

“An Incomplete Contract Approach to Eurozone Fiscal Governance”

— Commitment vs. Flexibility — ♦

Yutaka Suzuki* and Yoshihiro Tsuranuki
Faculty of Economics, Hosei University

January 6, 2016

Abstract

In this paper, we take an incomplete contract approach to Eurozone Fiscal Governance between the European Commission (EC) and any heavily debt member state, Greece in particular. Incomplete contract approach makes possible to put a long process of Eurozone Fiscal Governance into an extensive form game in which a renegotiation procedure is incorporated. We theoretically reveal the conflict of interests between the EC (Germany) and Greece over the Greek debt repayment plan proposed in 2015. We show that the Greek’s position is consistent with incomplete contract theory, but that the EC (Germany) does not allow the renegotiation for restructuring for growth-oriented debt repayment program proposed by the Greek government because the EC (Germany) judges that the commitment effect (on fiscal austerity) is greater than the flexibility one (pro-growth effect). This will undoubtedly provide a novel and interesting approach to Eurozone Fiscal Governance.

Key Words Eurozone fiscal governance, incomplete contract, renegotiation, commitment, flexibility

JEL Classification Numbers H63, D86

♦ The first author would like to thank the 2015 Grant from Zengin Foundation for Studies on Economics and Finance for financial support (No. 1515). The second author would like to thank Dr. Paola Subacchi, the Royal Institute of International Affairs, for her helpful comments and Professor Erik Jones, the Bologna Center, School of Advanced International Studies, Johns Hopkins University, for his help. He also would like to thank the Center for Political Research, Paris Institute of Political Studies for its stimulating academic environments and hospitality during his visiting scholarship in 2015-2016.

* E-mail: yutaka@hosei.ac.jp

I Introduction

This paper takes an incomplete contract approach (more specifically, à la Grossman and Hart (1986), Hart and Moore (1988), and Aghion, Dewatripont, and Ray (1994), which focus on optimal incomplete contracts over hold-up problem) to Eurozone Fiscal Governance between the European Commission (EC) and an agent (any heavily debt member state, Greece in particular.)¹

Incomplete contract approach to Eurozone Fiscal Governance makes possible to analyze it as one coherent whole process of governance from an initial contract, state's realization, renegotiations for setting a new contract, to payoffs realization and its division.

We apply and extend Suzuki (1998)'s model of renegotiations in incomplete contract game to Eurozone Fiscal Governance between the European Commission (EC) and an agent (e.g., Greece). Though Suzuki (1998)'s analytical setting is that a car-part supplier and a car-assembler engage in renegotiations over part's quality and new price for it, the European Commission and Greece similarly engage in renegotiation over their burden sharing in the latter's deficit reduction, and their renegotiation process has essentially the same property as Suzuki(1998)'s procurement setting.

Our paper indeed makes possible to put a long process of fiscal governance in Eurozone between the European Commission (EC) and an excessively deficit country (an agent) into an extensive form game in which a renegotiation procedure is incorporated. It enables us to identify how to divide surplus from economic growth between EC and the agent in a state-contingent way, that is, in the Bad State and in the Good State.

Using our incomplete contract approach, we reveal the real conflicts of interest between the EC (Germany) and Greece over the Greek debt repayment plan proposed in 2015. A. Tsipras, Greek's prime minister, and Y. Varoufakis, Greek finance minister, proposed for swapping the existing debt from the international lenders including the EC for *GDP-growth-indexed* Greek bonds. The Greek government tries to leave the existing bail-out framework for Greece and wants to leave its austerity program worked

¹ Incomplete contract approach has become a rigorous and widely used approach in dealing with various issues, including firm theory, international trade, scope of government, corporate finance, and political economy. Our paper deals with the most up-to-date international political economy bargaining problem between Supra- national authority (European Commission) and Sovereignty (Greece in particular) in an incomplete contract model. See Hart (1995) for an introduction into the research of incomplete contract, and Bolton and Dewatripont (2005) for an exhaustive explanation. For the arguments on the sources for contractual incompleteness, 1) Enforcement Costs, 2) Unforeseen contingencies, 3) Writing Costs, see, Tirole (1999).

out between the preceding Greek government and the international lenders. That is, the Greek government wants to leave its *austerity-oriented* debt repayment program for some *growth-oriented* one. In our paper, we derive the “After-renegotiation debt repayment plan I” , which can create a certain degree of growth incentive and corresponds to the plan proposed by the Greek government in 2015. The Greek’s position is consistent with incomplete contract theory.

Then, why does not the EC (Germany in particular) allow the renegotiation for restructuring for *growth-oriented* debt repayment program? The EC (Germany) judges that the commitment effect is greater than the flexibility one.

In particular, once the renegotiation for reducing national debt were permitted for the Greece, other PIIGS countries such as Portugal, Spain, Italy would also expect that the similar renegotiation for debt reduction were allowed for them, and require the EC to do so strongly. The EC could not help accepting the renegotiation offers by such countries. But, they would in turn lose incentives to achieve higher GDP through structural reforms of their economies. This decrease in GDP is essentially the ex-ante inefficiency generated by the ex-post renegotiation, which Jean Tirole, 2014 Nobel Prize Economist, has emphasized.

This argument just implies the trade-off between Commitment and Flexibility. By “Commitment”, the EC (substantially, Germany) can prevent the moral hazard, and soft budget problem by other PIIGS countries by committing to imposing *the fiscal austerity* on Greece. By “Flexibility”, the EC can induce a positive growth incentive from Greece, by proposing *the GDP-growth-indexed bonds* through debt restructuring, while it may incur the moral hazard, and soft budget problem by other PIIGS countries by losing the reputation for the EC to commit not to renegotiate for bailing out. Taking this trade-off into account, the EC (or Germany) tries to keep the existing bail-out framework for Greece and its austerity program, when the commitment effect is greater than the flexibility one.

