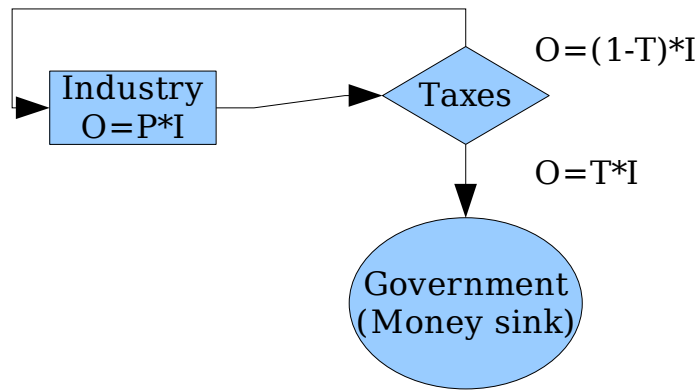


The simplest model of the economy can be represented as:

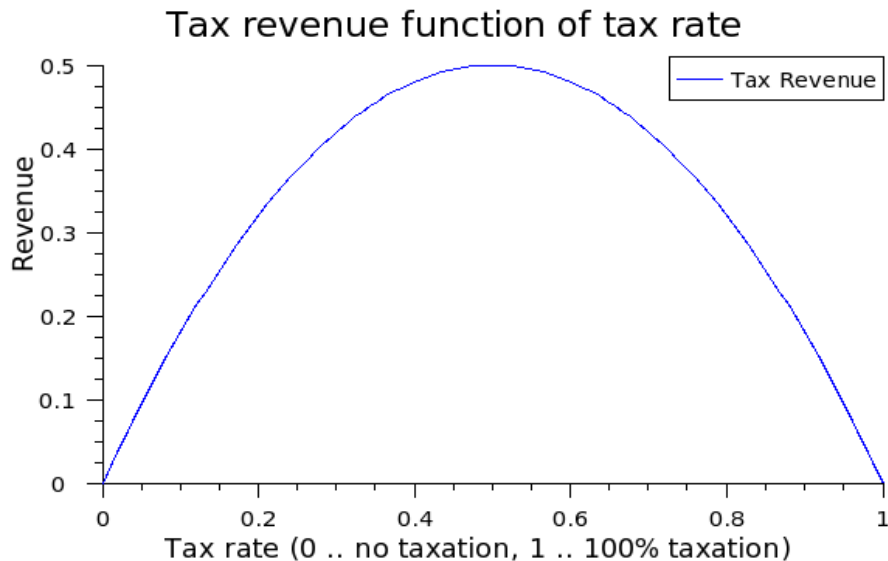


In this model, the Government is modeled as a money pit.

Considering the economic output today to be one unit, 1, we want to calculate the output on the next business cycle. After extracting the due taxes $T * 1$ the new input in to industry is going to be $1 * (1 - T)$, where T is the current tax rate, having values from 0 to 1 (0% to 100%). The new output of the industry in the next business cycle will be $P * (1 - T)$ while the collected taxes from this output will be $O(T, P) = P * (1 - T) * T$. The graphic representation of the function:

$$\text{revenue}(T, P) = P * (1 - T) * T$$

it is exactly the well known Laffer curve:



