Progressive Versus Uniform Consumption Tax Reforms

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January 30, 2009

Abstract
This paper contributes to the tax reform debate. Using a quantitative exercise, I compare the effects on welfare and output of "uniform consumption tax reforms" and "progressive consumption tax reforms" when income inequalities or the fraction of the population facing a no-borrowing constraint become larger. JEL: E61, E62.

Introduction
The tax reform debate has recently been enriched by proposals to adopt a higher uniform consumption tax rate\(^1\) in replacement of the inefficient capital income taxation\(^2\). Uniform taxation is generally preferred to progressive taxation because it minimizes distortions and welfare losses. By contrast, Conesa and Krueger (2006) find that in an incomplete market framework, a progressive tax system is optimal. In a model combining no-borrowing constraints and income inequalities, Mathieu-Bolh (2009) proposes several reforms that improve welfare and are distributionally neutral. In particular, capital income taxation can be eliminated and replaced either with a uniform consumption tax associated with more progressive labor income taxes ("uniform consumption tax reform") or with progressive consumption taxes, consisting of taxing necessities and luxury goods at different rates ("progressive consumption tax reform").

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\(^{3}\)See Auerbach and Hines (2001), Slemrod (2007).
In this paper, I apply the same model to a different question: Which of these two reforms is best if income inequalities or the fraction of the population facing a no-borrowing constraint become larger? The question is motivated by the observed increase in income inequalities, started in the 1970's and the tightening of credit constraints due to the recent financial crisis. The proposed framework is suitable to address this question since the larger income inequalities or the fraction of the population facing a no-borrowing constraint, the larger the potential welfare gains from consumption smoothing achieved by either reform.

I obtain three new results. Uniform consumption tax reforms consistently generate larger welfare gains but smaller output gains than progressive consumption tax reforms when income inequalities or the fraction of the population facing a no-borrowing constraint become larger. Quantitatively, the differences in welfare and output gains generated by the two types of reforms remain roughly unchanged when the percentage of the population facing a no-borrowing constraint becomes larger. By contrast, in the presence of credit constraints, the larger income inequalities, the more similar the effects of uniform and progressive consumption tax reforms on long term welfare and output.

1 The economy

In this section, I present a brief overview of the model, which is fully developed in Mathieu-Bolh (2009). The Yaari (1965)-Blanchard (1985) framework is modified in three ways. I introduce two stages in life, "poor" and "rich" as in Gertler (1997, 1999), two types of goods (necessities and luxuries) and a distortive set of taxes (capital income taxation, progressive labor income and consumption taxes). The model reflects changes in consumption behavior over the life-cycle to, which result from the optimal response of agents to exogenous changes in productivity and no-borrowing constraints. By assumption, all agents are born in the poor category with low productivity and no wealth. The poor faces a constant probability of becoming rich. With an increasing productivity profile, she desires to shift consumption from the future to the present. The no-borrowing constraint is therefore binding for the poor. As a result, she consumes her entire disposable income. The rich has a high productivity profile. Faced with lifetime uncertainty (and the decline in her income with retirement), the rich desires to

\textsuperscript{3}See Gourinchas and Parker (2002).
save to smooth her consumption. As a result, her no-borrowing constraint is not binding. The rich consumes her lifetime income.

Aggregate variables are deduced from individual behavior and from the aggregation rules derived from the population’s structure.

Firms produce a basket of necessities and luxury good using capital and effective labor as inputs. The production function is “Cobb-Douglas”. Each instant, firms maximize their instantaneous profit. Assuming perfect competition, production factors are paid their marginal product.

The government finances exogenous public spending by means of labor income taxes, a capital income tax, consumption taxes and debt. For any value of the tax rates, the debt level adjusts to satisfy a standard intertemporal budget constraint.

The model is closed with the market clearing condition.

2 Results

The calibration of the base case model is presented in tables 2 and 3 in the appendix⁴. The model mimics the main characteristics of the US economy (table 4 in the appendix). Income inequalities between rich and poor are described with a "lifetime effectiveness ratio" equal to 1.6. It is the share of income of individuals who hold at least a bachelor’s degree (61%) divided by the share of income of individuals who hold less than a bachelor’s degree (39%). The no-borrowing constraint affects the poor, which represent 45% of the adult population. This percentage is deduced from the expected time spent in the poor and rich categories (respectively from 16 until 42 years old and from 43 until 75).

In this environment, I consider a uniform and a progressive consumption tax reform. After eliminating capital income taxation, consumption and labor income tax rates are adjusted so that both the poor and the rich benefit from the same welfare gains, the government tax revenue is unchanged and overall welfare gains are maximized in the long run. Comparing steady states, I find that a uniform consumption tax reform generates a welfare gain which is 2.1% higher than with a progressive consumption tax reform, but that output is 1.0% lower (See table 1 below).

⁴See webpage for details.
Uniform and progressive consumption tax reforms are reexamined in light of two new scenarios\(^5\). In the first scenario, income inequalities are higher in the steady state. The lifetime effectiveness ratio is increased to 5.6, which reflects the differences in productivity between individuals who hold less than a high school degree and those who hold a professional degree. The ratio is further increased to a hypothetical value of 9. In the second scenario, the percentage of the working population affected by the no-borrowing constraint in the steady state is increased to 50% and 62%. This percentage is modified by increasing the expected time spent as poor and decreasing the expected time spent as rich\(^6\).

For each scenario, I re-calculate the tax rates\(^7\) that maximize welfare gains, leave the total tax revenue unchanged and are neutral for redistribution. Tables 5 and 6 in appendix present the percentage increase in welfare and output achieved by the reforms in the steady state. Table 1 compares the effects of the two types of reforms. In this table, the first number represents the difference between the welfare gains achieved by a uniform and a progressive consumption tax reform. The second number is the difference between the output gains.

