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Determinants of complexity of sovereign debt negotiation

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Abstract

The situation on all kinds of financial markets is determined by their increasing complexity. Negotiation of sovereign debt is also a complex endeavor. Its complexity results both from structural characteristics – number of actors, problems of coordination, communication, cooperation and conflict and from cognitive limitations. The survey of literature on sovereign debt management shows that no research has been done on complexity of sovereign debt management, and sovereign debt negotiation in particular. The aim of the paper is to provide initial framework concepts of complexity of sovereign debt restructuring negotiation referring to a universal collection of characteristics of negotiation. A model of debt restructuring negotiation is elaborated and a set of its complexity-related characteristics is proposed.

Keywords: complexity studies, negotiation theory, sovereign debt negotiation.

JEL Classification: C78, F34, G15, G28, H63.

Introduction

The recent negotiation with Greece and other cases of external indebtedness of developing and developed countries remind about unsolved challenges of sovereign debt management. Frequently, the decisive part of sovereign debt management is its restructuring, which is achieved in the long lasting and complex, multi-party negotiation.

While there exists a vast literature about international debt, the negotiation process itself has usually been given less attention. Most of the studies are focused upon formal aspects of negotiation, e.g. modelling the bargaining process with dynamic, stochastic, general equilibrium model. Such problems as the process of negotiation, bargaining phases, behavior of negotiators, structure of negotiation situation, the consequences of multi-actor negotiation have not yet been studied profoundly.

There is another aspect of the situation on all financial markets which is associated with their increasing complexity. It is reflected in variety of applications of that term in the public discourse on finance, including also sovereign debt. Negotiation of sovereign debt is by definition a complex endeavor. Its complexity results both from structural characteristics – number of actors, problems of coordination, communication, cooperation and conflict as well as from cognitive boundaries. Recently, complexity of debt restructuring negotiation has even increased due to overall uncertainty in the world economic system and due to new specific determinants of the debt restructuring cases, e.g. the Greece's debt crisis. The survey of literature on sovereign debt management shows that no research has been done on complexity of the sovereign debt management, and sovereign debt negotiation in particular.

The aim of the paper is to provide initial framework concepts of complexity of sovereign debt restructuring negotiation referring to a universal collection of characteristics of negotiation. A model of debt restructuring negotiation is elaborated and the set of complexity-related characteristics of negotiation is proposed.

Although the term complexity is frequently used in the discourse on negotiation, including debt restructuring negotiation, usually it is defined in an imprecise manner. Therefore the definitions of complexity are explained in the paper in a more rigorous way. The ideas presented in the paper can be used in a deeper understanding of the sovereign debt negotiating processes, their institutional determinants and behavior of the parts involved. The approaches based solely upon statistical analysis and rational assumptions about decision makers are insufficient, especially under the contemporary circumstances.

In the first part of the paper, sovereign debt and negotiation associated with its restructuring are discussed. Definitions of 'hard' and 'soft' complexity are presented in the second part. In the third part, the structure and the process of debt restructuring negotiation are depicted. In the final part the attributes of complexity of debt restructuring negotiation are proposed. Potential applications of complexity-related ideas drawn from theory of negotiations are also scrutinized in the last part.

1. Sovereign debt negotiation: A descriptive approach

1.1. Sovereign debt and its restructuring

Sovereign debt (public / government / national debt) is issued by a national government. It is theoretically considered to be risk-free, as the government can employ different measures to guarantee repayment, e.g. to increase taxes or to print money. Government debt can embody internal debt (owed to lenders within the country) and external debt (owed to foreign lenders).

In practice, there have been multiple cases in which governments could not serve their debt obligations and had to default. As a consequence, investors ask for different yields across countries. The more a country's repayment ability is in question and the riskier sovereign debt becomes, the higher is its yield. Sovereign debt differs within and across countries e.g. by its maturity, the currency in which it is issued and whether it offers nominal or real interest rates [Definition of Sovereign Debt 2015].

