu [35].
16) Schumpeter [42].
17) Clark [15]. See also [2], p.76.
18) Laffer and Seymore [34], p.5.
19) Thurow [46], p.133. According to a direction of Thurow, see also Danziger, Haveman, and Plotnick [16], p.975.
20) Wanniski [47].

Walter Heller has his own complaints about Wanniski's analysis. For example, Heller make an objection to Wanniski's evidence about the Andrew Mellon tax cuts of the 1920s: "At a time when only a few million Americans paid income taxes and federal spending was less than 5% of GNP (it was 3% in 1929), we are asked to believe that federal income tax cuts alone powered the growth of GNP from $70 billion in 1921 to $103 billion in 1929" (Heller [26], p.20. Reprinted in Laffer and Seymour [34], p.47).

Arthur Laffer, on the other hand, calls Wanniski's book "the best book on economics ever written" (Fullerton, *op. cit.*, p.154).

21) Kinsley [30]. Reprinted in Laffer and Seymour [34], pp.35-43.

22) Laffer points out that there must be some higher rate where economic activity goes to zero: "If, every time a person went to work, he received a bill from the government instead of receiving a check from his employer, sooner or later even the wealthiest and most highly motivated would stop going to his workplace. There would be no earnings, and total government revenue would equal zero. For the sake of argument, imagine the government collects zero revenue at 100 percent tax rates" (Laffer [32], p.53).

23) Kiefer [29], p.15.

24) *Ibid.*

25) Musgrave and Musgrave [38].

26) Kiefer, *op. cit.*, p.16.

27) Canto, Joines, and Laffe [11]; [12]. And see also Laffer [33].

28) Buchanan and Lee [6]; [7]; [8]; [9]; [10].

29) Wanniski [47], pp.98-99; idem [48], pp.8-9.

30) Gutmann [23].

31) Canto, Joines, and Webb [13].

32) Grieson, Hamovitch, Levenson, and Morgenstern [22], pp.178-179.

33) Grieson [21], pp.135-136.

34) Stuart [45], p.170.

35) Fullerton [18]; [19].

36) Healy and Atrill [25].

37) For a mathematical formula in order to derived the curve in figure 2, see Ballard, Fullerton, Shoven, and Whalley [3], pp.193-194. And also, see Blinder [5], pp.84-87.

38) Laffer and Seymour [34], p.5.

39) It should be emphasised that the Laffer curve shows cutting tax rate

causes increase of tax revenue when the tax rate is in the prohibitive range. It does not insist cutting tax rate always brings increase of tax revenue as many people misunderstand. It is very clear that cutting rate always does not raise tax revenue. When cutting tax rate by 1 percent is accompanied by increase of tax base by more than 1 percent, cutting rate results in larger tax revenue. It is possible only when tax rate is in the prohibitive range.

## References


[1] "Aftershocks from Proposition 13; A New Tax-Revolt Guru: Economist Arthur Laffer and the Laffer Curve", *Newsweek* (June 26, 1978), pp.22-26.

[2] "A Guide to Understanding the Supply-Siders", *Business Week* (December 22, 1980), pp.76-78.

[3] Ballard, Charles L.; Fullerton, Don; Shoven, John B.; and Whalley, John; *A General Equilibrium Model for Tax Policy Evaluation* (Chicago and London: University of Chicago Press, 1985).

[4] Bastable, C. F.; *Public Finance* (London: Macmillan, 1903).

[5] Blinder, Alan S.; "Thoughts on the Laffer Curve", in Laurence H. Meyer, ed., *Supply-Side Effects of Economic Policy* (Boston, The Hague, London: Kluwer/Nijhoff, 1981). pp.81-92.

[6] Buchanan, James M.; and Lee, Dwight R.; "The Simple Analytics of the Laffer Curve", *Working Paper*, Center for Study of Public Choice, VPI, Blacksburg, Va. (September 1981).

[7] ———; "Where Are We on the Laffer Curve? Some Political Considerations", in Federal Reserve Bank of Atlanta and Emory University Law and Economics Center (sponsored), *Supply-Side Economics in the 1980s: Conference Proceedings* (Westport, Connecticut/London: Quorum Books, 1982), pp.183-195.

[8] ———; "Tax Rates and Tax Revenues in Political Equilibrium: Some Simple Analytics", *Economic Inquiry*, Vol. 20 No. 3 (July 1982), pp.344-354. Reprinted in James M. Buchanan and Robert D. Tollison, eds., *The Theory of Public Choice-II* (Ann Arbor: University of Michigan Press, 1984), pp.194-205.

