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The bail-out!: Positive political economics of Greek-type crises in the EMU

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The Bail-Out! Positive political economics of Greek-type crises in the EMU

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Abstract

The Greek bail-out was highly controversial. An oft-heard assessment is that i) the bail-out was a mistake, ii) the political haggling over it was irrational and iii) the bail-out will create a moral hazard problem. Contrary to this view, our analysis suggests that, given EMU's present political-economic set-up, i) the bail-out was unavoidable, ii) the lengthy process of political haggling leading to it was understandable, and iii) the bail-out does not have to be necessarily associated with a future moral hazard problem. Based on our analysis, we suggest that the EMU's institutional design could be improved by establishing 'exit rules' and that bail-outs should be made rule-based. We have based our analysis on a political-economic, game-theoretic model that helps to understand why and how the parties involved in the Greek crisis arrived at the bail-out and on what conditions the final solution depended. The model allows tracing analytically the dynamics of the negotiation processes as well as the conditions and parameters on which the scope and limits of fiscal redistribution in EMU depends. In doing so, we formally take account of the 'negative externality' problem that has been central to policy debates related to the EMU's institutional design and has played an important role in the Greek crisis. However, contrary to the existing literature, we do not only focus on the economic aspects of such negative externality, but also look at where they emanate from and interact with political factors, in particular the dynamics of the political negotiation process within the EMU

1. Introduction[1]

With the outbreak of the Greek sovereign crisis in early 2010, the EMU confronted the biggest challenge in its decade-long history. After months of political haggling, the euro area came up with an unprecedented bail-out for Greece worth EUR 110 billion.[2] The support package has proved highly controversial among economists who disagree strongly whether this has been the right policy course. Some commentators (e.g., Frankel (2010), Issing (2010) or Wyplosz (2010)) have strongly argued that providing financial support is a policy mistake, as it undermines the foundations of the EMU (i.e. particularly the 'no bail-out' clause and the prohibition of monetary financing) and thus jeopardizes the euro in the long-run by creating a moral hazard problem and hampering the Eurosystem's credibility. In contrast, others (i.e. Eichengreen (2010) or Padoa-Schioppa (2010)) have argued that letting Greece default would spread the crises to other members, like Spain or Portugal, creating a risk of the EMU break-up which would trigger "the mother of all financial crises". Hence, in their view, Europe needs to create a strong emergency financing mechanism, eventually backed by higher degree of political integration (e.g. De Grauwe (2010), see also Baldwin et al. (2010) for an interesting overview of the debate).

While the discussion has been intense, and the controversies abound, it has been so far limited only to *normative* policy-oriented issues, focused mostly on the *economic* aspects, with much less account of the political-economic considerations[3] and has so far not generated formal models able to analyze the crisis. In this paper we propose a *positive* analysis that can serve as a framework for describing and analyzing Greek-type sovereign debt crises in the context of the EMU in a structured manner. We build on a political economic, game-theoretic model with incomplete political integration that, by taking into

1 We wish to thank Peter Backé, Michael Burda, Barry Eichengreen, Jeffrey Frankel, Stanisław Gomułka, Andreas Kern, Andrzej Raczko and Krzysztof Rybinski for their helpful comments and suggestions. We are also grateful to Cordelia Friesendorf and Katarzyna Laszkiewicz for their research assistance and linguistic support. Standard disclaimer applies.

2 The bail-out for Greece took the form of a 3-year package of emergency loans, with EUR 80 billion offered by the euro area members and EUR 30 by the IMF. A few days later the EU established a special purpose vehicle, namely the so-called European Stabilization Mechanism (ESM), worth EUR 750 billion. The ESM involves a 3-year stabilization plan that includes EUR 60 billion provided by the European Commission, EUR 440 billion provided in bilateral loans and guarantees by euro area members, as well as EUR 250 billion from the IMF. In addition, the ECB committed to the direct purchase of government bonds on the open market.

3 See, for example, Fisher et al. (2006) for a survey of political-economic arguments related to the EMU issues, although without accounting for a positive modeling framework.

account the interactions between the economic and political factors, helps to understand why and how the parties involved in the Greek crisis arrived at the bail-out and on what conditions the final solution depended. We demonstrate that, conditional on the present political-economic set-up of EMU, the bail-out was inevitable, i.e. a threat of default by one member that creates a negativity externality for the whole monetary union *must* (under identifiable conditions) result in sharing the costs of fiscal adjustment by the rest of the members. Importantly, we show that such bail-out does not need to be associated with a moral hazard problem.

One of the key novelties in our work is that we formally take account of the negative externality problem that has been central to policy debates related to EMU's institutional design since the very birth of the euro (see, for example, Gros et al. (2005) and de Haan et al. (2004) for early contributions within this debate) and played an important role in the specific case of the Greek crisis in the form of – as some commentators call it – a "bail-out blackmail" (see Mayer (2010)). However, contrary to the existing literature, we do not only focus on the economic aspects of such a negative externality, but also look at where it emanates from and how it interacts with political factors, in particular the dynamics of the political negotiation process within the EMU, i.e. to what extent a 'troubled' EMU member may negotiate a bail-out due to the existence of a negative externality arising from its potential default.