II A Framework of Incomplete Contract

1. Two-player model

We construct an incomplete contract model to analyze the Eurozone fiscal governance, where the players are the European Commission (EC) and an agent (any heavily debt member state, Greece in particular).

2. Timing

$t=1$: The EC makes a take-it-or-leave-it debt contract offer, D , to the agent (a heavily debt member state, e.g. Greece). Agent either accepts or rejects. Agent’s national debt level D is determined.

t = 2: Agent's (mid-term) GDP Q is realized.

t = 3: Given D and Q , the EC and the agent "renegotiate over the terms of the initial contract and decide the terms of the final contract."

t = 4: Agent chooses an investment level $i \in \{0, I\}$, whether to make a reform ($i = I$) or not ($i = 0$).

t = 5: Final GDP is realized and Payoffs are distributed among the players (the EC and the agent).

We formulate that Final GDP output is $Q + S$ if $i = I > 0$ (1)

, where S is the value added arising from the agent's (Greece) economic reform (investment) $i = I$.

We next discuss our assumption that the initial contract signed at t=1 is very simple, specifying only the agent's national debt level D . The future investment decision $i \in \{0, I\}$ and the midterm and final output levels ($Q, Q + S$) are not included in this initial debt contract. In many ways this "incomplete contract" assumption is quite sensible in our international context. Future decision $i \in \{0, I\}$ on an economic reform is very difficult to describe and enforce, and similarly it will be very hard to verify the GDP output levels ex post and so write and commit the players to the state-contingent "complete" national debt contract $D(Q)$ ex ante.

Note that during final adjustment of terms and conditions at t = 3, the national debt D determined at t = 1 is not unilaterally cancelled but, rather, is restructured based on an agreement by both parties. If the two parties are unable to reach the formal agreement regarding terms and conditions, negotiations break down. The disagreement point (T_A, T_{EC}) is the value player can expect to receive at the threat point (equilibrium point when negotiations break down).

An overall picture of the model can be gained by creating a timeline of the game.

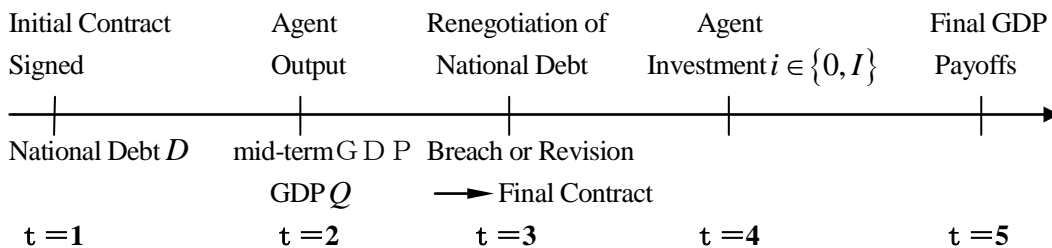


Figure 1

III The Commitment Regime that leaves room for Ex-post Renegotiation

- (1) If $Q + S < D$, **Bad State**, where $i = 0$ is the credible threat.
- (2) If $Q + S \geq D$, **Good State**, where $i = 0$ is the empty threat.

In the Bad State case (1), where $Q + S < D$, an equilibrium (rules revision) is reached wherein the agent enacts reforms I based on an agreement to restructure the national debt D and the making of a new national debt contract. The new debt plan $D^*(Q)$ when the two parties reach an agreement to restructure the debt is solved via the following **Nash bargaining solution**:

$$\begin{aligned} (U_A^*, U_{EC}^*) &= \arg \max (U_A - T_A)^g (U_{EC} - T_{EC})^{1-g} \\ &\{U_A, U_{EC}\} \\ &\text{subject to } U_A + U_{EC} = Q + S \end{aligned}$$

This solution attempts to maximize the product of the two excess utilities (i.e. the Nash Product) from the threat point (T_A, T_{EC}) between the EU member state (Greece etc.) and the EC on the negotiation (Pareto) frontier $U_A + U_{EC} = Q + S$.

The solution $U_A^* = T_A + g(Q + S - T_A - T_{EC})$ and $U_{EC}^* = T_{EC} + (1 - g)(Q + S - T_A - T_{EC})$ gives the rent distribution for Total Output (Final GDP) $Q + S$ after restructuring.

Total Output $Q + S$ is shared by EU member state A and the EC such that
 Payoff after renegotiation = Threat point payoff + $g \times \{ \text{Surplus generated from renegotiation} \}$
↑
Bargaining power (e.g. $g = 1/2$)