Governments usually borrow by issuing securities, bonds and bills. Less creditworthy countries sometimes borrow directly from a supranational organization – the IMF, the World Bank. As the government draws its income from much of the population, government debt can be viewed as an indirect debt of the taxpayers. Unlike private debt, sovereign debt is especially difficult to enforce. The legal doctrine of sovereign immunity limits suit against defaulting sovereigns, while few government assets are available for attachment in foreign jurisdictions. Due to numerous cases of difficulties of repayment by the countries and even the cases of default, the main concern of theory of economics are the problems with restructuring of sovereign external debt.

Sovereign debt restructuring can be defined as an exchange of outstanding sovereign debt instruments, such as loans or bonds, for new debt instruments or cash through a legal process [Das, Papaioannou & Trebesch 2012, p. 7]. Two components of debt restructuring can be distinguished:

- debt rescheduling, which can be defined as a lengthening of maturities of the old debt, possibly involving lower interest rates; debt reschedulings imply debt relief, as they shift contractual payments into the future,
- debt reduction, which can be defined as a reduction in the face (nominal) value of the old instruments.

Debt restructuring can be accomplished under two types of circumstances. First, routine liability management operations (LMOs), such as debt swaps. LMOs are purely voluntary market exchanges, and usually occur in normal times [Papaioannou 2009, p. 15; Das, Papaioannou & Trebesch 2012, p. 7], which can be also used for extra gains by the borrowers yet do not create any need for additional op-

erations. Second, all kinds of restructuring forced by negative external and internal conditions affecting the borrower, i.e. distressed debt restructuring.

Majority of research on sovereign debt management focus on distressed debt restructurings, which usually imply some form of debt reduction. Following the definition of Standard & Poor's [Chambers & Kraemer 2011; Das, Papaioannou & Trebesch 2012, p. 7], distressed debt exchanges can be defined as restructurings at terms less favorable than the original bond or loan terms. The 'less-favorable terms' could include a reduced principal amount, extended maturities, a lower coupon, a different currency of payment, or effective subordination.

Debt restructuring and default are closely related but not identical. A default is the failure of a government to make a principal or interest payment on due time (beyond the grace period). Credit ratings agencies like Standard and Poor's (S&P) define a default as beginning either when the sovereign breaks the contract, or when the sovereign tenders an exchange offer of new debt with less favorable terms than the original issue. Defaults can be partial, when only parts of the country's debt are not being serviced [Tomz & Wright 2013, p. 13]. For example, it is often the case that interest payments continue, while principal payments are suspended. A default can also imply a stoppage of all debt payments towards creditors. These instances are also referred to as a debt moratorium or payment standstill.

Usually, restructurings occur after a default. Restructurings, known as post-default restructurings, can be defined as debt exchanges that occur after a payment default, i.e., after the government has gone into arrears on parts or all of its debt to creditors. In fact, most debt restructuring processes are triggered by a default event. There may be also other specific cases, preemptive debt restructurings, which can be defined as debt exchanges that occur prior to a default, so that outstanding debt instruments are exchanged before the government misses any payments. While not all restructurings are preceded by a default, it is also important to underline that not all defaults are followed by a restructuring. There have been many instances in which governments temporarily miss payments, which, however, are eventually repaid. This means that a default is resolved (or 'cured') without a debt restructuring [Das, Papaioannou & Trebesch 2012, p. 8].

Another category of debt restructuring are buybacks (repurchasing) and debt swaps. In buybacks outstanding debt instruments are exchanged against cash, often at a discount. There are three reasons why governments in emerging market countries undertake debt buybacks and swaps: to reduce debt service payments, to minimize sovereign risk, and to develop domestic capital markets. Sometimes countries have other objectives, such as releasing collateral and eliminating restrictive bond covenants, but these tend to be subsidiary to the main objectives [Medeiros, Polan & Ramlogan 2007, p. 6].