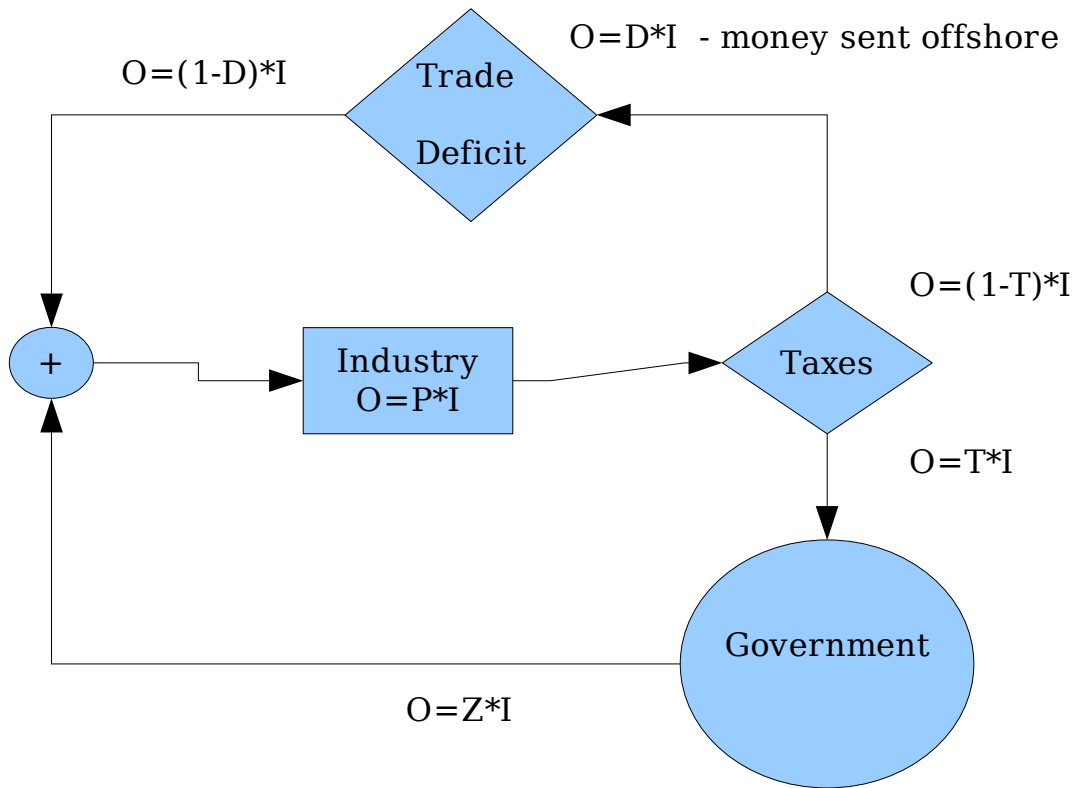
The condition for the economy to be sustainable (output not to decrease) is $P * (1 - T) > 1 \Rightarrow T < P - 1/P$. For example, for a industry creating 20% more wealth than is inputs the condition to keep the economy sustainable is not to tax it over 16.67 %, otherwise the economy will enter into a downward path.

This are the arguments employed by the adepts of **Supply Side** economics to support the idea that tax cuts are the right politics to stimulate the economy.

However, the fact that this model is too simplistic it is obvious. First, the maximum point is always at 50%, as result from solving the equation $d \text{ revenue}(T) / d T = 0$. From real life we know that this is not always the case. The reason for this differences is because the simplistic model ignore a lot of other factors. To create a more realistic model we consider 2 more factors:

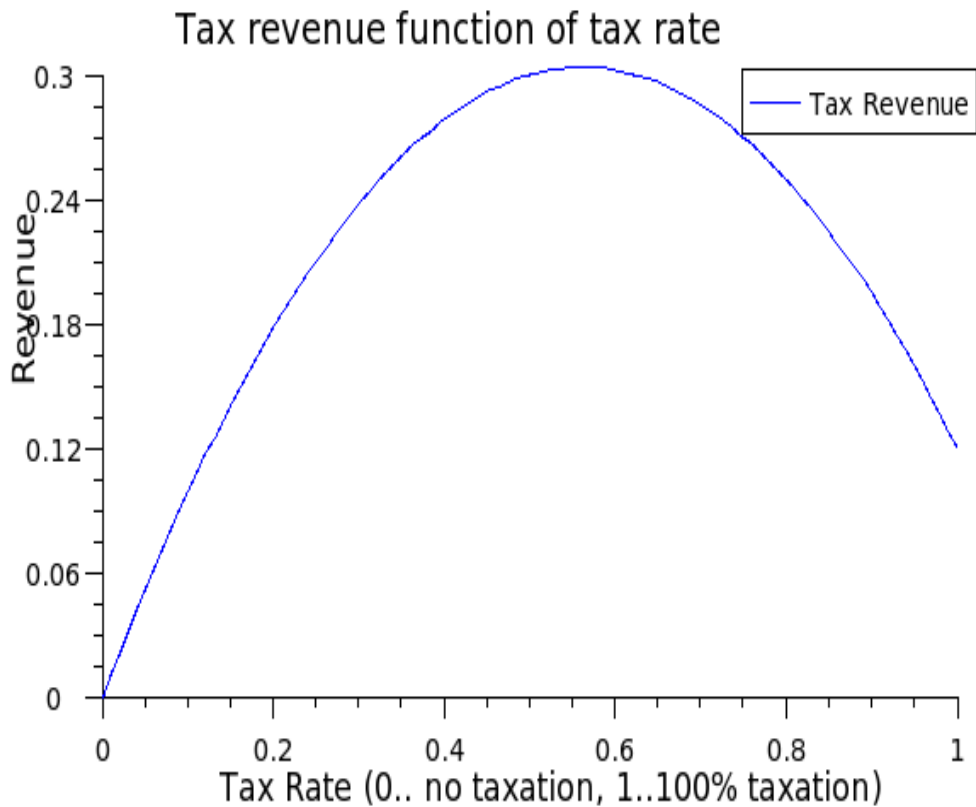
- Trade deficit (If I would live in China I would be interested in surplus :-)
- Government is not a money pit. The biggest part of the money government collect as taxes is spent back into the economy (Social Security, welfare, Medicaid/Medicare, infrastructure projects and so on). Let call the percent of the money gov. recirculate in the economy **Z-factor**.