[9] ———; "Politics. Time, and the Laffer Curve". *Journal of Political Economy*, Vol. 90, No. 4 (August 1982), pp.816-819.

[10] ———; "Some Simple Analytics of the Laffer Curve", in Horst Hanuscb, ed., *Public Finance and the Quest for Efficiency: Proceedings of the 38th Congress of the International Institute of Public Finance; Copenhagen 1982* (Detroit: Wayne State University Press, 1984), pp.281-295.

[11] Canto, Victor A.; Jones, Douglas H.; and Laffer, Arthur B.; "Tax Rates, Factor Employments, and Market Production", in Laurence H. Meyer, ed., *The Supply-Side Effects of Economic Policy* (Boston, The Hague, London: Kluwer/Nijhoff, 1981), pp.3-32.

[12] ———; "Tax Rates, Factor Employments, Market Production, and Welfare", in Victor A. Canto, Douglas H. Joines, and Arthur B. Laffer, *Foundations of Supply-Side Economics: Theory and Evidence* (New York: Academic Press, 1983), pp.1-24.

[13] Canto, Victor A.; Joines, Douglas H.; and Webb, Robert I.; "Empirical Evidence on the Effects of Tax Rates on Economic Activity", *Proceedings of the Business and Economics Statistics Section: 1979* (Washington, D. C.: American Statistical Association, 1979).

[14] Caves, Richard E.; and Jones, Ronald W.; *World Trade and Payments* (Boston: Little Brown, 1973).

[15] Clark, Colin; "Public Finance and Changes in the Value of Money", *Economic Journal*, Vol. 55. No. 220 (December 1945), pp.371-389.

[16] Danziger, Sheldon; Haveman, Robert; and Plotnick, Robert; "How Income Transfer Programs Affect Work, Savings, and the Income Distribution: A Critical Review", *Journal of Economic Literature*, Vol. 19, No. 3 (September 1981), pp.975-1028.

[17] Dupuit, Jules; "On the measurement of the Utility of Public Works", in K. J. Arrow and T. Scitovsky, eds., *Readings in Welfare Economics* (Published for the American Economic Association. Homewood, Illinois: Richard D. Irwin, 1969).

[18] Fullerton, Don; "Can Tax Revenues Go Up When Tax Rates Go Down", Washington, D. C.: Department of the Treasury, Office of Tax Analysis, Paper 41, September 1980. Reprinted in Bruce Bartlett and Timothy P. Roth, eds., *Supply-Side Solution* (London and Basingstoke: Macmillan, 1983), pp.140-157.

[19] ———; "On the Possibility of an Inverse Relationship between Tax Rates and Government Revenues", *Journal of Public Economics*, Vol. 19, No. 1 (October 1982), pp.3-22.

[20] George, Henry; *Progress and Poverty* (New York: Robert Schalkenbach Foundation, 1975; originally published in 1879).

[21] Grieson, Ronald E.; "Theoretical Analysis and Empirical Measurements of the Effects of Philadelphia Income Tax", *Journal of Urban Economics*, Vol. 8, No. 1 (July 1980), pp.123-137. Reprinted in Bruce Bartlett and Timothy P. Roth, eds., *Supply-Side Solution* (London and Basingstoke: Macmillan, 1983), pp.175-192.

[22] Grieson, Ronald E.; Hamovitch, William; Levenson, Albert M.; and Morgenstern, Richard D.; "The Effects of Business Taxation on the Location of Industry", *Journal of Urban Economics*, Vol. 4, No. 2 (April 1977), pp.170-185.

[23] Gutmann, Peter M.; "Taxes and the Supply of National Output", *Financial Analysis Journal* (November/December, 1979), pp.64-66.

[24] Hailstones, Thomas J.; ed., *Viewpoints on the Supply-Side Economics* (Reston, Virginia: Reston Publishing; Printice-Hall, 1982).

[25] Healy, C. Ross; and Atrill, Verne Henry; "Objective Economics: Will the Real Laffer Curve Please Stand Up?", *Financial Analysts Journal* (March/April 1983), pp.15-24.

[26] Heller, Walter; "The Kemp-Roth-Laffer Free Lunch", *Wall Street Journal*, July 12, 1978, p.20. Reprinted in Laffer and Seymour [34], pp.46-49.