1.2. Sovereign debt negotiation

While there is a broad literature about international debt, the negotiation process associated with that have usually been given less attention. Some earlier works are [Sachs 1984; Bulow & Rogoff 1988, 1989; Fernandez-Arias 1991; Mesjasz 2000]. In all the above mentioned works, negotiation of sovereign debt restructuring is the main point of interest. However, negotiation is also necessary before drawing any debt contract, should it be credit or bonds. Therefore the following typology of sovereign debt-related negotiations is proposed: debt contract preparatory negotiation and debt restructuring negotiation. The first group includes credit/loan negotiation and bond negotiation. In the latter case, different form of auctions are also applied. Undoubtedly the sovereign debt restructuring negotiation is a complex process determined by number of participants, diversity of participants, number of issues, diversity of issues, duration and numerous external factors. Four negotiating situations can emerge in debt restructuring:

- one lender vs. one borrower,
- one lender vs. multiple borrowers,
- multiple lenders vs. one borrower,
- multiple lenders vs. multiple borrowers.

Due to the number and diversity of lenders, in the sovereign debt restructuring negotiation, a coordination problem may arise. The creditors can be private, public or international financial organizations. The coordination of public lenders is accomplished by the Paris Club and coordination of private lenders is done by the London Club. Instead of multiple one-to-one negotiations, the debtor countries can negotiate with the Clubs who are the representatives of all lenders, public or private. The international financial institutions – the World Bank and the IMF can also take part in the negotiation as the third part. In the recent case of the Greece crisis, the European Union and the European Central Bank are also involved as the partners and as the third parties.

Negotiating to restructure sovereign debt is time consuming, on average taking more than six years to complete. Such delays are costly to all parties. Sovereign debtors in default face disruption in their access to world capital markets, while creditors suffer large losses in the value of their investments www [Pitchford & Wright 2010, p. 3].

2. ‘Hard’ and ‘soft’ complexity of social systems

Complexity is undoubtedly one of most popular notions applied in the contemporary science and policy making. Studies of complexity are rooted in cy-

bernetics and systems thinking¹. The first attempts to define and study complex entities go back to the works of Weaver [1948] (disorganized complexity and organized complexity), Simon [1962] – the Architecture of Complexity, and Ashby [1963] – the Law of Requisite Variety. In his search for explaining the meaning of complexity, Lloyd [2001] identified 45 methods of describing complexity. A very convincing picture of intricacy of the field of complexity studies can be also found in the scheme proposed by Castellani [2014].

Unequivocal distinction of complex systems from the ‘classical’ systems is not possible. In the works by Wiener [1961], Ashby [1963], defining ‘first order cybernetics’ and ‘hard’ systems thinking [von Bertalanffy 1968] – without considering the role of observer, complexity was treated as one of important systemic features. In those works, the first systemic/cybernetic characteristics of systems were enumerated: system, element, relation, subsystem, environment, input, output, feedback, black box, equilibrium, stability, synergy, turbulence.

In a preliminary approach complexity of systems derives from the number of elements and the number of their interactions. Furthermore, it can be also characterized by multitude of such traits as adaptability, adaptation, attractor, *autopoiesis*, chaos, bifurcations, butterfly effect, closed system, coevolution, complex adaptive systems, dynamical systems, edge of chaos, emerging properties, far-from-equilibrium states, fitness landscape, fractals, nonlinearity, open system, path dependence, power law, reflexivity, scale-free networks, self-organization, self-organized criticality, self-reflexivity, synergy, synergetics, turbulence. Those ideas are extensively depicted in a large number of writings of which only a small fraction are quoted in this chapter.

Impossibility of decomposition and incomprehensibility are also treated as important facets of complexity. Gell-Mann [1995] shows that complexity can be treated as a function of the number of interactions between elements in a system. Nicolis & Prigogine [1989] prefer measures of complexity based on system ‘behavior’ rather than on any description of system interactions. Similarly, behavior is also a foundation of analysis and description of CAS (Complex Adaptive Systems) [Holland 1995].