The new diagram of the economy become:

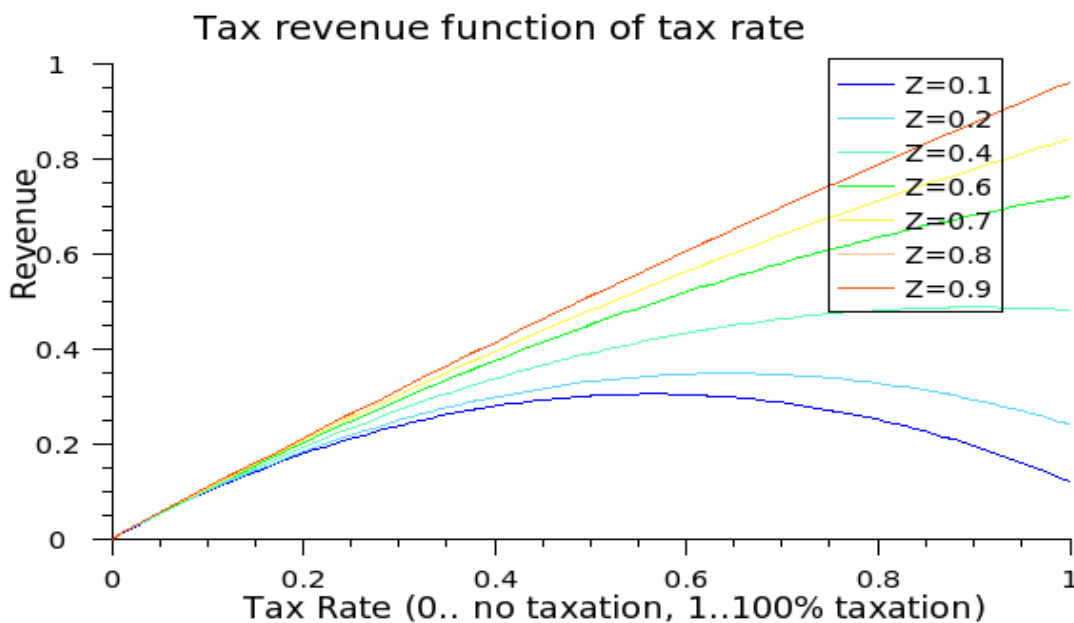


The equation for the output in the next business cycle based on an 1 unit present output become: $O(T, Z, D, P) = P \cdot ((1 - D) \cdot (1 - T) + Z \cdot T)$ and the tax revenue collected by government is going to be $\text{revenue}(T, Z, D, P) = P \cdot ((1 - D) \cdot (1 - T) + Z \cdot T) \cdot T$

If we plot the graph fixing the trade deficit at 10% of the industrial output and Z factor at 10% of government revenue we get the classic Laffer shape. However, this one is not symmetrical around 50% and we can calculate the peak of revenue as $d \text{ revenue} / d T = 0 \Rightarrow T = (1 - D) / 2 \cdot (1 - Z + D)$. For the case presented above Deficit 10% and Z-Factor=10% the optimum tax revenue will be at 0.56 as seen below.

