Principles of Tax Modeling II: Flat or non flat? Which system is better for tax collection maximization

José Manuel Martin Coronado

Available at: https://works.bepress.com/jmmartinc/14/
Principles of Tax Modeling II: Flat or non flat? Which system is better for tax collection maximization?

José-Manuel Martin Coronado

jm@emecep-consultoria.com
Head of Tax Research
EMAE Lawyers & Economists
Lima, Perú

Introduction

Recent discussion is focused on the type of tax rate countries should charge to taxpayers. Some argue that the best tax is the progressive (non-flat) tax rate, which discriminates (legally) between taxable incomes of taxpayers. Others prefer a simpler and wider flat tax, which may lower the willing to apply tax strategies to avoid taxes.

This discussion is clearly hot, because the OECD is promoting a flat tax, while many tax scholars (economists and lawyers), such as Thomas Piketty argue that the richest should be charged significantly more than the less fortunate.

In this article, a response to this dilemma will be analyzed with as simulation. One should note that the tax collection depends on four important quantitative variables: 1) The Income Distribution among tax payers, 2) The nominal change of the tax rate structure, 3) The reaction function of taxpayers, 4) The learning curve of taxpayers.

The tax model

To present this argument, a simulation of a random economy will be done, called "Randonomia", where "TI" is the basic taxable income counted as "n" times the minimum wage. The basic tax rate (TR) is 10%, which is a flat rate.
There are ten groups of income (G), which determine socioeconomic groups. The key aspect is that Randonomia has three possible scenarios of how income is distributed between its 40 millions of inhabitants. DISTR1 is used to assign a uniform distribution, which means that there are 4 millions of people in each Group of Income (G). To the contrary DISTR2 assumes that Randonomia has a non-centrally Chi-square distribution and quite biased to the right, which means that most of the population’s income is low or medium and only few are high income earners. Finally, the third distribution (DISTR3) is a traditional normal distribution. The above mentioned is presented in Table 1.

Table 1

<table>
<thead>
<tr>
<th>TI</th>
<th>1000</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DISTR1</td>
</tr>
<tr>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>10</td>
<td>4</td>
</tr>
<tr>
<td>TOTAL</td>
<td>40</td>
</tr>
</tbody>
</table>

Source: José-Manuel Martin Coronado (EMECEP Consulting)

Now, in the earlier stage of this country, it was stated that a flat tax was more simple in order to start collecting taxes. It was suggested that a 10% flat tax rate was the simplest to start with. As a consequence in Group 1 (01 times the minimum wage of 1000 "spurees", the national currency), the tax due for each
individual is 100 spurees and multiplied by the population \((P = 4\) in the first case))

in that group of income gives a total of 400 spurees collected. This formula

\((TR \times G \times 1000 \times P)\)

is applicable to all the groups of income and distribution scenarios.

Table 2\(^1\)

<table>
<thead>
<tr>
<th></th>
<th>TR</th>
<th>10%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>G</td>
<td>RTFD1</td>
</tr>
<tr>
<td>1</td>
<td>400</td>
<td>200</td>
</tr>
<tr>
<td>2</td>
<td>800</td>
<td>1,000</td>
</tr>
<tr>
<td>3</td>
<td>1,200</td>
<td>2,100</td>
</tr>
<tr>
<td>4</td>
<td>1,600</td>
<td>2,400</td>
</tr>
<tr>
<td>5</td>
<td>2,000</td>
<td>2,500</td>
</tr>
<tr>
<td>6</td>
<td>2,400</td>
<td>2,400</td>
</tr>
<tr>
<td>7</td>
<td>2,800</td>
<td>2,800</td>
</tr>
<tr>
<td>8</td>
<td>3,200</td>
<td>2,400</td>
</tr>
<tr>
<td>9</td>
<td>3,600</td>
<td>1,800</td>
</tr>
<tr>
<td>10</td>
<td>4,000</td>
<td>2,000</td>
</tr>
<tr>
<td>TOTAL</td>
<td>22,000</td>
<td>19,600</td>
</tr>
</tbody>
</table>

Source: José Manuel Martín Coronado (EMECEP Consulting)

As the reader can observe, the normal distribution (DISTR3) has a overall tax collection equal to the uniform one. Though, when the bias is given to the high income population, and thus the most income of the country is concentrated in low and medium income inhabitants, then the taxes collected are around 11% lower \((19,600/22,000 - 1)\).

Therefore, it's clear that the success of a flat tax regime depends on the distribution of its population's income. Also, the general rule in real life is that most of the

\(^1\) Note: RTFD1 = Revenue from taxes - flat and distribution 1 - uniform
population is under a chi-square like distribution, and not an uniform or normal, though, empirical estimation must be done in case by case basis.