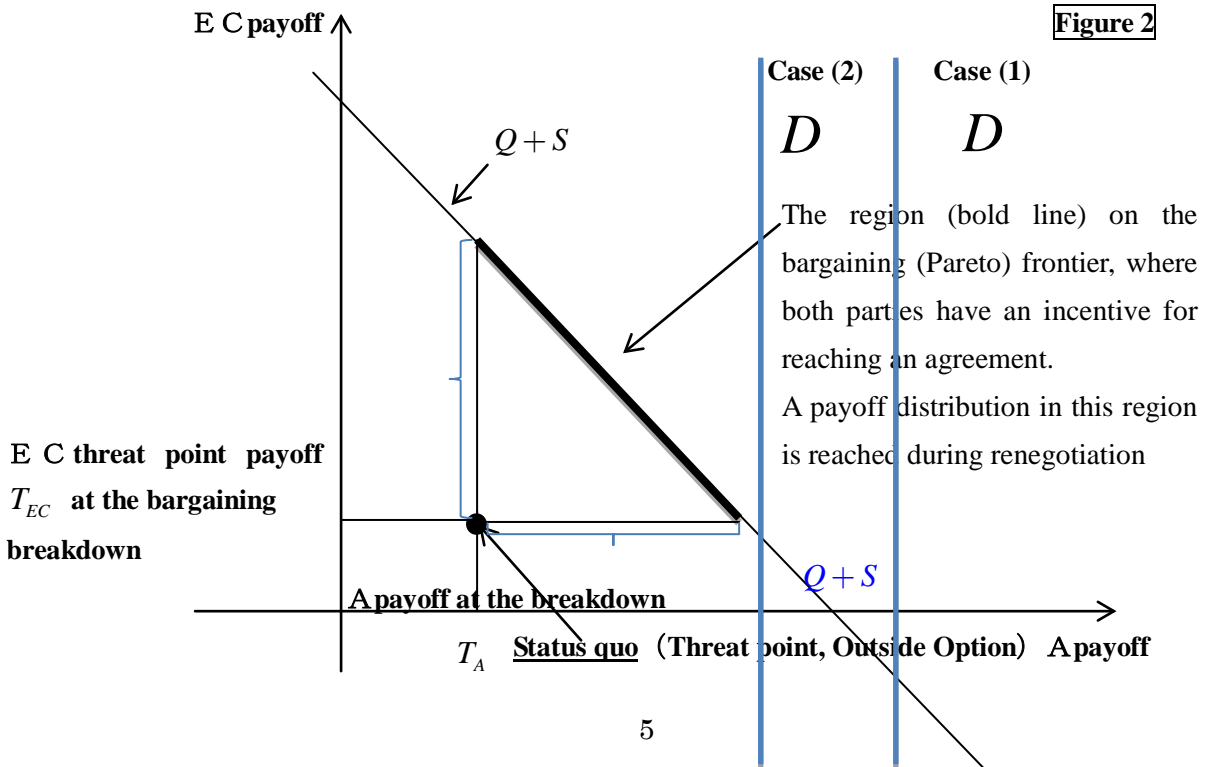


Figure 3: Nash Bargaining Solution

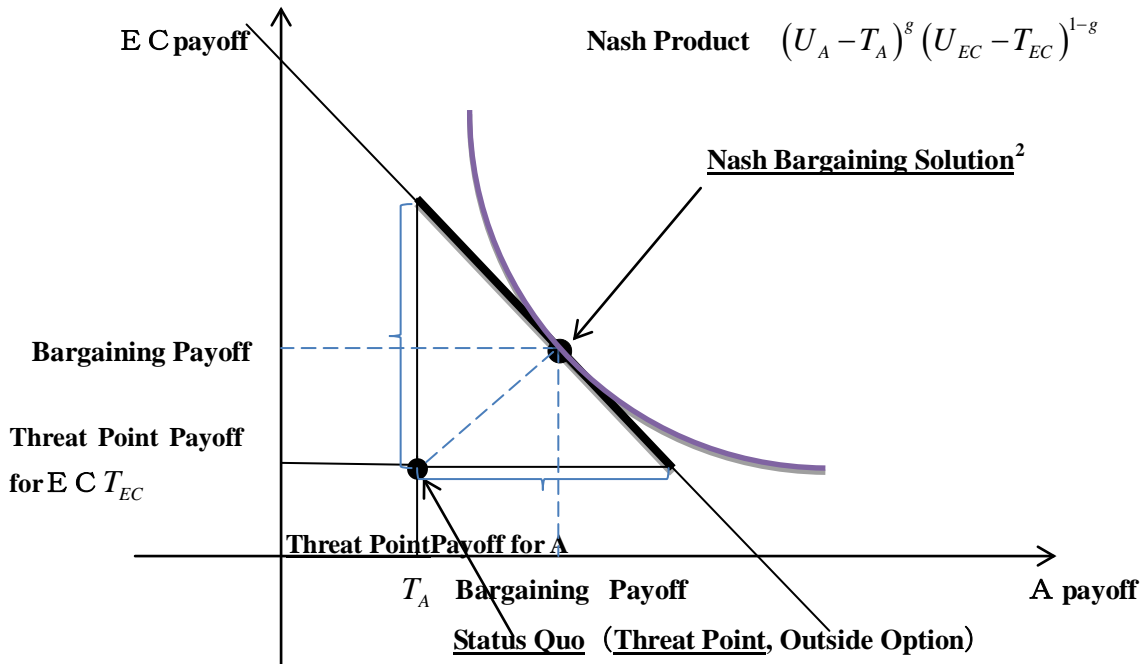


Figure 3 shows at which point state A and EC agree over division of surplus. It is the point where the Nash Product touches the thickened line on the bargaining frontier. By reading the pair on the graph (Figure 3), we can know A's payoff. It can also be calculated by solving the first order condition for the Nash bargaining solution. That is,

$$U_A^* = T_A + g(Q + S - T_A - T_{EC}) = gQ + [gS + (1 - g)T_A - gT_{EC}]$$

In the Good State case (2), where $Q + S \geq D$, the EC does not have an incentive to accept the agent's (Greece) request for debt restructuring (debt reduction and exemption). This is because the threat that the agent "will not be able to repay its existing debt D (i.e. that it will default) unless this existent debt is restructured or reduced, even if he enacts structural reform $i = I$ and increases output S beyond the current GDP level Q " is an empty threat. In other words, the debt D can be repaid under the original contracted agreement so long as structural reform is enacted and output is increased. In Figure A2 in the Appendix, this scenario corresponds to the subgame that occurs when the agent submits a request to restructure its existing debt, and it is rejected by the EC. It can be seen that, if the agent implements

² The Nash Bargaining Solution locates at the point which makes the Nash product, the product of the increase in each player's payoff by agreeing from his/her threat point payoff, largest on the bargaining (Pareto) frontier.

investment I , repayment of the debt is possible whereby the payoff is $Q + S - D > 0$. In this scenario, an equilibrium is reached wherein the agent (EU member) does not submit a request for debt restructuring and a final agreement is reached (agreement compliance) through negotiations under the existing rules, and the investment is carried out. The agent's equilibrium rent becomes $Q + S - D$ in this regime.