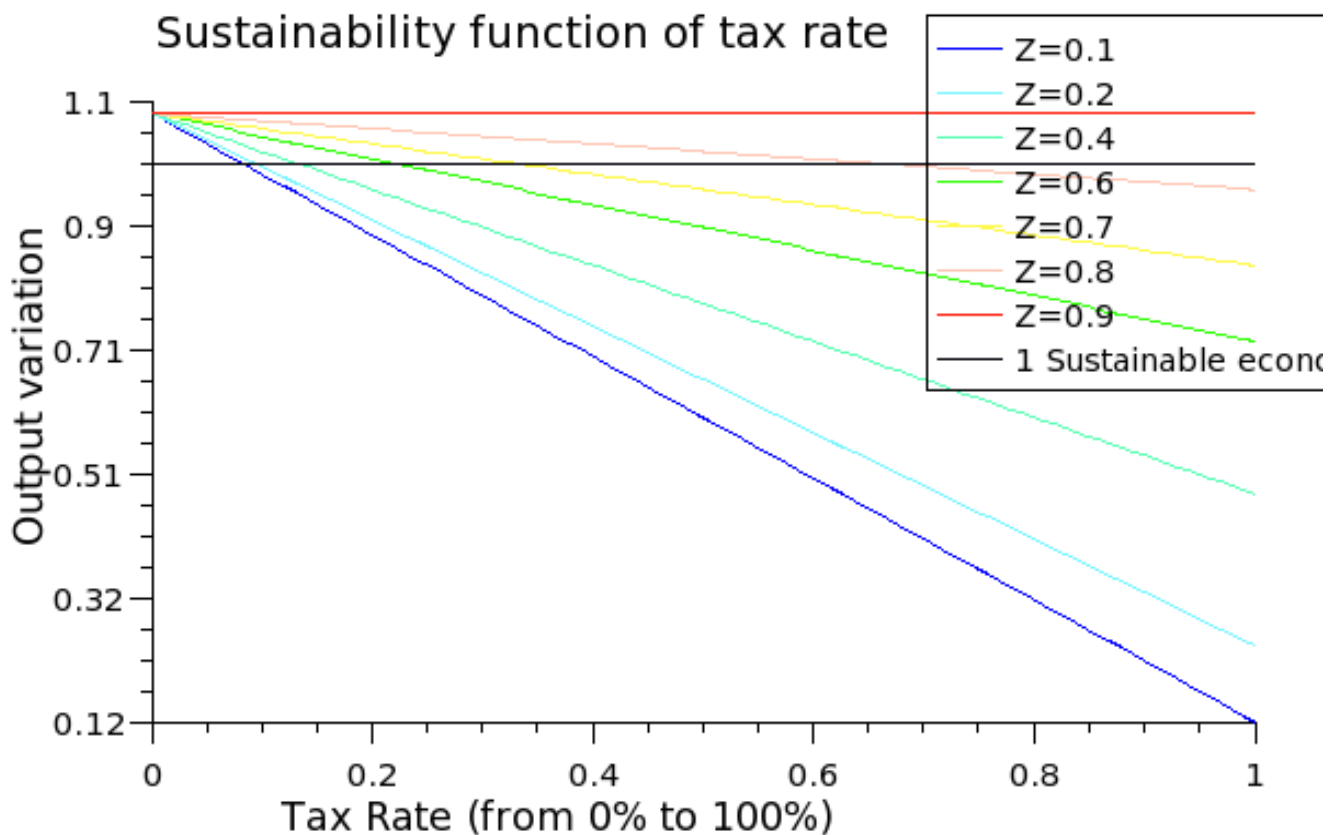


A very interesting analyze however, will be to study how the tax revenue is going to variate based on variation of Z factor, keeping in mind that all the governments of today are working with Z factors larger than 0.1. In the following graph, the Deficit is kept at 10% and Z factor (involvement of government in economy) is studied from 0.1 till 0.9.



Surprise, surprise, surprise. If the Z-factor is over 0.5 the top of the revenue curve is getting out of the graphic. That means there is not going to be any more a point over which increasing the tax rate is going to reduce the tax revenues. And, well, most of governments actually operate with a Z-factor over 0.5.