Furthermore, the model also allows tracing analytically the dynamics of the negotiations process as well as the parameters on which the scope and limits of a fiscal redistribution depend. In doing so, the analysis helps to shed some light on several key policy aspects, such as: i) the conditions under which a bail-out does not generate a moral hazard problem in the long-run, ii) the role of political factors such as voters attitude towards fiscal retrenchment and their support for the European integration process, iii) how the risk of contagion to other weak members, the perceived risk of EMU break-up or the possibility of coalition-building between groups of euro area members can affect the negotiation outcome, iv) the duration of the political haggling over the bail-out.

We show that the political negotiations over the bail-out can be described by a brinkmanship threat game in which the respective brinkmanship is formalized and completed by a Nash bargaining solution. The analysis determines the scope and limits of the brinkmanship and subsequently inquires into the bargaining solution. However, contrary to the existing

literature, the bargaining problem is characterized by disutility rather than utility allocations. A hallmark of the model is that haggling over fiscal adjustment costs is captured in a bargaining that renders the entire threat game analytically as well as empirically tractable (see also Fahrholz (2007)).

The paper is composed of four sections. The next section presents our analysis in the context of the existing literature. The following section presents the modeling framework, i.e. its general structure, the nature of brinkmanship, and the subsequent bargaining. The final section concludes and discusses some policy implications.

2. Related literature

The Greek bail-out involved intense negotiations among euro area members and depended a great deal on political factors. At the onset of EMU, already Bordo and Jonung (1999) highlighted that that political factors will be the central determinants of the future of EMU. In such a setting, game theoretic analysis seems highly suitable and instructive.

In fact, there is already a long tradition to use the type of modeling to different aspects of international relations (see, for example, Dixit and Nalebuff (2008), Zagare and Kilgour (2000) for extensive surveys). Within this general line of research there exists also a diverse literature on applications of threat games and brinkmanship strategies respectively (see Schwarz and Sonin (2008) for a survey of related strands in literature as well as Acemoglu (2003) on general issues, at which research in economics and political science overlap). However, most of this literature has been applied mainly to political science. The few exceptions that capture economic applications address international trade negotiations (e.g., Milner and Rosendorff (1997)), exchange-rate policies (Fahrholz (2007)) or selected cases of economic history (e.g., Yared (2010); Dye and Sicotte (2006)).

Our analysis differs from the above literature as it concerns the political-economic aspects of EMU. The political-economics setting of our analysis resembles that of Alesina and Drazen (1991) who argue that domestic fiscal reforms may have significant distributional implications, so that societal groups may seek to pass the burden of fiscal adjustment costs onto other groups at the national level. However, our focus is on the mutual dependence of

fiscal policy-making within EMU-member states. We particularly account for the interaction between both the national and the European sphere. In this regard, we consider the canonical 'Schelling conjecture' (Schelling (1960); Dixit (2006) for a reappraisal). This 'two-level metaphor' postulates that national executives intermediating between the national and the European level have to craft ratification within the domestic arena. The latter process can also be traced to a permissive consensus of voters and lobbies that can enforce substantial political conflict potential. Such a domestically constrained executive can make use of its internal 'weakness' in terms of enhancing its bargaining position, for instance, in negotiations concerning European fiscal affairs. In case there exists an opportunity of playing off national constituency against other entities and inflicting the latter actors with negative externalities such proactive stance toward moral-hazard behavior represents a 'brinkmanship' strategy. The scope and limits of such a 'threat' may thus represent bargaining leverage, for example, in European fiscal affairs depend on numerous aspects.

There exists theoretically oriented literature of both disciplines economics and political science which enquires into conditions determining corresponding strategy sets. In this respect, according models account not only for actors' preferences but also for their attitudes toward risk and time (discount rates) etc. The latter research approach is usually known as the 'Nash-program' (Binmore et al. (1986)) and traces in the seminal contributions of Nash (1950, 1953). As regards formal modeling, the number of actors involved (Mao (1993)), the way of modeling constraints – i.e. the Schelling-conjecture – including the distribution of information concerning this matter (Tarar (2001); further, Iida (1993)), and assumptions concerning discount rates shape particular threat games.

3. Modeling framework

In this section we outline the modeling framework. Our analysis is based on a brinkmanship game, which may be solved by a Nash bargaining solution (Nash (1950, 1953)). The analysis determines the scope and limits of the brinkmanship and subsequently inquires into the bargaining solution. It demonstrates to what extent a 'troubled' EMU member may negotiate a bail-out due to the existence of a negative externality arising from its potential default.

The general set-up

In order to keep the game simple and tractable, the focus is limited to several key aspects of the political-economics design of EMU.

First, the main basis of the game is the negative externality problem arising from the fact that an unsustainable fiscal position and a threat of default by one EMU member is likely to spill-over on the rest of EMU members. As indicated earlier, since the birth of the euro the negative externality problem has been central to all policy debates related to EMU's institutional design. In fact, it has been one of the key arguments in favor of the Stability and Growth Pact: imposing fiscal rules on EMU members would – as it was hoped – counter the tendency for fiscal bias and free riding.[4] Also in the context of the recent euro area crisis Baldwin, Gros and Laeven (2010) point out that "(…) in a monetary union without a fiscal union governments might be tempted to run up unsustainable debts and push the ECB to inflate them away or run up high levels of debts that would create negative spillovers for others." Substantial negative externality effects have been also confirmed empirically. For example, Faini (2006) has shown that expansionary fiscal policy in one EMU member state has an effect not only on the spreads of this particular member's interest rates, but also – and to an even greater extent – on the average level of interest rates in the whole euro area. In essence, the costs of fiscal profligacy are paid not only by the sinner, but also by other members[5].