Table 1: Welfare/output gains of uniform vs. progressive consumption tax reforms

<table>
<thead>
<tr>
<th></th>
<th>Income inequalities</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.6</td>
<td>5.6</td>
<td>9.0</td>
</tr>
<tr>
<td>No 45%</td>
<td>2.1/-1.0</td>
<td>0.8/-0.3</td>
<td>0.5/-0.2</td>
</tr>
<tr>
<td>borrowing 50%</td>
<td>2.1/-1.0</td>
<td>0.8/-0.3</td>
<td>0.5/-0.2</td>
</tr>
<tr>
<td>constraint 62%</td>
<td>2.1/-1.2</td>
<td>0.8/-0.3</td>
<td>0.5/-0.2</td>
</tr>
</tbody>
</table>

(1) Uniform consumption tax reforms consistently generate larger welfare gains but smaller output gains than progressive consumption tax reforms when income inequalities or the fraction of the population facing a no-borrowing constraint become larger.

Uniform consumption tax reforms involve progressive labor income taxes. Adjusting the progressivity of the labor income tax seems the best tool to smooth consumption and generate welfare gains. However progressive consumption taxes lead the rich to accumulate more capital, thereby generating the largest output gains.

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\(^5\)See web page for details.
\(^6\)Overall life expectancy is therefore unchanged.
\(^7\)See web page for details.
(2) Quantitatively, the differences in welfare and output gains generated by the two reforms remain roughly unchanged when the percentage of the population facing a no-borrowing constraint becomes larger. In this scenario, the welfare gains from either reform become larger as they both enable to smooth consumption. The effect of both types of reforms on output remain roughly the same as they both stimulate capital accumulation, which compensates for the fact that a smaller proportion of the population accumulates capital.

(3) In the presence of credit constraints, the larger income inequalities, the more similar the effects of uniform and progressive consumption tax reforms on long term welfare and output.

The larger the welfare gains from progressive consumption tax reforms and the smaller the welfare gains from uniform consumption tax reforms. Output gains become larger with uniform consumption tax reforms and smaller with progressive consumption tax reforms.
References


Mathieu-Bolh, N (2009), Welfare Improving and Distributionally Neutral Tax Reforms, Mimeo.


Appendix

Table 2: Calculated parameters, base case

\[
\begin{array}{ccccccc}
T_c & T_b & T_c^p & T_b^p & \phi_1 & \phi_1^p & \frac{E^R}{E^P} \\
7.15\% & 3.19\% & 0.7\% & 40.3\% & 0.65 & 0.34 & 39\%
\end{array}
\]

Note: The parameters are, from left to right, the tax rate on necessities and luxuries, the labor income tax for the poor and the rich, the parameters of the consumption function and the lifetime effectiveness ratio.

Table 3: Chosen parameters, base case

<table>
<thead>
<tr>
<th>(\lambda_P)</th>
<th>(\lambda_R)</th>
<th>(\delta)</th>
<th>(L)</th>
<th>(\phi)</th>
<th>(d)</th>
<th>(T_k)</th>
</tr>
</thead>
<tbody>
<tr>
<td>26 years</td>
<td>32 years</td>
<td>0.035</td>
<td>0.8</td>
<td>0.33</td>
<td>0.02</td>
<td>0.30</td>
</tr>
</tbody>
</table>

Note: The parameters are, from left to right, the expected time spent as poor and rich, the rate of time preference, the share of capital in the production function, depreciation and the capital income tax.

Table 4: Characteristics of the economy

<table>
<thead>
<tr>
<th>(TC/C)</th>
<th>(T_c\omega/T)</th>
<th>(T_b\tau/T)</th>
<th>(C_R/Y)</th>
<th>(C_P/Y)</th>
<th>(G/Y)</th>
<th>(K/Y)</th>
</tr>
</thead>
<tbody>
<tr>
<td>US</td>
<td>13.9%</td>
<td>86.1%</td>
<td>66.2%</td>
<td>24.7%</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Model</td>
<td>11.77%</td>
<td>60.10%</td>
<td>28.13%</td>
<td>40.74%</td>
<td>27.71%</td>
<td>3.5</td>
</tr>
</tbody>
</table>

Note: The characteristics are, from left to right, the shares of consumption, labor and capital income tax revenues in total tax revenues, the share of consumption by the rich and the poor in total income, the share of government expenditure in income and the capital income ratio.

Table 5: Effects on welfare of uniform/progressive consumption tax reforms (%)

<table>
<thead>
<tr>
<th>Income inequalities</th>
<th>1.6</th>
<th>5.6</th>
<th>9.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>45%</td>
<td>15.7/13.6</td>
<td>14.9/14.1</td>
</tr>
<tr>
<td>borrowing</td>
<td>50%</td>
<td>15.9/13.8</td>
<td>15.1/14.3</td>
</tr>
<tr>
<td>constraint</td>
<td>62%</td>
<td>16.4/14.3</td>
<td>15.7/14.9</td>
</tr>
</tbody>
</table>

Table 6: Effects on output of uniform/progressive consumption tax reforms (%)

<table>
<thead>
<tr>
<th>Income inequalities</th>
<th>1.6</th>
<th>5.6</th>
<th>9.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>45%</td>
<td>11.7/12.7</td>
<td>12.2/12.4</td>
</tr>
<tr>
<td>borrowing</td>
<td>50%</td>
<td>11.7/12.7</td>
<td>12.1/12.4</td>
</tr>
<tr>
<td>constraint</td>
<td>62%</td>
<td>11.6/12.8</td>
<td>12.1/12.4</td>
</tr>
</tbody>
</table>

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\(^8\)Welfare gains are measured by the negative of the compensated variation.