Ideas originated in systems thinking and complexity studies are used in social sciences as models, analogies and metaphors. According to this distinction, the term ‘model’ is narrowed only for mathematical structures. Mathematical models in complexity studies can be applied in three areas: computing-based experimental mathematics, high precision measurement made across various

¹ There are various interpretations of relations between cybernetics and systems thinking but following von Bertalanffy [1968], it can be agreed that the former can be regarded as a part of the latter. As to avoid unnecessary typological considerations, it is also assumed that complex systems studies are treated herein as a part of systems thinking [Midgley (ed.) 2003].

disciplines and confirming ‘universality’ of complexity properties and rigorous mathematical studies embodying new analytical models, theorems and results. Models, analogies and metaphors are instruments of theories in social sciences and are applied for description, explanation of causal relations, prediction, anticipation and normative approach [Lakoff & Johnson 1999].

Complexity has also the deepest interpretations which are connected with the limits of mathematics and logic. Since it concerns any kind of mathematical modelling, it also has to be taken into account in game theory models.

Computational complexity, computational (algorithmic) intractability are always the boundaries of application of any mathematical models and computer simulation [Biggiero 2001; Chaitin 2001]

The above ideas can be called ‘hard’ complexity research as an analogy with the ‘hard’ systems thinking, and to some extent, with the ‘first order cybernetics’. It includes mathematical modelling of systems with well-defined and measurable characteristics in physics, chemistry, natural sciences and in society².

The ‘soft’ complexity research, also coined per analogy with ‘soft’ systems thinking and ‘second order cybernetics’, includes the ideas of complexity elaborated in other areas – cybernetics and systems thinking, social sciences and in psychology. Those ideas can be divided into two groups. The first group includes concepts, which are based upon analogies and metaphors drawn from ‘hard’ complexity studies and they are dominating in social sciences theory and practice being very often abused and misused [Gleick 1987; Castellani 2014]. The second group includes indigenous qualitative concepts of complexity like, for example, those elaborated by Luhmann [1995].

Subjectivity is the first aspect of complexity in the ‘soft’ approach. Following this line of reasoning, from the point of view of the second-order cybernetics, or in a broader approach, constructivism [von Foerster 1982; Glasersfeld 1995; Biggiero 2001], complexity is not an intrinsic property of an object but depends on the observer. Usually it is stated that “complexity, like beauty is in the eyes of the beholder”. It may be also stated that human systems are the ‘complexities of complexities’ [Mesjasz 2010].

In social sciences, and particularly in sociology, attention is given to the concepts of complexity of systems proposed by Luhmann. It’s the main idea of ‘soft’ complexity, akin to ‘second order cybernetics’. As one of a few authors, Luhmann has made an attempt to provide a comprehensive definition of social system based solely on communication and on the concept of *autopoiesis* (self-creation) of biological systems. According to Luhmann, a complex system is one in which there are more possibilities than can be actualized. Complexity of oper-

² The distinction between ‘soft’ and ‘hard’ complexity was also introduced by Richardson & Cilliers [2001] although with a slightly different meaning.

ations means that the number of possible relations becomes too large with respect to the capacity of elements to establish relations. It means that complexity enforces selection. The other concept of complexity is defined as a problem of observation. Now, if a system has to select its relations itself, it is difficult to foresee what relations it will select, for even if a particular selection is known, it is not possible to deduce which selections would be made [Luhmann 1990, p. 81].

Complex systems exhibit non-linear behavior that is referred to as positive feedback where internal or external changes to a system produce amplifying effects. Non-linear systems can generate a specific temporal behavior which is called chaos. Chaotic behavior can be observed in time series as data points that appear random, and devoid of any pattern but show a deeper, underlying effect. During unstable periods, such as chaos, non-linear systems are susceptible to shocks (sometimes very small). This phenomenon, called 'sensitivity to initial conditions' and popularized as the Lorenz's 'butterfly effect', exemplifies the cases, where a small change may generate a disproportionate change [Gleick 1987].