Such negative externality may take different forms. For example, decreased political support for European integration process, deteriorated financial market access, protracted growth slack or disrupted trade relations (henceforth we call them 'externality costs').[6] Because the above costs adversely affect all the members, such externality may serve as a bargaining leverage that a particular member can use for negotiating redistribution – a bail-out – of its costs of fiscal adjustment within EMU. While such concessions may in principle take pecuniary form (for example, some sort of fiscal transfers) or non-pecuniary form (for

[4] For the early discussions on the rationales for the Stability and Growth Pact and its provisions see for example, Artis and Winkler (1998), Beetsma and Uhlig (1999), Brunila et al. (2001) or Buti and Sapir (2006).

[5] It is worth noting that these short-term effects have been different during the current Greek crisis: while interest rates for public debt of Spain, Portugal or Ireland increased in reaction to Greek woes, those for German public debt fell down in the course of the overall portfolio rebalancing within EMU.

[6] Note that the negative externality arises here in the political economics context. On purely economic considerations it can be argued that letting Greece default could be efficient as it would strengthen incentives for structural reforms among all EMU countries. In other words the default would lead to some sort of "positive externality'. However, reforms that eventually benefit all are often resisted or delayed and a growing body of literature explains how such "inefficient" outcomes can be compatible with rational behavior (e.g, Rodrik (1996)).

example, loosening some rules in face of deteriorating fiscal position), in the following discussion we focus on the former compensation.

Second, there are two types representative players involved in the game. Within EMU there are a group of countries which suffer from the twin problems of public debt sustainability and external debt sustainability. These 'twin deficit' countries – think of Greece, Spain or Portugal – are labeled 'TD'. The second group of countries – think of Germany – is characterized by current account surpluses within the euro area and sustainable public debt position (henceforth labeled 'CA').[7] Later we assume that only one particular TD_i – think of Greece – faces an imminent default risk, although other TDs are susceptible. This assumption allows us to bring the structure of the model closer to the ongoing discussion and to take into account the potential contagion effect on other TDs and its implications for final bargaining outcome.[8]

Third, there is incomplete political integration among the players: Countries have different incentives to be EMU member, face different constituency constraints and there is no automatic emergency financing mechanism for unwinding severe fiscal and macroeconomic imbalances in EMU. In fact, for this reason, a fierce bargaining within European fiscal affairs has recently evolved.

Both representative players TD and CA are interested in preserving smooth functioning of EMU. From the viewpoint of TD, membership in the euro area is advantageous as it provides access to financial markets and to real external resources (as euro loosens external constraints for TD). At the same time, membership in the euro area is beneficial for CA, as it supports its export-oriented policy stance (due, *inter alia*, to a slower growth of its relative unit labor costs) – a reversal of this policy stance and associated adjustment of production processes would incur CA with short run costs.

[7] Sustainability of public finances is understood here in relative terms. While such a relative position is key for the financial markets in the short and medium-run which is the focus of this analysis, one has to remember that due to the ageing problem, all EU member countries face severe challenges for their public finances. According to the OECD, with no policy change only because of demographic changes, the average debt rises to 500% of GDP in 2060).

[8] The IMF was an important player during negotiations over the bail-out. For simplicity, we do not formally include the IMF into the game. However, integrating the IMF into the model would increase the bargaining power of TD_i (as has been the case with Greece) which would strengthen the case for bail-out. Integrating into the model another external actor would also not rule out the issue of negative externality stemming from the institutional set-up of EMU.

Against this background there exits a public good 'EMU stability', whose deterioration in the course of one member's default would make all players worse off. While the individual motivation is different, the interest in preserving a smooth operation of EMU is shared by all players. Hence, both TD and CA have some willingness-to-pay for preserving EMU stability and their membership within EMU.

This mutual willingness-to-pay for 'EMU stability' is the foundation of bargaining for redistribution of players' cost shares within EMU. In this context, an individual TD player may resort to a brinkmanship strategy, as its potential default would create a negative 'externality cost', i.e. a Damocles sword hanging over the rest of EMU members. Within the scope and limits of such brinkmanship strategy, CA might be credibly threatened to actually reveal its willingness-to-pay for 'EMU stability'. Accordingly, TD may effectively elicit a bail-out by the rest of EMU members. Importantly, for all players there is the risk of an overall worst outcome for such maneuvering on the brink – this worst outcome constitutes the threat, which is not under full control by the players. As soon as it turns out that the threat is indeed credible brinkmanship ensues. Our analysis then inquires into a Nash bargaining solution (NBS) for that conflict which completes the entire threat game. We show to what extent a single TD may indeed pass some of the 'fiscal adjustment costs' on to the rest of EMU, i.e. successfully incur CA with some of the burden of financial assistance.

The analysis unfolds in three steps: First, we discuss the basic characteristics of such a threat game. Second, the brinkmanship is elaborated. Third, we determine a sub-game perfect equilibrium for successful brinkmanship, i.e. eliciting bail-outs within EMU.