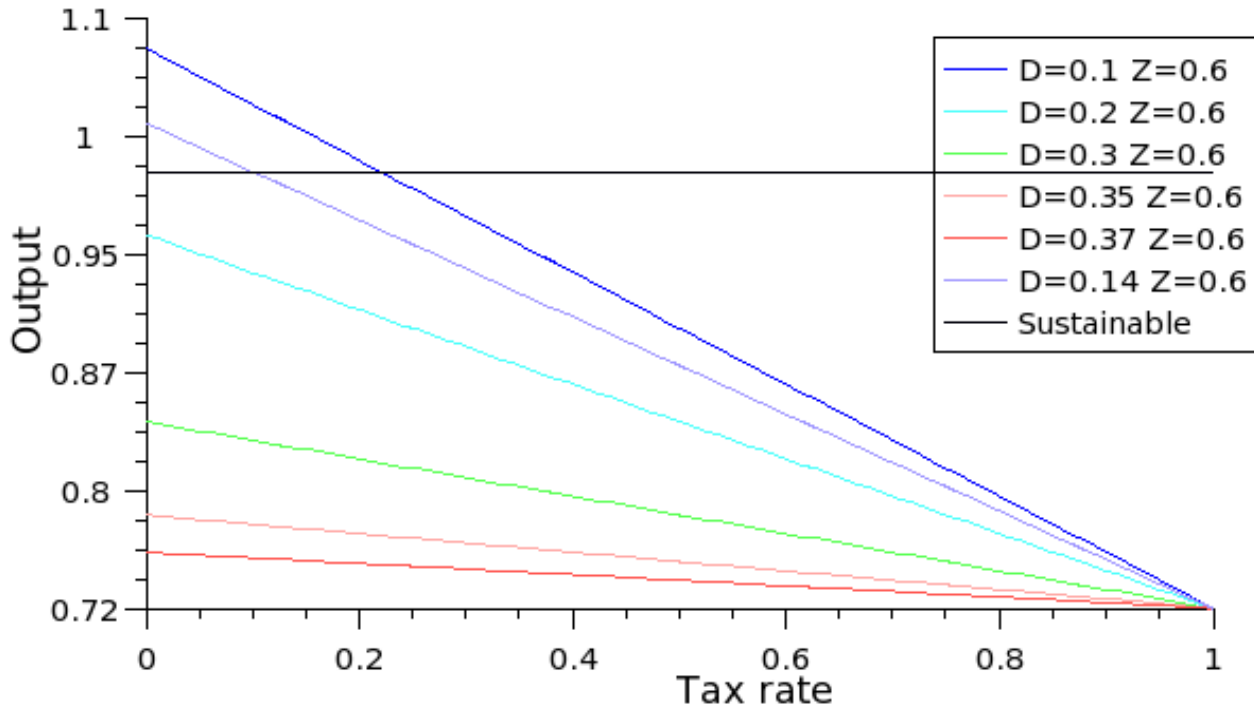
Another interesting idea to study is how is the economy sustainable based on tax rate and variations of the z-factor. From the output equation we can define sustainability as $\Delta O \geq 0$ this imply $P*((1-D)*(1-T) + Z*T) > 1$. Keeping Deficit at 10% and $P=1.2$ as in all the examples above we get the following sustainability graph:



As we see, with a small government $Z=0.1$ the economy is not sustainable anymore for any taxation over 10%, for a big government $Z=0.9$ the economy is sustainable at ANY tax rate. Seems to me the adepts of supply side economics using Laffer's curve to support their idea of tax cuts, got it completely wrong.

The influence of deficit is also a point very interesting to look at. In the next graphic I kept the Z at 0.6 and plot the industrial output function based on deficit. It is easy to observe that the economy is not sustainable for a deficit bigger than 16% regardless of taxation. This model of economy does not account for national debt. However, this debt have to be payed some time in future too.

