Do Tax Cuts Increase Consumption?
An Experimental Test of Ricardian Equivalence
(FU Berlin Discussion Paper No. 2014/16)

**Theory**

A dynamic stochastic optimization model for 25 periods
- Induced time-separable CARA utility: $u(c_t^{*}) = 338\left[1-e^{-0.0125c_t}\right]$
- Dynamic optimization: $\max E_t \sum_{t=1}^{25} u(c_{t+1})$
- Transition equation: $c_t^{*} + a_{t+1} + r_t = y_t - a_t$
- Stochastic exogenous i.i.d. (labor) income $y_t \in 120$ or 250 Taler with equal probability in each period; standard deviation $\sigma_y = 65$
- Initial/finite lifetime condition: $a_1 = 1000$ Taler, $a_{26} = 0$ Taler
- Constant sum of Taxes condition: $\sum_{t=1}^{25} T_T = 3000$ Taler

**Findings**

1. Consumers do not behave as predicted by expected utility theory
   - overreact to income changes
   - difficulties in assessing magnitudes
   - social norm that deems parsimony as a good thing
2. Over the life cycle, a tax relief increases consumption on average by about 22% of the tax rebate
3. A tax increase causes consumption to decrease by about 30% of the tax increase
4. In our experiment, we find the behavior of about 62% of our subjects to be inconsistent with the Ricardian proposition
5. Taxation influences consumption beyond the current period

**Experimental Design**

Control:
- 25 times 120, no tax cuts, no increases
- In the following two treatments: Tax cuts in early periods, tax increases after period 16
- There are 3 tax cuts and 3 tax increases; each of them are always 120 Taler
- Subjects are informed that the sum of taxes equals 3000 Taler over one life cycle

Treatment 1:
- Tax cuts (increases) occur only if low (high) income shock
- Net income is pre-smoothed

Treatment 2:
- Tax cuts (increases) occur only if high (low) income shock
- Net income is more volatile

Optimal consumption is the same across all treatments

**Nonparametric Analysis**

Mean aggregate absolute deviation
$m_1 = \sum_{t=1}^{T} |c_t - c_t^{*}|$

Mean utility loss
$m_2 = \sum_{t=1}^{T} [u(c_t^{*}) - u(c_t)]$

**Structural Panel Regression**

- Optimal consumption is a linear function in each period
- We weight income $y_t$, assets $a_t$, taxes to be paid $T_T$, precautionary saving $\Gamma(\theta_{a_T})$, permanent income $\overline{y_t}$, such that theory predicts coefficients of these variables to be equal to one
- Theory predicts coefficients on tax dummies and lagged tax dummies to be zero

<table>
<thead>
<tr>
<th>Ordinary Least Squares</th>
<th>Fixed Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\hat{\gamma}$</td>
<td>1.158*** (4.42)</td>
</tr>
<tr>
<td>$\hat{a}$</td>
<td>0.709*** (-2.484)</td>
</tr>
<tr>
<td>$\hat{\gamma}$</td>
<td>0.339*** (-14.18)</td>
</tr>
<tr>
<td>$\Gamma(\theta_{a_T})$</td>
<td>1.598 (0.93)</td>
</tr>
<tr>
<td>$(T - t)\hat{\gamma}$</td>
<td>1.145 (1.83)</td>
</tr>
<tr>
<td>Tax cut dummy</td>
<td>19.100*** (5.10)</td>
</tr>
<tr>
<td>Tax increase dummy</td>
<td>-25.660*** (-9.52)</td>
</tr>
<tr>
<td>Lagged tax dummies</td>
<td>YES</td>
</tr>
<tr>
<td>Other controls</td>
<td>YES</td>
</tr>
</tbody>
</table>
| $t$-statistics for coefficient equal to 1, *** $p<0.01$, ** $p<0.05$, * $p<0.10$ | $t$-statistics for coefficient equal to 0, *** $p<0.01$, ** $p<0.05$, * $p<0.10$

**Literature**