Oracle Taxation Theory

January 4, 2019

Introduction

What do we want to accomplish

Questions we are interested in:

- System security—Cost of Corruption > Profit from Corruption
- Understand effect tax rate in relation to equilibrium token price
- Dynamic tax rates to induce secure token price (Not Today)

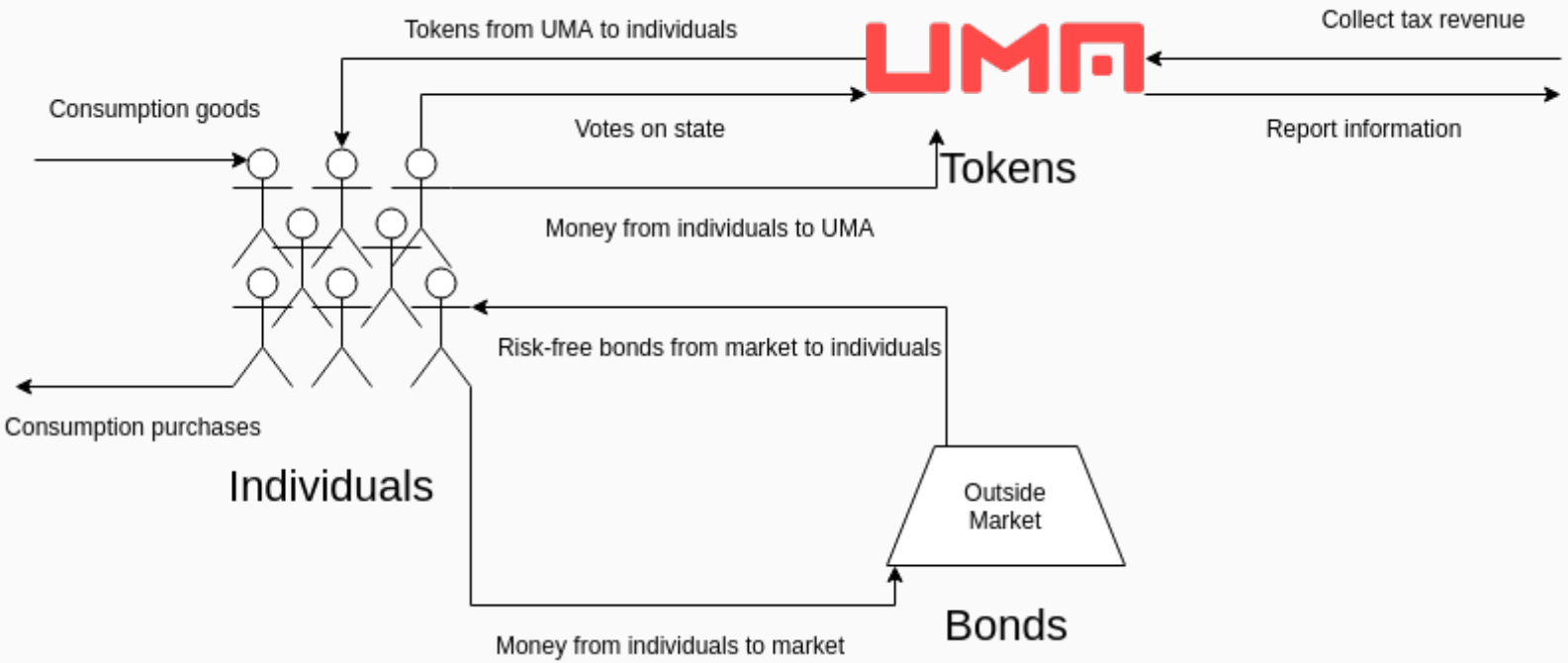
Goals

Why economic theory?

- Safe environment for “testing”
- Mathematical formalism makes assumptions transparent
- Often learn new things about the environment we build

Model Structure

Overview


Tokens from UMA to individuals
Collect tax revenue
Consumption goods
Votes on state
Report information
Tokens
Money from individuals to UMA
Risk-free bonds from market to individuals
Consumption purchases
Individuals
Outside Market
Bonds
Money from individuals to market

Details: Oracle

Must report information to derivatives market, but cannot verify the information on its own

Requires others to vote on information

Oracle sells voting rights and raises tax revenue (μ margin taxed at τ)

Uses revenue to incentivize people to reveal the needed information

Details: Individuals

There are many individuals

Each individual likes to eat consumption goods

Can save for tomorrow using bonds or tokens

Details: Voting

If an individual owns tokens, they vote on information Oracle must report

If they choose to tell the truth then

- With probability η, they forget to vote
- With probability π, they make a mistake

Liars are deliberate... No forgetting and no mistakes

Equilibrium concept is *Perfect Bayesian Equilibrium* — Everyone believes that everyone else will attempt to tell truth

Details: Wealth Evolution

If you, and everyone else, attempt to tell truth then

$$w_{t+1} = \begin{cases} (1+r)b + qx & \text{if forget} \\ (1+r)b + (1+\gamma\frac{\pi}{1-\pi})(q+\mu\tau)x & \text{if report truth} \\ (1+r)b + (1-\gamma)(q+\mu\tau)x & \text{if mistake} \end{cases}$$