3. Structure and process of debt restructuring negotiation

3.1. Framework pattern of negotiation process

Sovereign debt restructuring negotiation can be viewed as a specific type of negotiation (Figure 1). An inspiration for negotiation may come from various areas of knowledge. In the discussions on sovereign debt restructuring negotiation, the approach based on formal game models is dominating. Such an approach seems insufficient since other factors also play an important role in that negotiation.

Therefore it seems necessary to extend the set of 'traditional' methods of analysis of sovereign debt restructuring negotiations. A natural extension is to draw on the models of negotiation used in micro-scale – in management, trade and finance at the corporate level. Negotiation in those areas is analyzed from multiple points of view – social, behavioral, cultural, economic and mathematical. As the point of departure a framework process of debt restructuring is proposed. Obviously such an approach will make the subject of research much more complex but under the present circumstances it is the only possible way of studying sovereign debt restructuring negotiations. The process of negotiating can be depicted with the characteristics presented in Figure 2 and Table 1.

Figure 1. Framework model of sovereign debt restructuring negotiation

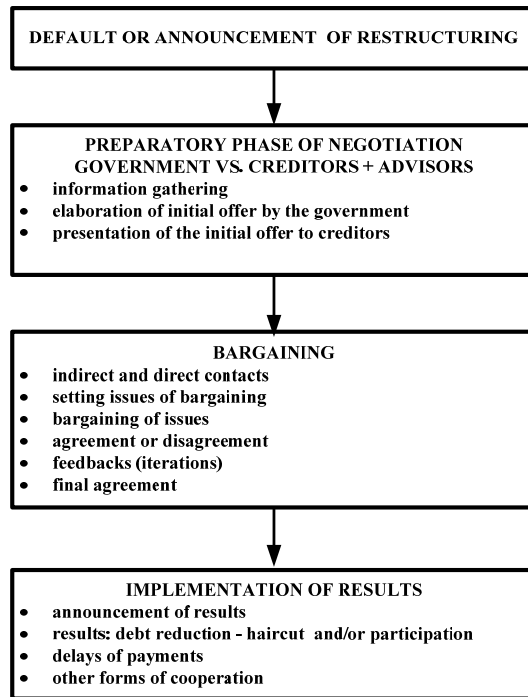
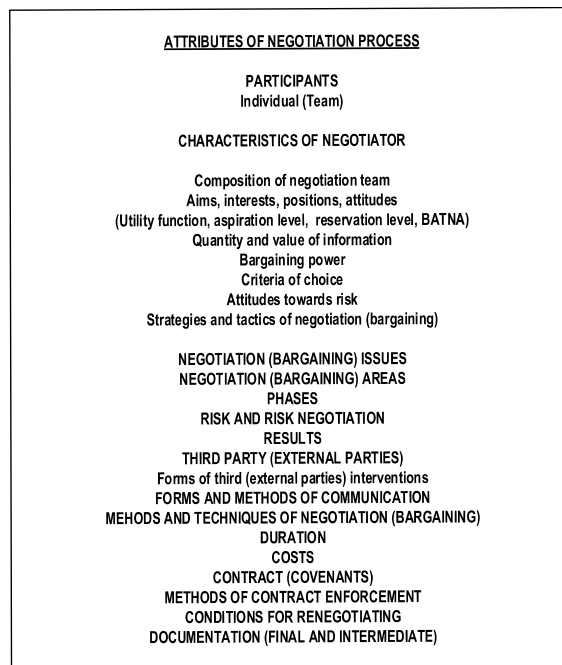


Figure 2. Attributes of negotiation process



3.2. Structural model of debt restructuring negotiation

In majority of considerations on sovereign debt restructuring attention is focused upon the differences between this kind of debt and other, ‘classical’ corporate debt, debt of other institutions and domestic lending.

Understanding of international debt negotiations starts from recognizing the difference between domestic and international lending regarding the enforcement of the debt contracts. In domestic lending the legal system allows collateral to be attached, which provides a guarantee for the creditor and an incentive to comply for the debtor. Insufficient collateral may lead to debt restructuring and even bargaining, but under normal circumstances the liquidation value of the collateral can be expected to be enough to assure contract compliance [Fernandez-Arias 1991, pp. 4-5].