The model

A single TD_i (denoted as player $j=1$, whereas $i=1,...,n$) and a representative CA (player $j=2$ in place of the group of current account surplus countries within the euro area) are two risk-neutral players with quasi-linear preferences for the public good 'EMU stability'. The first player TD_i has complete but imperfect information regarding CA's willingness-to-pay for preserving a smooth functioning of EMU. As mentioned above, the reason for distinguishing between particular TDs is that there might be a contagion effect (i.e. a negative externality) in the course of a likely bail-out of a single twin deficit country. Furthermore, we assign bargaining power to both players: α_i is the bargaining power of a

TD$_i$ and β_{-i} the particular corresponding bargaining power of CA, with $\alpha_i + \beta_{-i} = 1$. At the heart of our brinkmanship game is the haggling between the TD$_i$ and CA over sharing the costs of fiscal adjustments within EMU, i.e. contributions to safe-guarding 'EMU stability'. These costs are denoted as C_i^F (henceforth, 'fiscal adjustment costs') for the specific TD$_i$. By the same token, benefits with respect to a single TD$_i$ are denoted as B_i – these benefits stand for preserving membership within EMU and providing access to financial markets and external resources. From the perspective of CA, the same B_i represents the benefits from euro area membership as prerequisite for its export-oriented stance.[9]

In this regard, another issue concerns the limited liability feature of CA, which is the extent to which CA countries within the euro area actually pay for TDs' failure in fiscal consolidation. A deterioration of the public good 'EMU stability' entails above all costs for TD$_i$. However, CA will also suffer from a default as it has a stake in EMU. Though, CA has a particular subsidiary role: While TD$_i$ will not accept costs higher than total C_i^F in exchange for contributing to 'EMU stability', CA will administer financial assistance within the limits of their maximum willingness to pay if $C_i^D > C_i^F$. Accordingly, CA will have limited liability amounting to a share λ_i of total C_i^F with $0 < \lambda_i \leq 1$. This is to say, CA countries will at most transfer funds to TD$_i$ amounting to C_i^F, because beyond that point their willingness to pay for preserving 'EMU stability' would be exhausted, too. The following proposition can be derived from these considerations:

$$\lambda_i = \begin{cases} 0 & \text{if } C_i^F \geq C_i^D \\ 0 < \lambda_i < 1 & \text{if } C_i^F < C_i^D < 2C_i^F \\ 1 & \text{else} \end{cases}.$$

Bearing the entire C_i^F reflects each player's maximum willingness to pay for successful managing Greek-type crises within EMU. In this regard, C_i^F reflects each player's cost tolerance in escalation processes of brinkmanship. The rationale of such brinkmanship is that TD$_i$ threatens to realize the overall worst pay-off represented in the disagreement point d.

[9] We assume that the benefits are the same for both players as it renders the game simpler to solve. One may rightly argue that benefits can be different for, say, a big economy like Germany and, say, a small one like Greece. However, assuming that the benefits were not symmetric would not change the general tone of our results, so we have decided to keep the game as simple as possible.

In doing so, it can under identifiable conditions pass a share of the fiscal adjustment costs, C_i^F, on the rest of the EMU members. If a credible brinkmanship evolves, then both players will not maximize their piece of the pie, but minimize their respective share of fiscal adjustment C_i^F during negotiations. The present bargaining problem is thus characterized by the tuple (C_i, d) where $C_i \subset R_+^{*2}$ is a vector combination of feasible (dis)utility allocations. The disagreement point d is the bargaining outcome if both parties' negotiations break down. In that case, markets will notice that both TD$_i$ and CA cannot agree on an appropriate policy solution for TD$_i$ that helps safe-guarding 'EMU stability', i.e. redistributing the 'fiscal adjustment costs' amounting to C_i^F. This will then, in turn, trigger a default. This way the realization of d is equivalent to the occurrence of default costs C_i^D. The following costs arise in this game $G(C_i^F, d)$: First, there are the above mentioned 'fiscal adjustment costs' C_i^F for bail-outs around which the bargaining revolves. If the according negotiations on distributing C_i^F were to break down, then a default will occur, and both players will be stuck with the disagreement point d comprising the actual 'default costs' C_i^D and λ_i respectively.

Further reservations regarding the delineated basic characteristics of this brinkmanship game are as follows: On the one hand, the question arises whether TDs should form a cartel to strengthen their brinkmanship vis-à-vis other EMU members. On the other hand, whether other EMU countries within the euro area can announce in advance that they will club together in order to punish the first country which dares to practice brinkmanship. This is to say that they might pursue an enter-deterrence game. However, because of the coordination problem and competition between all EMU members both scenarios are unlikely. As to the first scenario, if it becomes evident that some particular TDs explicitly coordinate brinkmanship strategy then this may lead financial markets and other members of EMU to discriminate more between both group of countries, TDs and CAs. Also, since – as we have assumed before – only TD$_i$ is facing an imminent default risk, other TDs will not be willing to join as it might signal the financial markets that they also face an imminent default risk. As to the second scenario, the coordination problem among CA countries arises because of uncertainty regarding their future potential need for assistance.[10]

[10] The scope for an enter-deterrence game is limited also by the fact that due to problems of effective monitoring, assessing fiscal policy and identifying deliberate infringement to fiscal rules in EMU is a complicated issue (e.g.

Successful brinkmanship is especially dependent on the two given probabilities p and q_i that are independent of each other and endogenous. The latter say depicts the fact that the cost structure determines the probability values. From the perspective of a TD$_i$, p denotes the probability of encountering an 'offish' CA or a 'lavish' one with a probability $(1-p)$. The more offish the CA, the lower is the probability of executing successful brinkmanship. At this stage, we take up on the point that a TD$_i$ as an EU member has a say in the European decision-making process. Hence, CA may link financial assistance as a tool when seeking a TD$_i$'s consent to any agreement. In line with this rationale, we assume that values of p are smaller than 1. At the same time $p > 0$ because CA has at least some willingness to pay for preserving 'EMU stability' (see above). Hence, we reject according corner solutions of p, so that $0 < p < 1$.