Remark: Based on the above argument, the extensive form for the renegotiation game in the Bad State ($Q + S < D$) and the Good State ($Q + S \geq D$) can be shown as in **Appendix**.

IV Equilibrium rents for Agent

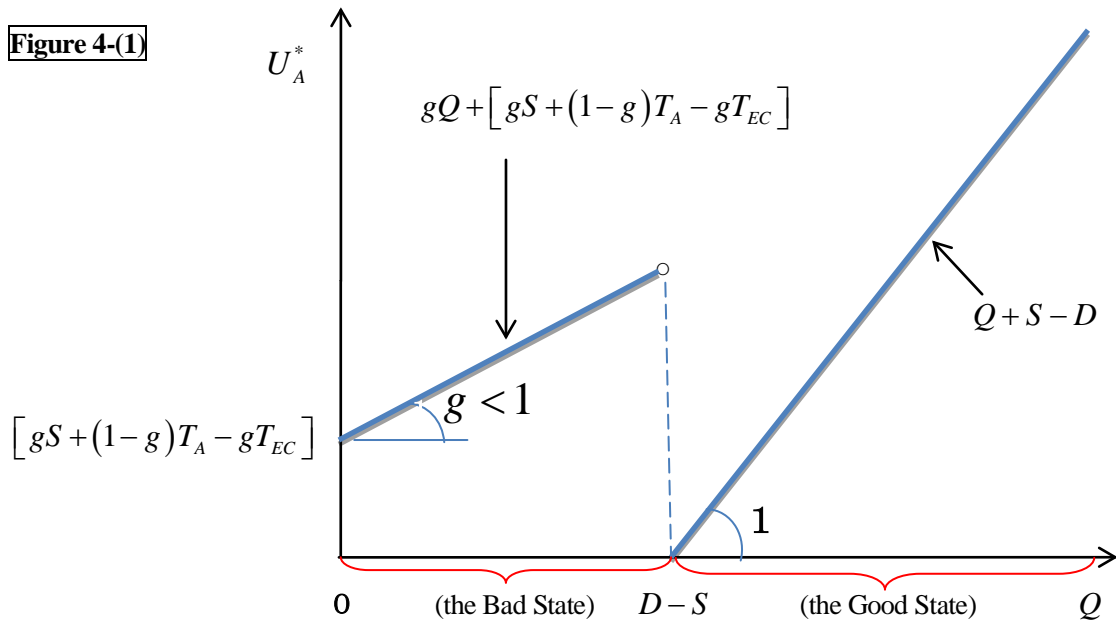
From an analysis in cases (1) and (2) above,, the equilibrium rents for two types of the different agents (for example, Greece in Bad State of Case (1) and Germany in Good State of Case (2)) can be obtained. Their equilibrium rents can be shown as a function of GDP Q below:

$$U_A^* = \begin{cases} gQ + [gS + (1-g)T_A - gT_{EC}] & \text{if } Q < D - S \quad (\text{the Bad State}) \\ Q + S - D & \text{if } Q \geq D - S \quad (\text{the Good State}) \end{cases}$$

Presented in graph-form, the **equilibrium rent function that allows renegotiation** is as follows.

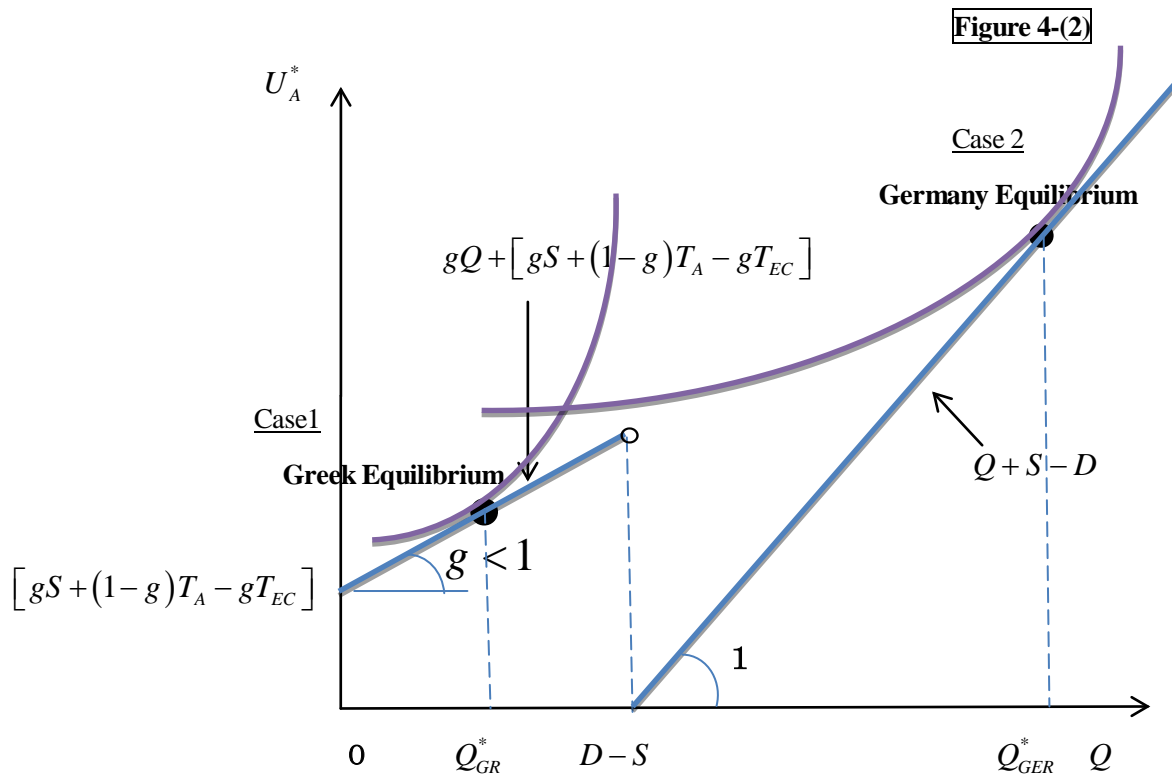
Each type of the renegotiation-proof equilibrium rent can be shown in Figure 4-1 and Figure 4-2 below:

