Interest on cash with endogenous fiscal policy

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Monetary policy cannot be studied without describing fiscal policy

- allowable fiscal instruments
- how they are used
- (see, for example, Correia, I., J. Nicolini and P. Teles, Optimal fiscal and monetary policy: equivalence results. *JPE* 2008)

This paper

- policy implied by frictions that generate role for money
- main friction is imperfect monitoring

Imperfect monitoring and the role of currency

Observations

- currency used to evade taxation
- currency used in the underground economy

Suggest a connection between

- the role of currency and
- feasible taxation

Preview

Model based on Cavalcanti-Wallace 1999:

- an above-ground economy (perfectly monitored)
- an underground economy (anonymous)
- heterogeneous one-time costs of becoming monitored

For some examples,

- compute optimum (max ex ante representative-agent welfare)
- examine interest rate paid on currency at the optimum

The environment

- discrete time
- measure of infinitely-lived people with discounted (at rate β) utility preferences
- period utility is $u(x) - c(y)$
- production is perishable

Monitoring

Initial and permanent split of people into two groups

- m people: perfectly monitored
- n people: anonymous, not monitored at all, can hide money
- people publicly choose m or n status after receiving a private and independent draw from a distribution of
  - additively separable one-time utility cost of becoming m
  - the distribution is the realized cross-section distribution of costs

Meetings and money

Two stages at each date

- Stage 1: production and consumption in pairwise meetings at random with no double-coincidences ($1/K$ is prob of being producer and is prob of being consumer, $K \geq 2$)
- Stage 2: transfers of money

Outside money

- individual money holdings in $\{0, 1\}$
- money disintegrates at rate $\xi \in [0, 1]$

0ptimal allocations

Allocations (initial distributions, trades, transfers) that maximize ex ante welfare subject to *symmetry*, *stationarity*, *truth-telling*, and *no defection*

Defections:

- individual and cooperative defections in stage 1 meetings
- individual defection at stage 2

Punishment: an m agent $\longrightarrow$ n agent

Extreme cases and the choice of β

First-best: $y^* = \arg\max[u(y) - c(y)]$

Everyone is m: first-best is implementable if

$$\frac{u(y^*)}{c(y^*)} \geq 1 + K(1-\beta)/\beta. \tag{1}$$

Everyone is n: relevant constraint is

$$\frac{u(y)}{c(y)} \geq 1 + \frac{K(1-\beta)/\beta}{1-\theta}. \tag{2}$$

$\beta \in [\beta^*, \bar{\beta}]$, where

- $\beta = \beta^* \iff$ (1) at equality
- $\beta = \bar{\beta} \iff$ (2) at equality when $y = y^*$ and $\theta = 1/2$

Rate of return on money for n people (R)

For consumer types $s \in \{(n,1),(m,1)\}$, let

$$R(s) = \frac{\text{expected discounted goods obtained}}{\text{output produced by } (n,0) \text{ for consumer } s}$$

$R =$ average over s (Friedman rule: $R = 1$)

R is affected by

- the distribution of money
- trades between n people and m people
- disintegration rate

Examples

$$u(y) = 1 - e^{-10y}, c(y) = y, K = 3$$

Implies $u'(0) = 10$,

$$y^* = \ln(10)/10 \approx .23$$

and

$$\begin{aligned} \beta^* &= \frac{1}{1 + \frac{(9/\ln 10) - 1}{3}} \approx 0.5077 \\ \bar{\beta} &= \frac{1}{1 + \frac{(9/\ln 10) - 1}{6}} \approx 0.6735. \end{aligned}$$

Lower-bound benchmark: everyone (treated as) n

β	$\theta^{(n,1)}$	y/y^*	λ	R_0	W_0
β^*	0.38	0.55	1	0.18	0.09
$\frac{\beta^*+\bar{\beta}}{2}$	0.45	0.76	1	0.21	0.13
$\bar{\beta}$	0.51	1.00	1	0.26	0.17

Exogenous fraction who are monitored

R/R_0 when fraction of m is α

$\beta \setminus \alpha$	1/4	1/2	3/4
β^*	0.84	0.81	undefined
$\frac{\beta^*+\bar{\beta}}{2}$	0.91	0.88	undefined
$\bar{\beta}$	0.95	0.95	1.04

Details for $\beta = \frac{\beta^* + \bar{\beta}}{2}$ and $\alpha = 1/4$

W/W_0	Ev^m/W_0	Ev^n/W_0	$\theta^{(m1)}$	$\theta^{(n0)}$	$\theta^{(n1)}$	ξ
1.43	3.20	0.87	1/4	0.57	0.18	0.16

stage-1 meeting	y/y^*	λ
(n0)(n1)*	0.573	1
(n0)(m1)*	0.573	1
(m1)(n0)	0.113	-
(m1)(n1)*†	0.381	1
(m1)(m1)*	0.381	-

Endogenous choice of m status

Aggregate features: $\beta = \frac{\beta^* + \bar{\beta}}{2}$, $F = F_{(1/4,\mu)}(x)$

μ	W/W_0	Ev^m/W_0	Ev^n/W_0	$\theta^{(m1)}$	$\theta^{(n0)}$	R/R_0	ξ
0	1.43	3.20	0.83	.250	.574	0.909	.159
.2	1.35	3.16	0.85	.249	.574	0.909	.156
.4	1.28	3.12	0.86	.244	.575	0.911	.151
.6	1.21	3.06	0.88	.235	.579	0.915	.143

Concluding remarks

Most studies omit the restrictions for feasible policies implied by the frictions that give money a role

The omission is important. Why, for example, estimate US welfare costs of inflation ignoring:

- half of U.S. currency is held abroad
- currency heavily used in illegal activity
- explicit policy goal is to inhibit the use of currency

This paper: even with benign underground economy, an optimum does not always use feasible taxation to raise the return on currency