On the other hand, what could happen if the policy makers change the tax regime to a differentiated progressive tax rate? The results will vary as follows

Table 3

<table>
<thead>
<tr>
<th>TR</th>
<th>RTFD1</th>
<th>RTFD2</th>
<th>RTFD3</th>
</tr>
</thead>
<tbody>
<tr>
<td>10%</td>
<td>400</td>
<td>200</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>800</td>
<td>1,000</td>
<td>400</td>
</tr>
<tr>
<td></td>
<td>1,200</td>
<td>2,100</td>
<td>1,200</td>
</tr>
<tr>
<td></td>
<td>1,600</td>
<td>2,400</td>
<td>2,400</td>
</tr>
<tr>
<td>15%</td>
<td>3,000</td>
<td>3,750</td>
<td>5,250</td>
</tr>
<tr>
<td></td>
<td>3,600</td>
<td>3,600</td>
<td>6,300</td>
</tr>
<tr>
<td></td>
<td>4,200</td>
<td>4,200</td>
<td>6,300</td>
</tr>
<tr>
<td></td>
<td>4,800</td>
<td>3,600</td>
<td>4,800</td>
</tr>
<tr>
<td>20%</td>
<td>7,200</td>
<td>3,600</td>
<td>3,600</td>
</tr>
<tr>
<td></td>
<td>8,000</td>
<td>4,000</td>
<td>2,000</td>
</tr>
</tbody>
</table>

TOTAL 34,800 28,450 32,350

Source: Jose-Manuel Martin Coronado (EMEGEP Consulting)

This table looks optimistic from a tax collection perspective. Though, it’s not very realistic in the sense of tax justice because the lowest income earners don’t have tax rate reduction nor they receive a sort of tax subsidy from the richer.

So, a specific tax policy should be more realistic given the political and social component of tax reforms. Thus, a new tax table, with adjustments, is presented.
Table 4

<table>
<thead>
<tr>
<th>TR</th>
<th>RTFD1</th>
<th>RTFD2</th>
<th>RTFD3</th>
</tr>
</thead>
<tbody>
<tr>
<td>5%</td>
<td>200</td>
<td>100</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>400</td>
<td>500</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>600</td>
<td>1,050</td>
<td>600</td>
</tr>
<tr>
<td></td>
<td>800</td>
<td>1,200</td>
<td>1,200</td>
</tr>
<tr>
<td>10%</td>
<td>2,000</td>
<td>2,500</td>
<td>3,500</td>
</tr>
<tr>
<td></td>
<td>2,400</td>
<td>2,400</td>
<td>4,200</td>
</tr>
<tr>
<td></td>
<td>2,800</td>
<td>2,800</td>
<td>4,200</td>
</tr>
<tr>
<td></td>
<td>3,200</td>
<td>2,400</td>
<td>3,200</td>
</tr>
<tr>
<td>20%</td>
<td>7,200</td>
<td>3,600</td>
<td>3,600</td>
</tr>
<tr>
<td></td>
<td>8,000</td>
<td>4,000</td>
<td>2,000</td>
</tr>
<tr>
<td>TOTAL</td>
<td>27,600</td>
<td>20,550</td>
<td>22,750</td>
</tr>
</tbody>
</table>

Source: José-Manuel Martin Coronado (EMECEP Consulting)

As one can see, the results are not as good as table 3, which means that the tax rate of departure has a very high importance for this tax policy.

Flat or non flat?

To sum up, the dynamics of a change from a flat tax regime to a progressive one are shown in table 5.

Table 5

<table>
<thead>
<tr>
<th>DYNAMICS</th>
<th>RTFD1</th>
<th>RTFD2</th>
<th>RTFD3</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLAT TO DIF(+)</td>
<td>12,800</td>
<td>8,850</td>
<td>10,350</td>
</tr>
<tr>
<td>%CHG</td>
<td>58.2%</td>
<td>45.2%</td>
<td>47.0%</td>
</tr>
<tr>
<td>FLAT TO DIF(+-)</td>
<td>5,600</td>
<td>950</td>
<td>750</td>
</tr>
<tr>
<td>%CHG</td>
<td>25.5%</td>
<td>4.8%</td>
<td>3.4%</td>
</tr>
</tbody>
</table>

Source: José-Manuel Martin Coronado (EMECEP Consulting)
Again, one can see how sensible tax policy changes are, in particular when the government chooses a progressive positive tax rate (which means all tax rates are increased) than a more fair progressive tax rate. In the latter case, only the high income earners are subject to a tax increase and the lower earner obtains a decrease.