Figure 4-(1): Renegotiation-proof equilibrium rent functions



The Figure 4-(1) shows that if the mid-term GDP level Q exceeds the threshold $D - S$, that is, in the Good State, the agent can obtain 100% bargaining power $g = 1$ or control power over any additional surplus $Q + S - D$ after paying back the constant initial debt level D . That is, the agent becomes a 100% marginal residual claimant. On the other hand, if the GDP level Q falls even slightly below the threshold $D - S$, that is, in the Bad State, the agent's bargaining power is substantially reduced from $g = 1$, and the agent can only obtain the ratio $g < 1$ of the surplus created from the GDP Q through the renegotiation (Nash Bargaining) over revision of the initial contract, as the term $g \cdot Q$ shows. That is, the agent is no longer a 100% marginal residual claimant.

Taking into consideration by backward induction its "renegotiation-proof rent function", an each nation makes its endogenous choice of its GDP level Q . It depends on each country's GDP cost function³, and generates an efficient German equilibrium Q_{GER}^* and an inefficient Greek equilibrium Q_{GR}^* in which national debt is reduced and financial assistance is received as a result of ex-post renegotiations.



³ GDP cost functions correspond to two kinds of positively-sloped curves in the Figure 4-(2), where Greece has a steeper curve, while Germany has a much gentler curve. The difference reflects their cost difference (competitiveness) in increasing GDP.

[Proposition 1] “After-renegotiation debt repayment plan” in the commitment regime that leave room for ex-post renegotiation [I]

In cases where the Nash Bargaining Solution is employed as the renegotiation process, the equilibrium result is $i = I$ for all Q , and the after-renegotiation debt $D^*(Q)$ is given by:

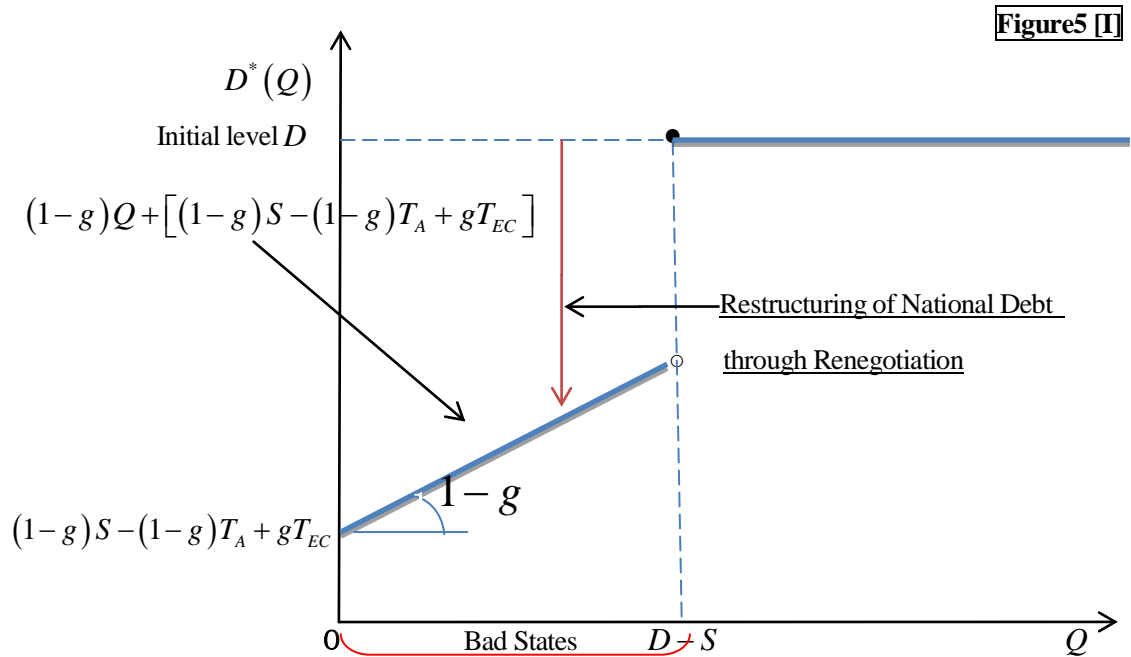
$$(1) D^*(Q) = (1-g)Q + [(1-g)S - (1-g)T_A + gT_{EC}] \text{ if } Q + S < D \text{ (the Bad State)}$$

$$(2) D^*(Q) = D \text{ (the initial debt level) if } Q + S \geq D \text{ (the Good State)}$$

Explanation: Based on the previous figure, when $Q + S < D$, $U_A^* = Q + S - D^*(Q)$. Therefore,

$$\begin{aligned} D^*(Q) &= Q + S - U_A^* = U_{EC}^* = T_{EC} + (1-g)(Q + S - T_A - T_{EC}) \\ &= (1-g)Q + (1-g)S - (1-g)T_A + gT_{EC} \end{aligned}$$

In this case, structural reform (investment $i = I$) is carried out for all levels of mid-term GDP Q , (while the principal accepts restructuring the agent’s debt). In other words, **default is avoided through the restructuring of national debt**, and Efficiency deriving from this surpasses efficiency deriving from “committing to the existing debt obligation.” Under such a regime, the **“After-renegotiation debt repayment plan”** can be shown in the figure 5[I].



