Game Theory (Microeconomics)

Jérôme MATHIS (LEDa - Univ. Paris-Dauphine)

Exercise Chap.2

Cyprus: Taxation of bank deposits to avoid a euro exit

Summer 2012, Cyprus asked the European Union to provide help for the crisis-hit country. Affected by the Greek haircut, Cypriot banks called for the government aid after having lost 4.2 billion euros (24% of Cyprus GDP) due to a large amount of Greek sovereign bond holdings. Dragged into the Greek crisis, Cyprus may be unable to pay the loan repayments if an agreement on a rescue plan is not achieved in the coming weeks with the so-called *troika* comprised of the European Commission (EC), the European Central Bank (ECB) and the International Monetary Fund (IMF). Before contributing the troika suggests that the Cypriot government implement austerity measures to restore the fiscal balance. In late February 2013, the Managing Director of the European Stability Mechanism considers that Cyprus presents a systemic risk to the entire euro zone and that decisions must be made quickly to avoid contagion. March 2013, the issue of bailout arises more than ever.

We would like to study the three following games, using the following information – labeled from (I_1) to (I_9).

(I_1) A Cyprus euro exit would be the worst outcome for all stakeholders.

(I_2) Although all stakeholders wish rescue, everyone wants to be involved as little as possible.

(I_3) Cyprus rescue over the period 2012-2016 requires a help estimated at 17 billion euros (equivalent to Cyprus annual GDP).

(I_4) If the Cypriot government grants an extra effort, it has the possibility of a windfall tax on domestic bank deposits to raise 7 billion euros. Two possible forms of taxations are considered: the first one, denoted by T_1, is a tax of 6.75% on all bank deposits in the country below 100,000 euros, and a tax of 9.9% on those above that threshold; the second one, denoted by T_2, is to tax only bank deposits above 100,000 euros, which suffer losses up to 30%. The total amount collected is the same under both taxation schemes.

(I_5) In the case of extra effort, the Cypriot government would favor the second tax which is more popular as small depositors are exempted.

(I_6) If the EU, IMF and ECB agree to help Cyprus, they have the option to lend either 10 or 17 billion euros.

In what follows, motivate your answers by indicating, if any, what information (I_k), $k \geq 1$ to use.

1. Label the three possible Cyprus actions and the three possible troika's (EU, ECB and IMF) actions.

2. Depict the sequential form game played by Cyprus and the troika where Cyprus moves first. Rather than specifying any payoffs denote the nine leaves (terminal node) of the game tree by f_1, f_2, ..., f_9.

3. Which leaves correspond to a rescue of Cyprus?

4. Within each subgame following a Cyprus action, identify troika's preferred leaves.

5. Among the three preceding troika's preferred leaves, identify Cyprus preferred leaf.

6. Find the backward induction outcome.

(I_7) Cyprus is the leading destination for Russian capital abroad. Ratings agency Moody's estimated Russian businesses and individuals hold 30 billion euros in deposits on the island. Although the Cypriot authorities deny it, the island is considered a tax haven. Concerned about the fate of his rich fellow exiles, Russia disapproves any taxation of bank deposits above € 100,000. In February 2013, Russia is willing to offer, subject to the Cyprus' commitment to not raise any tax, financial assistance in exchange for licensing production of natural gas off the island. However, the Russian finance minister warns that these measures will not save Cyprus, and that a recovery will require a European Union assistance. We assume that financial aid from Russia would consist in 7 billion euros. Russia prefers not to provide any assistance that would not yield to a rescue.

(I_8) In March 2013, the eurozone and the IMF report that their bailout would be a maximum of 10 billion euros. This reduction of the potential bailout from 17 to 10 billion euros has been decided to not increase the public debt.

7. Now, what are the possible troika's actions? What are the possible Russia's actions?

8. Depict the sequential form game played by Russia, Cyprus and the troika where Russia moves first and Cyprus moves second. Indicate the corresponding total amount of money collected at each of the eight leaves of the game tree.

9. Find the backward induction outcome.

10. Does the troika prefer this equilibrium to the one of question **6** ?

(I_9) The Chancellor of Germany does not like Moscow's proposal, which would put Cyprus in the orbit of a foreign state to the European Union. She urges the Cypriot President that negotiations on the bailout plan are carried out with the troika only. Cyprus has to choose between Russian and troika assistance but cannot benefit from both altogether.

11. Depict the new game tree in the sequential order of question **8**.

12. Find the backward induction outcome.

13. Does the troika prefer this equilibrium to the one of question **6** and **10**?

14. Provide a conclusion on the optimal troika's strategy.