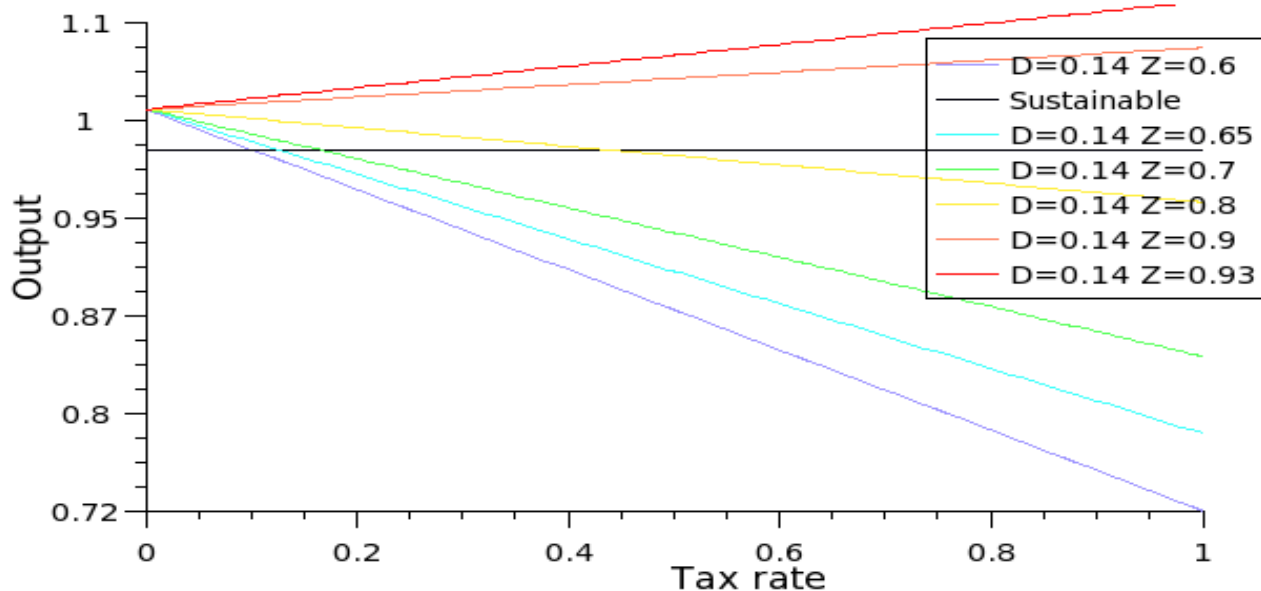
Sustainability function of deficit and taxation



For example, for a deficit of 14% the economy is not sustainable if the taxation rate is 10% or more. While the camp of supply side will argue to decrease the taxation in case of deficit, I will show you a much better solution.

In the next graphic we start from the curve we have at deficit=14%, which we know that will result into an unsustainable economy for taxation of 10% or bigger. However, I am going to increase the Z factor to see how the economy behave.

Sustainability with deficit and increasing Z



The results are amazing, and possibly a deadly blow to the supply side economics groups. Increasing the Z factor (participation of the government into local economy) the economy start to be sustainable even for bigger tax rates. More than that, if the Z factor is bigger than 1-D we actually are going to see an increase into the economy output while increasing taxes.

So, if you have a situation where the deficit is a big problem to the sustainability of the economy itself, the solution to recover is NOT to cut taxes but to INCREASE them, simultaneously with increasing the Z factor. That is. Instead of cutting taxes, increase them and put all extra money in infrastructure projects or social services. This will put money into domestic economy while limiting the amount of cash that flow outside. The domestic economy is going to rebound.

Limitation of the current study.

Yes, there are limitations. I used the simple economy model possible that take care about the government spending, deficit and industrial output. Some variation are to be expected if a much more accurate model is employed.

Another limitation is that I quantized by the factor P all the issues regarding production in the private industry, and I considered P constant regardless of the tax rate. This may not be the case due to human nature. In real life, it is possible to actually see a decrease in P with an increase in tax rate, since people (and companies too) don't like high taxes and a de-motivation can happen.

However, despite these limitations I hope I made very clear the point that supply side economics it is a flawed theory and this can be proved with exactly the same tools they use to promote it. I believe that the main fault of supply side economics is that they does not account for what I called here the Z-Factor.

They assume by default a small government ($Z = 0$) that actually act as a money pit. Based on this assumption, the only option to help the economy is to cut taxes since there is not way to use the Z loop to recirculate money into the economy. This seems like a circular logic: Assume by default an impotent government they prove that the government is impotent to handle the economy. Not a very bright logic isn't it ?

Comments, corrections, critique etc. can be sent at: mtm_spm@yahoo.com.