V Alternative bargaining game formulation

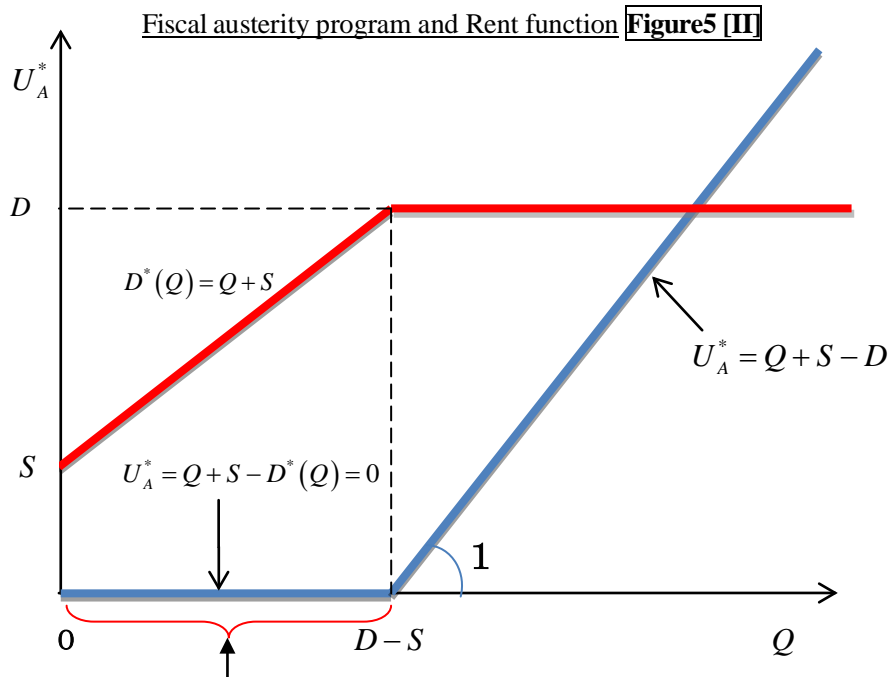
In the case above, the Nash Bargaining Solution was applied in the restructuring of terms and conditions of the initial contract. There is another form of bargaining game for it, too. It is an “ultimatum game“, where the EC makes a “take-it-or-leave-it” offer to the agent. Then, the equilibrium outcome (after-renegotiation debt repayment plan) is as follows:

[Proposition 2] “After-renegotiation debt repayment plan” in the commitment regime that leave room for ex-post renegotiation [II]

In a bargaining game in which the EC makes a “take-it-or-leave-it” offer to the agent, the equilibrium result is $i = I$ for all Q , and the after- renegotiation debt $D^*(Q)$ is given by:

- (1) $D^*(Q) = Q + S$ if $Q + S < D$ (the Bad State),
- (2) $D^*(Q) = D$ if $Q + S \geq D$ (the Good State).

Thus, we have the “after-renegotiation debt repayment plan” in the commitment regime with ex-post renegotiation (the “**Ultimatum game**” case) as **the red kinked line $D^*(Q)$** in the below figure, and then the renegotiation-proof equilibrium rent function for the agent is **the blue kinked line U_A^*** .



Implication: Greece’s rent $U_A^* = 0$ for this range $Q \leq D - S$ due to fiscal austerity program

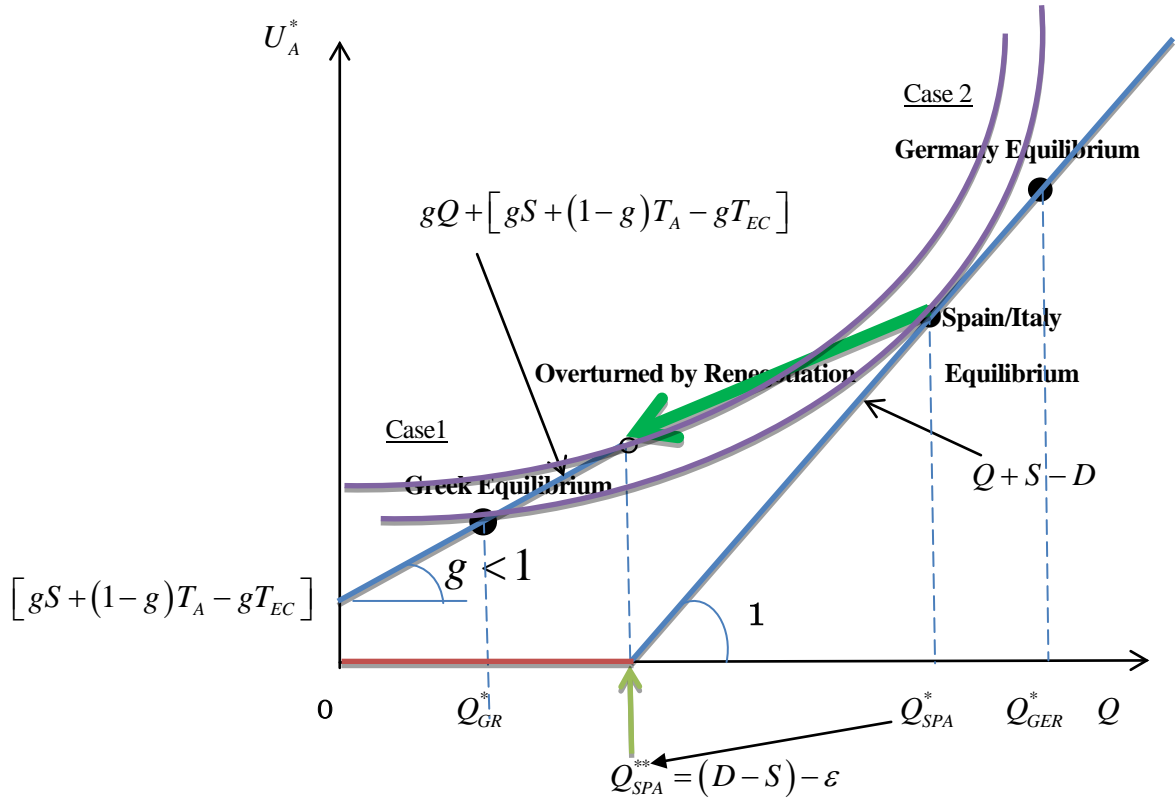
VI Interpretations of the Greek debt repayment plan proposed in 2015