The probability q_i basically describes the likelihood of externalities by triggering voter alienation towards enacted fiscal consolidation processes, i.e. incurring the electorate with the full amount of 'fiscal adjustment costs' C_i^F.[11] Uncertainty regarding the constituency's reaction to stipulated fiscal retrenchment processes may buttress TD$_i$'s bargaining position in negotiations vis-à-vis CA. If the electorate was completely 'Europhile', then there would be no room for the government for incurring other EMU members with any form of externality costs as imposed fiscal austerity would not havoc any political upheaval. In fact, the according probability q_i would be zero in such circumstances. At the same time, we expect that voters as well as their delegated governments must also rank the benefits B_i as valuable. Otherwise, any efforts towards fiscal consolidation within TD$_i$ would be unacceptable, and a government would be unable to craft consensus towards its contribution to safe-guarding 'EMU stability' in the domestic arena. In line with the aforementioned reasoning, we exclude according corner solutions so that $0 < q_i < 1$. There accordingly exist some political resources on the national level, which a government in TD$_i$ may play off against CA in intergovernmental European negotiations.

Jaeger and Schuknecht (2004) discussing it in the context of pro-cyclical fiscal positions and boom-bust phases). As regards boom-bust cycles within EMU please also refer to Backé and Wójcik (2008).

[11] Here, national strikes in Greece provide a vivid example how political imponderability on the national level may bring about a bargaining leverage in international negotiations.

If the conditions for successful brinkmanship are met, then CA will dance obligingly to TD$_i$'s tune and share some 'fiscal adjustment costs' C_i^F in terms of providing a bail-out. In the following paragraphs, we determine the Nash strategies, i.e. the mutually best responses which will eventually constitute a sub-game perfect Nash equilibrium of the brinkmanship game.

The brinkmanship game

We proceed with the analysis of the political-economic, game-theoretic model by simplifying things without loss of generality: Given that both players' maximum willingness to pay for 'EMU stability' in terms of still reaping the benefits B_i from smooth operation of the euro area corresponds to the total C_i^F, we can normalize $C_i^F = B_i = 1$. Hence, we can transform the threat game $G(C_i, d)$ to the form of $\Gamma(\varsigma_i, d)$ with $0 < c_{ij} \leq 1, c_{ij} \in \varsigma_i, \varsigma_i \subset R_+^{*2}$. The standard assumption holds that ς_i is a non-empty, convex and compact set comprising any convex combination of vector $c_{ij} = (c_{i1}, c_{i2})$. In this game $\Gamma(\varsigma_i, d)$ TD$_i$ quasi maximizes the CA's share of 'fiscal adjustment costs' for safe-guarding 'EMU stability', i.e. incurring them with the costs of their negative externality. The bargaining may lead to a new outcome c_i for TD$_i$. In turn, TD$_i$ burdens CA with the share $1 - c_i$. Accordingly, the players' continuous utility functions $u_{(i)j}(c_{(i)j})$ are:

$$u_{i1}(c_{i1}) = c_{i1} = c_i,$$
$$u_2(c_{i2}) = c_{i2} = (1 - c_i).$$

At the same time, the brinkmanship game $\Gamma(\varsigma_i, d)$ still comprises the disagreement point d – i.e. the realization of default costs C_i^D – and represents TD$_i$'s threat, where the pay-off is $(-1, -\lambda_i)$ in line with the aforementioned proposition (see above).

Contagion and moral hazard effects

Two different sub-games of $\Gamma(\varsigma_i, d)$ due to complete but imperfect information have to be taken into consideration. First, TD$_i$ does not know whether it will encounter an offish (p) or

a lavish $(1-p)$ CA. In this context, specific default costs have to be considered. On the one hand, a single crisis has the potential to trigger further defaults of all n TD$_i$. This would be the overall worst pay-off from the viewpoint of CA. Therefore, fearing such exorbitant costs the primary goal of CA would be to sustain the support in each TD$_i$ for safe-guarding 'EMU stability'. From this point of view, it may be more beneficial to be lavish. Second, CA may display a rather reluctant attitude towards providing bail-outs because any obvious generosity would intensify moral hazard behavior which possibly does require transferring n-times of c_i. Due to CA's ambiguous attitude towards providing extra funding, the TD$_i$'s pay-offs have to be weighted with a probability p for encountering an offish and $(1-p)$ for a lavish CA.

The TD$_i$'s feasible set of strategies is comprised of two choices: 'consolidate' or 'not-to-consolidate'. The latter strategy consists of practicing brinkmanship on the basis of the premise that national constituency would not accept consolidation measures. If TD$_i$ chooses to 'consolidate', i.e. not practicing brinkmanship, it forgoes the opportunity to pass a share c_i of 'fiscal adjustment costs' on to CA. This would be the best pay-off from the perspective of CA. When TD$_i$ relies on a strategy of choosing 'not-to-consolidate', the outcome ultimately depends on the reaction of CA. The latter player can choose a strategy of 'bail-out' or 'no-bail-out' by withholding any funding. The according pay-offs are as follows: If TD$_i$ chooses a strategy of 'consolidate', then it receives zero, whereat CA receives the entire benefits of secured 'EMU stability', i.e. further smooth operation of euro area, amounting to 1. If TD$_i$ chooses to 'not-to-consolidate', CA can 'bail-out' or 'no-bail-out'. When CA reins TD$_i$'s prospective default in, then TD$_i$ receives the aspired alleviation of 'fiscal adjustment costs' in amount of c_i. In this case CA receives a pay-off $(1-c_i)$. Taking into account the principle of equal treatment within Europe, however, CA may also have to deal with transferring payments to all TD$_i$ amounting to n times the size of $(1-c_i)$. If CA chooses to 'no-bail-out', TD$_i$ may be stuck with default costs amounting to $(-q_i)$. The latter pay-off hinges upon TD$_i$'s likelihood of losing public support for fiscal retrenchment and consequently defaulting. Simultaneously, CA receives the pay-off $(-q_i\lambda_i+1-q_i)$ or $(-q_i\sum_{i=1}^{N}\lambda_i+1-q_i)$ in the case of possibly spreading defaults among all TDs.