If you lie then

$$w_{t+1} = \begin{cases} (1+r)b + (1+\gamma\frac{1-\pi}{\pi})(\mu\tau+0)x + \kappa\mu & \text{if corrupted} \\ (1+r)b + (1-\gamma)(\mu\tau+q)x & \text{if not corrupted} \end{cases}$$

Results

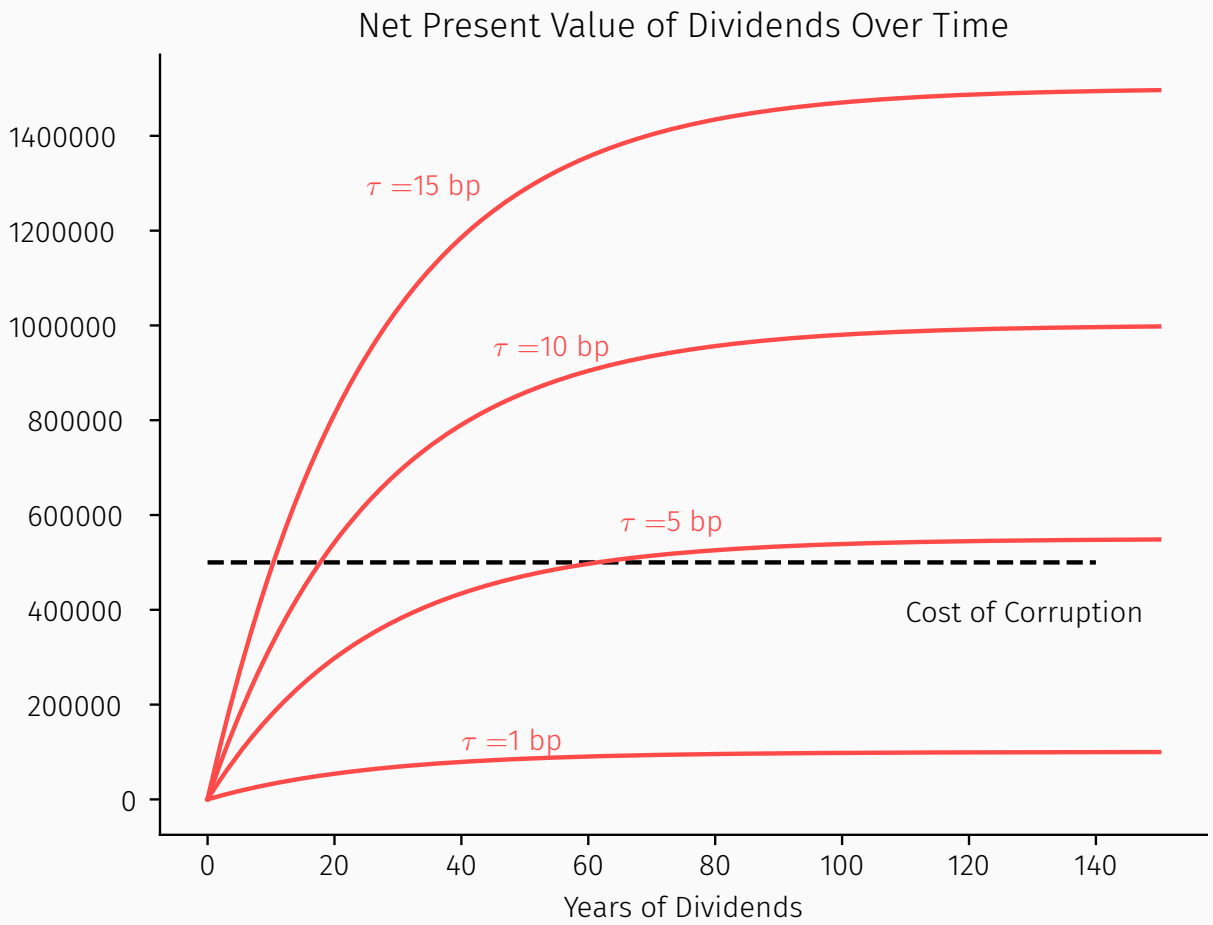
Risk-Neutral Pricing

If there all individuals were risk-neutral investors, then the token market cap would be its expected discounted returns

$$q = E\left[\sum_{t=0}^{T}\left(\frac{1}{1+r}\right)^{t}(\text{dividend payment})\right]$$

Risk-Neutral Pricing

With 1,000,000 in margin and a (yearly) discount rate of $r = 0.04$



Risk-Neutral Pricing

τ	Yearly Tax Rate	Years of Dividends Required
5 bp	2.5%	61
10 bp	5.3%	18
15 bp	8.1%	10
20 bp	10.9%	7
25 bp	13.9%	5

Oracle Vulnerability

Model teaches us that

- Oracle is vulnerable when dividends are too low—Able to support system at even lower tax rates than seen in previous slides... However, some of this is due to model being forced to a world without this asset if corrupted
- Low prices alone do not corrupt the system as long as the present discounted value of dividends is sufficiently high

Next Steps

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