A. Tsipras, Greek prime minister, and Y. Varoufakis, Greek finance minister, proposed for swapping the existing debt from the international lenders including the EC for GDP-growth-indexed Greek bonds. The Greek government tries to leave the existing bail-out framework for Greece and wants to leave its austerity program worked out between the preceding Greek government and the international lenders. By emphasizing growth over austerity measures, the Greek government wants to leave its *austerity-oriented* debt repayment program, which corresponds to the red line in **Figure 5[II]**, for some *growth-oriented* one. The plan proposed by the Greek government corresponds to the “After-renegotiation debt repayment plan” shown in **Figure 5[I]**, which can create a certain degree of growth incentive $Q_{GR}^* > 0$, as Figure 4-(2) shows.

VII The incentive for the EC (Germany in particular) not to allow the renegotiation for restructuring for growth-oriented debt repayment program, i.e. the debt restructuring from Figure 5[II] to Figure 5[I]

Once the renegotiation for reducing national debt were permitted for the Greece, other PIIGS countries such as Portugal, Spain, Italy would also expect that the similar renegotiation for debt reduction were allowed for them, and require the EC to do so strongly. Then, the EC could not help accepting the renegotiation offer by such countries. However, they would in turn lose incentives to achieve higher GDP Q_{SPA}^* in the Figure 6, and only try to achieve $Q_{SPA}^{**} = (D - S) - \varepsilon$ in the Figure 6, which is the optimal GDP level when faced with the “renegotiation-proof equilibrium rent function” for the Bad states $Q < D - S$ in Figure 5[I]. This decrease in GDP $Q_{SPA}^* \rightarrow Q_{SPA}^{**}$ in the Figure 6 is essentially “the ex-ante inefficiency generated by the ex-post renegotiation”, which Jean Tirole, 2014 Nobel Prize Economist, has emphasized.

Figure 6



Commitment vs. Flexibility

The argument so far, as a whole, implies the trade-off between Commitment and Flexibility. By “Commitment”, it means that the EC (substantially, Germany) can prevent the moral hazard, soft budget incentive problem by other PIIGS countries by committing to imposing the fiscal austerity on Greece. This will generate GDP levels $Q^*_{GR} \simeq 0$ and Q^*_{SPA} . By “Flexibility”, it means that the EC can induce a growth incentive $Q^*_{GR} > 0$ from the Greece, by proposing the GDP-growth-indexed bonds through debt restructuring, while it may bring about the moral hazard, soft budget problem by other PIIGS countries by losing the reputation for the EC to commit not to renegotiate for bail out. This will generate GDP levels $Q^*_{GR} > 0$ and $Q^*_{SPA} \ll Q^*_{SPA}$. Taking this trade-off into account, the EC (or Germany) tries to keep the existing bail-out framework for Greece and its austerity program, when the commitment effect is greater than the flexibility one.

VIII Assessment of Our Analysis

Specifically, by setting the threshold point to be the dividing line of states into either solvency or insolvency, our model explains how decisively bargaining powers over control of surplus shifts between an agent (any heavily debt member state, Greece in particular) and the principal (the European Commission (EC)). Second, by focusing on how to provide an agent (heavily debt member state, e.g. Greece) in the Bad State with an incentive for necessary investment, the model shows the way to achieve ex-post efficiency. Third, by comparing the two commitment regimes with room for ex-post renegotiation, one via the NBS and the other via ultimatum offer, the model explains the trade-off between commitment and flexibility. Eurozone fiscal governance possesses all these three properties. The model well captures them.

In more overall assessment, Eurozone fiscal governance has typical features of relation-specific investment and hold-up problem. Economic reforms any heavily debt country faces are required and specified by the creditor represented by the EC. The debtor signs a revised contract promising to implement the reforms in exchange for the credit. The credit is seriously sought after by the debtor as the last resort to avoid default. However, the reforms are also as much difficult to implement as to secure the credit. They are truly quid pro quo for the credit the debtor receives. The implementation of the reforms as required investment is the guarantee for debt repayment to the creditor. Out of surplus they produce, regular debt is payed back. Credit supply, implementation of the economic reforms, and debt repayment are *inseparably interconnected*. The economic reforms are thus very much like the relation-specific investment. In addition, the debtor has very limited markets on which it can put its progress in the economic reforms for alternative sources of credit. The IMF, the most probable source for credit, is already in the creditor group represented by the EC. If the debtor carries out the reforms, bonds markets will favorably respond to it and interest rates for bonds will fall. Bonds investors are, however, decentralized and anonymous. They can't be parties for specific contracts for the debtor, taking away meaningful sources of incentive for investment away from the debtor.

On the other hand, economic reforms face strong domestic opposition. Deregulation, liberalization, and privatization all clash with vested interests of strong interest groups and are extremely hard for any incumbent government to carry out without taking the risk of losing in coming elections.

The two factors above lead the debtor to lose incentive for the reforms, causing the "hold-up problem". We thus need to make an effective arrangement for incentive, enough to induce the debtor to fulfill the reforms. With the incomplete contract approach, we could shed a new light to this essential aspect in the Eurozone fiscal governance and its incentive problem.

