Department of Economics
Research Area: Public Economics, Macroeconomics, Experimental Economics

Freie Universität Berlin

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: $u(c_t) = 338[1 - e^{-0.0125c_t}]$
- Dynamic optimization
  - $\max_{c_t} E_t \sum_{j=0}^{25-t} u(c_{t+j})$
- Transition equation: $s.t.\ c_t + a_{t+1} + \tau_t = y_t + a_t$
- Stochastic exogenous i.i.d. (labor) income y_t 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: $\sum_{t=1}^{25} \tau_t = 3000$ Taler

Definition: *Ricardian Equivalence. Suppose the sum of all tax payments is certain and constant over the life-cycle, then the timing and the size of tax payments is irrelevant for optimal consumption.*

Experimental Design

Control:
Taxes are 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 Ricardian 1:
Tax cuts (increases) occur only if low (high) income shock
Net income is pre-smoothed
Treatment Ricardian 2:
Tax cuts (increases) occur only if high (low) income shock
Net income is more volatile

Optimal consumption is the same across all treatments
Subjects play either the Control, Ricardian 1 or Ricardian 2 (random selection, about 43 subjects per treatment)

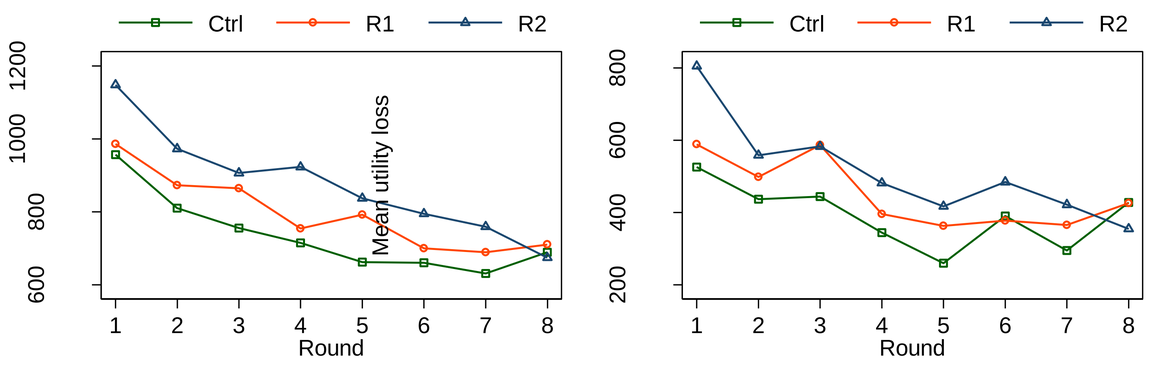
Nonparametric Analysis

Mean aggregate absolute deviation

$$m_1 = \sum_{t=1}^{T} |c_t^*(w_t) - c_t|$$

Mean utility loss

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



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

Structural Panel Regression

- Optimal consumption is a linear function in each period
- We weight income $\tilde{y}$, assets $\tilde{a}$, taxes to be paid $\tilde{\mathcal{T}}$, precautionary saving $\tilde{\Gamma}(\theta\sigma_y)$, permanent income $\tilde{y}_p$ 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

1. Using Fixed Effects all weighted variables are significantly different from one
2. Tax cut dummies are positive and significantly different from zero
3. Tax increase dummies are negative and significantly different from zero
4. Some lagged tax dummies are statistically different from zero

	Ordinary Least Squares		Fixed Effects	
$\tilde{y}$	1.158^{***}	(4.42)	1.210^{***}	(5.78)
$\tilde{a}$	0.700^{***}	(-24.84)	0.891^{***}	(-4.50)
$\tilde{\mathcal{T}}$	0.339^{***}	(-14.18)	0.467^{***}	(-11.31)
$\tilde{\Gamma}(\theta\sigma_y)$	1.598	(0.93)	2.006^{*}	(1.69)
$(T-t)\tilde{y}_p$	1.145^{*}	(1.83)	1.277^{***}	(3.81)
Tax cut dummy	19.100^{***}	(5.10)	19.780^{***}	(5.27)
Tax increase dummy	-25.660^{***}	(-9.52)	-25.930^{***}	(-9.57)
Lagged tax dummies	YES		YES	
Other controls	YES		YES	

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

Caballero, R. J. (1990): "Consumption Puzzles and Precautionary Savings," Journal of Monetary Economics, 25(1), 113–136.
Caballero, R. J. (1991): "Earnings Uncertainty and Aggregate Wealth Accumulation," The American Economic Review, 81(4), 859–871.
Carbone, E., and J. D. Hey (2004): "The Effect of Unemployment on Consumption: An Experimental Analysis," The Economic Journal, 114(497), 660–683.
Fischbacher, U. (2007): "z-Tree: Zurich Toolbox for Ready-Made Economic Experiments," Experimental Economics, 10(2), 171–178.
Seater, J. J. (1993): "Ricardian Equivalence," Journal of Economic Literature, 31(1), 142–190.
Shapiro, M. D., and J. Slemrod (1995): "Consumer Response to the Timing of Income: Evidence from a Change in Tax Withholding," American Economic Review, 85(1), 274–83.

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