A brinkmanship strategy has to meet some prerequisite conditions. In particular, a successful brinkmanship has to be effective and acceptable. The effectiveness condition of such brinkmanship rests on the extent of TD_i's default: As CA is increasingly affected by costs, a TD_i's threat gains more credibility. In this respect, the probability of default is subject to a critical threshold: If the respective probability is too small, CA cannot be coerced into providing financial assistance. However, the credibility of the brinkmanship strategy is also dependent on whether the outcome is acceptable to TD_i. If the probability of a default is too high and, hence, the acceptability condition cannot be accomplished, then TD_i will have to 'consolidate'. In turn, this player will entirely incur the envisioned 'fiscal adjustment costs' for sustaining 'EMU stability'.

The TD_i's brinkmanship will be successful, which means eliciting the desired extra funds amounting to c_i, if it constitutes a credible threat. In this regard, TD_i's brinkmanship may be effective, if the expected pay-off of CA from a choice to 'bail-out' is higher than from a decision to 'no-bail-out' when taking into account possible contagion, i.e. defaults spilling over to other TDs. Therefore,

$$(-q_i \sum_{i=1}^{N} \lambda_i + 1 - q_i) < (1 - c_i).$$

Accordingly, the minimum probability $q_{i,min}$ has to be:

$$q_{i,min} > \frac{c_i}{\sum_{i=1}^{N} \lambda_i + 1}.$$

The probability $q_{i,min}$ is the lower bound of the brinkmanship for TD_i. Below this level CA would choose a strategy of 'no-bail-out', even if it is lavish. However, with a probability of p TD_i may feel that the strategy 'not-to-consolidate' is too risky with regard to encountering an offish CA. At the same time, TD_i will encounter a lavish CA with a probability of $(1-p)$, which will choose a strategy of 'bail-out' given that the effectiveness condition holds. Thus, for a given $0 < q_i < 1$ TD_i will pose a probabilistic threat, if its expected pay-off is higher than a zero pay-off from choosing to 'consolidate':

$$(-q_i p) + c_i (1 - p) > 0.$$

After resolving we obtain:

$$q_{i,max} < c_i \frac{1-p}{p}.$$

Accordingly, the acceptability condition depends on values for p. Therefore, values for p have to be below a critical threshold. Otherwise, $q_{i,max}$ would have to be even smaller than $q_{i,min}$ for some high values of p. That would render any brinkmanship fruitless as it indeed becomes effective but not acceptable. From the proposition $q_{i,min} < q_{i,max}$ it follows that the upper bound is:

$$p_{max} < \frac{\sum_{i=1}^{N} \lambda_i + 1}{\sum_{i=1}^{N} \lambda_i + 2} < 1.$$

If the probability p for an offish CA satisfies the acceptability condition, then the following proposition must be valid:

$$p^* \in P^*, \qquad P^* := \{p^* \mid p^* < p_{max} < 1, p^* \in R_+^*\}.$$

Regarding $q_{i,min}$, the probability q_i in a brinkmanship strategy has to remain below the critical threshold $q_{i,max}$. Above that value TD$_i$ will refrain from a strategy of 'not-to-consolidate' because it fears mutual detrimental effects. Therefore, for every given probability $0 < p < 1$ the probabilistic threat is credible when a country-specific q_i^* is an element of the finite set Q_i^*. The according proposition is:

$$q_i^* \in Q_i^*, \qquad Q_i^* := \{q_i^* \mid q_{i,min} < q_i^* < q_{i,max}, q_i^* \in R_+^*\}.$$

When the endogenous effectiveness and acceptability conditions for the parameters p and q_i are satisfied, TD$_i$ will resort to brinkmanship. CA's response to TD$_i$'s brinkmanship is to immediately transfer 'fiscal adjustment costs' amounting to the share c_i. This is equivalent to TD$_i$ passing the respective portion of 'fiscal adjustment costs' on to current EMU members, i.e. the bail-out in the face of such negative externalities. At this stage, then TD$_i$ will henceforth commit to fiscal consolidation since there are no further opportunities to pass costs on to current account surplus countries of the euro area. This is because beyond that point CA is no longer willing to pay for safe-guarding 'EMU stability'. The remainder of the game-theoretic analysis focuses on the Nash bargaining solution for distributing TD$_i$'s 'fiscal adjustment costs' during a Greek-type crisis for EMU. This is to say that we ascertain each player's portion of such fiscal costs.