REFERENCES

- Aghion, P, M. Dewatripont and P. Rey (1994) “Renegotiation Design with Unverifiable Information,” *Econometrica*, 62, 257-282.
- Bolton, P., and M. Dewatripont (2005) *Contract Theory* Cambridge, Massachusetts: The MIT Press
- Grossman, S. and O. Hart (1986) “The Costs and Benefits of Ownership: a theory of Vertical and Lateral Integration”, *Journal of Political Economy*, 94, 691-719.
- Hart, O (1995) *Firms, Contracts, and Financial Structure* Oxford: Oxford University Press.
- Hart, O and J. Moore (1988) “Incomplete Contracts and Renegotiation”, *Econometrica*, 56. 4, 755-785.
- Holmstrom, B (1982) “Moral Hazard in Teams”, *Bell Journal of Economics* 13, 323-340.
- Nash, J (1950) “The Bargaining Problem,” *Econometrica*, 18, 155- 162
- Suzuki, Y (1998) “Commitment and Renegotiation in Procurement Relationships: A Contract Theoretical Analysis of 'Rules vs Discretion',” *KEIZAI SHIRIN* (Hosei Economic Review), Vol. 66, No. 1, pp. 311-338
- Suzuki, Y (2014) “Centralization, Decentralization and Incentive Problems in Eurozone Financial Governance: A Contract Theory Analysis”, Tokyo Center for Economic Research (TCER) Paper No. E-72, available at SSRN: <http://dx.doi.org/10.2139/ssrn.2397562> , and ICES Working Paper No.170, Hosei University.
- Tirole, J (1999) “Incomplete Contracts: Where Do We Stand?” *Econometrica*, Vol. 67, No. 4, July, pp. 741-781

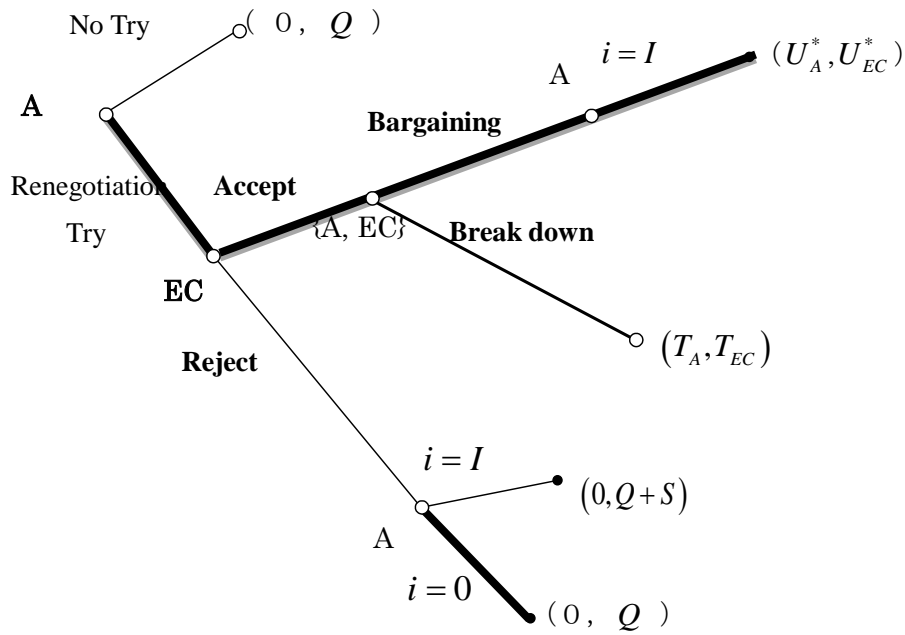


Figure A1

(Agent Payoff, EC Payoff)

Bad State $i = 0$ (No investment) is **Credible threat**: $Q + S < D$

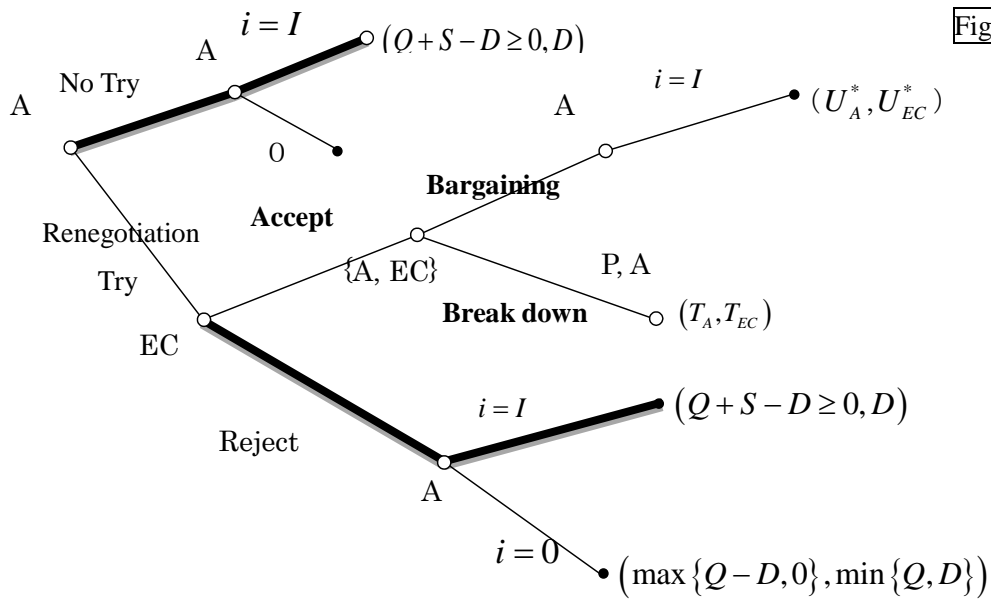


Figure A2

Good State $i = 0$ is **Empty threat**: $Q + S \geq D$