It's important to note than in this simulation, the first four income groups are considered the low income earners, the second group of four are the medium income earners and the remainders are the richest. However, the distribution of applicable tax rates is also a variable that can be updated in future extensions of this model.

Therefore, the interesting increases of tax revenue in the Table 4 are lowered because of a more realistic or fair tax policy. And if the cost of the tax reform is around 5% total revenue, simply there will not be any profit at all for a tax administration in a country with Chi-square or normal distributions.

**Model Extension: Tax avoidance**

On the other hand, we are assuming so far that tax payer don't take strategic decisions, which is of course untrue in real world. In this simulation, two reactions will be assumed according to the tax policy selected: Differentiated progressive tax rate with general increase for all tax payers (D+, as Table 3) or a fair increase (D+/-, as Table 4).

The main reaction of taxpayers could be tax avoidance, but not yet in an illegal way. It should be stated that this model doesn't include an underground economy with huge levels of illegal tax evasion. The results are as follows.
Table 6 (A-left & B-right)

<table>
<thead>
<tr>
<th>AVOIDANCE (DIF+)</th>
<th>RTFD1B</th>
<th>RTFD2B</th>
<th>RTFD3B</th>
</tr>
</thead>
<tbody>
<tr>
<td>5%</td>
<td>380</td>
<td>190</td>
<td>95</td>
</tr>
<tr>
<td></td>
<td>760</td>
<td>950</td>
<td>380</td>
</tr>
<tr>
<td></td>
<td>1,140</td>
<td>1,995</td>
<td>1,140</td>
</tr>
<tr>
<td></td>
<td>1,520</td>
<td>2,280</td>
<td>2,280</td>
</tr>
<tr>
<td>33%</td>
<td>2,001</td>
<td>2,501</td>
<td>3,502</td>
</tr>
<tr>
<td></td>
<td>2,401</td>
<td>2,401</td>
<td>4,202</td>
</tr>
<tr>
<td></td>
<td>2,801</td>
<td>2,801</td>
<td>4,202</td>
</tr>
<tr>
<td></td>
<td>3,202</td>
<td>2,401</td>
<td>3,202</td>
</tr>
<tr>
<td>50%</td>
<td>3,600</td>
<td>1,800</td>
<td>1,800</td>
</tr>
<tr>
<td></td>
<td>4,000</td>
<td>2,000</td>
<td>1,000</td>
</tr>
<tr>
<td>TOTAL</td>
<td>21,805</td>
<td>19,320</td>
<td>21,803</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AVOIDANCE (DIF+/-)</th>
<th>RTFD1B</th>
<th>RTFD2B</th>
<th>RTFD3B</th>
</tr>
</thead>
<tbody>
<tr>
<td>5%</td>
<td>190</td>
<td>95</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td>380</td>
<td>475</td>
<td>190</td>
</tr>
<tr>
<td></td>
<td>570</td>
<td>998</td>
<td>570</td>
</tr>
<tr>
<td></td>
<td>760</td>
<td>1,140</td>
<td>1,140</td>
</tr>
<tr>
<td>5%</td>
<td>1,900</td>
<td>2,375</td>
<td>3,325</td>
</tr>
<tr>
<td></td>
<td>2,280</td>
<td>2,280</td>
<td>3,990</td>
</tr>
<tr>
<td></td>
<td>2,660</td>
<td>2,660</td>
<td>3,990</td>
</tr>
<tr>
<td></td>
<td>3,040</td>
<td>2,280</td>
<td>3,040</td>
</tr>
<tr>
<td>50%</td>
<td>3,600</td>
<td>1,800</td>
<td>1,800</td>
</tr>
<tr>
<td></td>
<td>4,000</td>
<td>2,000</td>
<td>1,000</td>
</tr>
<tr>
<td>TOTAL</td>
<td>19,380</td>
<td>16,103</td>
<td>19,093</td>
</tr>
</tbody>
</table>

Source: José-Manuel Martin Coronado (EMEC EP Consulting)

Table 6 (A & B) show that the static modeling of the tax policy in Tables 3 and 4 was unrealistic, because taxpayers will likely defend its disposable income whenever it’s possible. And the means to do that is by tax planning (“legal avoidance”) which is affordable by higher income earners rather than the lower’s.

Conclusion

The implementation of a progressive tax after a flat tax will provide a strategic opportunity for those taxpayers that have the means to adjust and maintain their effective tax burden. Thus, this tax policy will mainly cause tax avoidance (and even so, tax evasion) rather than improve tax collection. And that’s counterproductive for any fiscal policy which will likely impede to redistribute income and achieve a more equal society.