The bargaining game

An NBS is characterized by complete information. It is finite in that only one offer and no counter-offers are possible when bargaining. The bargaining revolves around arguing over sharing the 'fiscal adjustment costs' of safe-guarding 'EMU stability'. Given that all characteristics of the game are common knowledge, the players look ahead and anticipate the reciprocal best responses. Due to this backward induction, negotiation time is irrelevant and the bargaining game comes to an immediate solution. In line with this rationale, present see-sawing – in terms of announcing and stipulating fiscal retrenchment on the Greek level and deliberating upon bail-outs at European end – is representing the preparatory stage before both camps finally put their cards on the table.

The game $\Gamma(c_i, d)$ is completed by a Nash bargaining on the non-empty, convex and compact set comprising any convex combination of vector (c_1, c_2) in R_+^{*2}. According to the NBS it has to be dealt with Pareto-efficient solutions only. The particular share c_i of 'fiscal adjustment costs', which TD$_i$ can load on to CA, is the bargaining outcome. The NBS is derived from the Nash product (NP) weighted with the respective bargaining power:

$$\max_{c_{ij}} NP(\Gamma(\varsigma_i, d)) = (u_{i1}(c_{i1}) - u_{i1}(d_1))^{\alpha_i} (u_2(c_{i2}) - (u_2(d_2))^{\beta_{-i}}$$

with $c_{ij} \geq d_j, c_{ij} \in \varsigma_i, \alpha_i \geq 0$, $\beta_{-i} \geq 0$, and $\alpha_i + \beta_{-i} = 1$.

Given the players' utility functions the maximization problem in light of $d = (-1, -\lambda_i)$ is:

$$\max_{c_{i1}, c_{i2}} \Gamma(\varsigma_i, d) = (c_i + 1)^{\alpha_i} ((1 - c_i) + \lambda_i)^{\beta_{-i}} .$$

The according first-order condition is:

$$\frac{dNP}{dc_i} = \alpha_i (c_i + 1)^{\alpha_i} ((1 - c_i) + \lambda_i))^{\beta_{-i}} - (c_i + 1)^{\alpha_i} \beta_{-i} ((1 - c_i) + \lambda_i)^{\beta_{-i}} = 0 .$$

After rearranging we receive the equilibrium solution:

$$c_i^* = \begin{cases} \text{not defined} & \text{if } \frac{(1+\lambda_i)\alpha_i - \beta_{-i}}{\alpha_i + \beta_{-i}} \leq 0 \\ 0 < c_i \leq 1 & \text{if } 0 < \frac{(1+\lambda_i)\alpha_i - \beta_{-i}}{\alpha_i + \beta_{-i}} \leq 1 \\ 1 & \text{else} \end{cases} .$$

Here, it becomes obvious that CA's actual willingness to pay for bailing out TD$_i$ depends on the distribution of bargaining power. The less bargaining power β_{-i} CA exhibits, the higher are the values for c_i^*. Consequently, TD$_i$ can elicit more funds amounting to c_i^* from CA as

their bargaining power α_i increases, hence, having other EMU members over the barrel. We recall that c_i^* is the share of 'fiscal adjustment costs' C_i^F that is acceptable to CA. With respect to the complete brinkmanship game $\Gamma(\varsigma_i, d)$ the NBS is, hence,

NBS: $\Gamma^*(\varsigma_i, d) = (c_i^*, (1-c_i)^*)$.

Considering the specific characteristics of the NBS, the combination of both players' Nash strategies ['not-to-consolidate', 'bail-out'] can also be represented in terms of their respective reaction functions R_{ij}. Due to complete information TD$_i$ can anticipate CA's optimal choice. Hence, its own best response is:

$$R_{i1}(c_{i2}^*) = \begin{cases} \text{not defined} & \text{if } \frac{(1+\lambda_i)\alpha_i - \beta_{-i}}{\alpha_i + \beta_{-i}} \leq 0 \\ 0 < c_i \leq 1 & \text{if } 0 < \frac{(1+\lambda_i)\alpha_i - \beta_{-i}}{\alpha_i + \beta_{-i}} \leq 1 \\ 1 & \text{else} \end{cases}.$$

From the perspective of CA the corresponding reaction function is:

$$R_{i2}(c_{i1}^*) = \begin{cases} \text{not defined} & \text{if } \frac{2\beta_{-i} - \lambda_i \alpha_i}{\alpha_i + \beta_{-i}} \leq 0 \\ 0 < (1\text{-}c_i) \leq 1 & \text{if } 0 < \frac{2\beta_{-i} - \lambda_i \alpha_i}{\alpha_i + \beta_{-i}} \leq 1 \\ 1 & \text{else} \end{cases}.$$

The players' reaction functions R_{ij} constitute the unique sub-game perfect Nash equilibrium incorporating a specific NBS of the entire game $\Gamma(\varsigma_i, d)$ and $G(C_i^F, d)$ respectively for every fixed $\overline{p} \mid \overline{p}^* \in P^*$ and $\overline{q} \mid \overline{q}^* \in Q^*$. This is to say that for effective and acceptable brinkmanship, CA's response to TD$_i$'s credible brinkmanship strategy is to burden itself with 'fiscal adjustment costs' C_i^F amounting to the share of c_i. Thus, TD$_i$ passes the respective 'fiscal adjustment costs' on to other EMU members. When obtaining a share c_i of 'fiscal adjustment costs', TD$_i$ will abstain from further attempts to promote a hazardous fiscal policy stance and will behave well. This is because, at that point, CA's willingness to pay for contributing to the public good 'EMU stability' is exhausted. So, there is no more moral hazard related to fiscal policy.