[27] Hume, David; *Writings on Economics*, Eugene Rotwein ed., (Freeport, New York: Books for Libraries Press, 1955).

[28] Khaldun, Ibn; *The Muqaddimah*, trans., Franz Rosenthal, Princeton University Press Bollingen Series, XLVIII, Vol. 2 (Princeton University Press, 1967).

[29] Kiefer, Donald W.; "An Economic Analysis of the Kemp/Roth Tax Cut Bill, H. R. 8333: A Description, an Examination of Its Rationale, and Estimates of Its Economic Effects", *Congressional Record* (August 2, 1978), pp.H7777-H7787. Reprinted in Laffer and Seymour [34], pp.13-27.

[30] Kinsley, Michael; "Alms for the Rich", *New Republic*, Vol. 179 (August 19, 1978), pp.19-26. Reprinted in Laffer and Seymour [34], pp.35-43.

[31] Kobayashi, Yasuyoshi; "Foundations of Supply-Side Economics", *The Bulletin of the Society for the Study of Science Today*, No. 23 (December 1989), pp.15-36.

[32] Laffer, Arthur B.; "An Equilibrium Rational Macroeconomic Framework", Nake M. Kamrany and Richard H. Day, eds., *Economic Issues of the Eighties* (Baltimore and London: Johns Hopkins University Press, 1979), pp.44-57.

[33] ———; "Government Exactions and Revenue Deficiencies", *Cato Journal*, Vol. 1, No. 1 (Spring 1981), pp.1-21. Reprinted in Richard H. Fink, ed.,

*Supply-Side Economics: A Critical Appraisal* (Maryland: Aletheia Books; University Publication of America, 1982), pp.185-203; and in Bruce Bartlett and Timothy P. Roth, eds., *Supply-Side Solution* (London and Basingstoke: Macmillan, 1983). pp.120-139.

[34] Laffer, Arthur B.; and Seymour, Jan P.; eds., *The Economics of the Tax Revolt: A Reader* (New York: Harcourt Brace Jovanovich, 1979).

[35] Leroy-Beaulieu, Paul; "On Taxation in Generall", in Richard A. Musgrave and Alan T. Peacock, *Classical in the Theory of Public Finance* (London: Macmillan, 1964).

[36] Meadows, Edward; "Laffer Curveball Picks Up Speed", *Fortune* (February 23, 1981), pp.85-88.

[37] ——; "The Ideas of Arthur Laffer" *Economic Impact* (1981/3), pp.20-22.

[38] Musgrave, Richard A.; and Musgrave, Peggy B.; *Public Finance in Theory and Practice*, 2nd ed. (New York: McGrow-Hill, 1973).

[39] "Notable and Quotable", *Wall Street Journal* (September 29, 1978), p.20.

[40] Ricardo, David; *On the Principles of Political Economy and Taxation* (New York: Dutton, 1973; originally published in 1817).

[41] Say, Jean Baptiste; *A Treatise on Political Economy or the Production, Distribution, and Consumption of Wealth*, trans., Clement C. Biddle (Boston: Wells and Lilly, 1924; original published 1803).

[42] Schumpeter, Joseph A.; *Die Krise des Steuerstaats* (Graz und Leipzig, 1918).

[43] ——; *History of Economic Analysis* (New York: Oxford University Press, 1954).

[44] Smith, Adam: *An Inquiry into the Nature and Causes of Wealth of Nations*, Edwin Cannan ed. (Tokyo: Charles E. Tuttle Company, 3rd printing, 1982; original published 1776).

[45] Stuart, Charles E.; "Swedish Tax Rates, Labor Supply, and Tax Revenues", *Journal of Political Economy*, Vol. 89, No. 5 (October 1981, pp.1020-1038. Reprinted in Bruce Bartlett and Timothy P. Roth, eds., *Supply-Side Solution* (London and Basingstoke: Macmillan, 1983), pp.158-174.

[46] Thurow, Lester C.; *Dangerous Currents: The State of Economics* (New York: Ramdom House, 1983).

[47] Wanniski, Jude; *The Way the World Works: How Economies Fail and Succeed* (New York: Basic Books, 1978).

[48] —— ; "Taxes, Revenues, and the "Laffer Curve", *Public Interest*, No. 50 (Winter 1978), pp.3-16. Reprinted in Laffer and Seymour [34], pp.7-12.