It is important to note that this outcome is primarily related, although not restricted to, to the parties directly involved in the negotiation process.[12] It goes without saying that the exogenously invoked limited liability can be altered. However, increasing CAs' willingness-to-pay would not change the general tone of the analysis on moral-hazard behavior. At least, this applies as long as it is assumed that EMU represents a joint public good. Henceforth, there must be some positive limited liability. However, in this respect, there might be another caveat in order: as the modeling framework reckons one TD's brinkmanship vis-à-vis CA, the Greek-type crisis has been one particular round in the 'boxing match', though such a crisis scenario may occur again. Insofar, one may expect that newly incipient but random sovereign debt crisis within EMU to mark the starting point for another round of the outlined threat game. Hence, the institutional setup of EMU is the ground for brinkmanship, whereas 'crisis' acts as a catalyst within the overall process.

4. Conclusions and policy implications

The Greek crisis involved intense negotiations among the euro area members and depended to a large extent on political factors. In this paper, we have presented a framework that formally takes account of the interactions between the economic and political factors in such type of a crisis in the context of the EMU. We have based our analysis on a political-economic, game-theoretic model that helps to understand why and how the parties involved in the Greek crisis arrived at the bail-out and on what conditions the final solution depended. In doing so, we have formally taken account of the negative externality problem that is central to all policy debates related to the EMU's institutional design and played an important role in the Greek crisis. However, contrary to the existing literature, we have not only focused on the economic aspect of such negative externality, but also looked at how it emanates and interact with the political factors, in particular the dynamics of the political negotiation process within the EMU. Based on our analysis, we have demonstrated that the bail-out was inevitable (i.e. a threat of default by one member must (under identifiable conditions) result in sharing the costs of fiscal adjustment by the rest of the members) but that it does not have to be associated with a future moral hazard problem.

[12] Additional analysis would be needed to see how this result may impact other player's behavior in the dynamic setting.

As regards the policy implications, it is important to stress that the results are conditional on the present political-economic set-up of the EMU. In other words, the EMU problems do not only ensue from the Greek fiscal problems alone, but from the interactions of these problems with the actual political-economic configuration of the EMU. The sheer fact that countries share the same currency does not necessarily have to lead to negative spillovers between them. If this was the case, the fiscal problems in Ecuador, a dollarized country, would give rise to a threat to the dollar – evidently this is not the case (see more Balcerowicz (2010)). In the EMU, however, refinancing difficulties of a small country like Greece which accounts for only 2% of the euro area's GDP can trigger a systemic crisis for the whole EMU. This is different from the case of the US monetary union where fiscal woes of even such big states as California do not wreak such havoc.

The weakness of the current EMU set-up is that it neither provides sufficient incentives for curtailing excessive lending and indebtedness (see more De Haan et al. (2004)), nor secures the degree of political integration necessary to attain a sufficient degree of policy coordination. Strengthening fiscal discipline is of key importance, but it has consistently collided with the enforceability problem of applying supra-national fiscal rules to sovereign states. While stepping-up the degree of political integration could alleviate this tension, policy makers in Europe are well aware of how lengthy this process would be and how naïve it is to believe that political integration could be significantly accelerated.

Squeezed between the undesirable now and the long-to-attain future, the EMU needs to develop some intermediate solutions that would help to bridge this gap. Our analysis suggests at least a few possible avenues (see also Fahrholz and Wójcik (2010)).

First, should a bail-out be unavoidable, given the current state of the political-economic configuration of the EMU – as our analysis seems to suggest – then it is better to make it rule-based and explicit. This may at least limit the haggling and uncertainty in the course of such events resulting in a lower risk premium associated with such uncertainty (see Bini Smaghi (2010) who makes a similar case in context of financial markets). This would also render support for the European Monetary Fund suggested earlier by Gros and Mayer (2010).

Second – and this is our main conclusion – the analysis suggests that, in order to improve the EMU's functioning, more weight should be given to solutions which address the negative externality problem. This could be achieved by changing the political incentives in the negotiation processes of the EMU. In a sense, this would address the political aspect of the political-economic set-up of the EMU and hence would complement the necessary (but so far largely failed) efforts to improve the EU and domestic fiscal frameworks per se. One such solution could be to establish 'exit rules'. Specifying conditions for leaving the EMU, including the costs and legal requirements of such an operation, would bring at least three benefits: i) on the constituency level, it would make exit costs explicit to electorates, thus diminishing incentives to follow such strategies; ii) on the government level, it would weaken the bargaining position of troubled countries vis-à-vis the rest of EMU, thus decreasing the effectiveness of brinkmanship strategies; iii) on the markets level, it would reduce uncertainty and stabilize market reaction in case of a future potential default or exit, thus decreasing the scope for negative externality.

Overall, making exit costs and procedures explicit would increase the perceived costs of an exit relative to the short-term political costs of economic adjustment. This would serve as a deterrent to brinkmanship, stimulate fiscal discipline and decrease the scope for the negative externality. While additional research is needed to shed more light on the effects of such exit rules, it seems that the existence of the rules would strengthen the EMU's sustainability in the long-run, both in economic and political terms. Paradoxically, it may make future exits less – not more – probable, as shown by the history of certain national states struggling to preserve their internal integration (cf. The Economist 2005). Their experience suggests that when secession is not permitted, a pressure for it rises. When secession is openly allowed, many would-be secessionists cease to press so hard for it – or for a bail-out as is the case with the Greek-type crisis.

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