Usually the negotiation takes place between multiple bank lenders or representatives of bondholders and representatives of the debtor country. They bring about all consequences of multiple-party negotiations – increased complexity, multitude of conflicting interests, possible multiple coalitions. Negotiations between the banks’ consortium and each country in the context of a debt crisis can be schematically described as follows (Table 1).

The banks abide by the rule of law because otherwise they would lose the possibility of applying legal sanctions. The country, however, does not have this constraint and can renegotiate its obligations in any period. Therefore, without the loss of generality, renegotiations seeking a rescheduling agreement can be assumed to take place in every period if the constraint is established that the outcome cannot be detrimental to the country, compared to complying with the original schedule in the current period [Fernandez-Arias 1991, p. 11].

Table 1. Structural interpretation of sovereign debt negotiation process

Universal characteristics <i>1</i>	Specific characteristics <i>2</i>
Participants	Debtor country, representatives of foreign governments, representatives of foreign banks, representatives of bondholders (state, banks, other financial institutions)
Bargaining issues	Debt restructuring – reduction, rescheduling, swaps, debt forgiveness, internal economic reforms by the borrower, changes of debt maturity
Phases	Initiation – credit ‘event’, identification of situation (pre-emptive activities, insolvency, default), preparation for renegotiation, renegotiation, implementation of solution
Risk and risk negotiation	Low risk of costs of sovereign default (theoretical); in reality the restructuring and especially default may be costly for lenders, negotiated risk sharing, absence of collateral
Results	Debt restructuring (debt rescheduling, debt forgiveness (partial, complete))
Third party (external parties)	World Bank, International Monetary Fund, London Club (private lenders), Paris Club (public lenders), European Central Bank, European Commission

Table 1 cont.

<i>1</i>	<i>2</i>
Forms of third (external parties) interventions	World Bank – delegated monitoring, provider of additional resources, IMF – delegated monitoring, provider of additional resources, London Club – coordination of private lenders Paris Club – coordination of public lenders ECB – debt of EU members
Duration	Continuous process, negotiation from 1 to 6 years
Costs	High transaction costs, high agency costs of all parts involved
Contract (covenants)	Legal binding contract, political agreement, declaration of will, reputation contracts, cash in advance contracts Covenants constraining activities of the borrower Covenants influencing decisions of the borrower, e.g. sales of assets, restructuring of assets Sets of ratios (indicators) to be observed by the borrower (e.g. asset-to-liability or revenue-to-cost ratios), possibility of collective action clauses
Methods of contract enforcement	Threat of loss of reputation, restrictions in access to international borrowing, institutional pressure, political pressure
Conditions for renegotiation	Possibility of perpetual renegotiation

The above general approach to sovereign debt negotiations can be an adequate point of departure for developing a more precise and at the same time more universal model of this type of negotiations. The ideas applied so far in studies of the debt restructuring negotiations are insufficient since they omit behavioral, psychological, historical and cultural aspects. Therefore the characteristics included in the framework model approach proposed in Figure 2 can be specified as to reflect the structure of sovereign debt restructuring negotiations in a more detailed way. The characteristics in Table 1 are not complete and only show the directions for further specification.

4. Ideas and models relevant to complexity of debt restructuring negotiation

The multitude of definitions of complexity of social systems is also reflected in different interpretations of complexity of negotiation. Similarly as in social sciences, this term is applied with more or less profound understanding. Coming from the earlier survey of the meanings of complexity, two ideas can be proposed: structural complexity and cognitive complexity, which are not identical with ‘hard’ and ‘soft’ complexity. Both types of complexity are relevant for conflict and negotiation, which are non-separable. The former has a broader meaning since negotiation is but one of the methods of conflict management.

Structural complexity can be described with the following measurable characteristics of negotiators and their interactions:

- number of negotiators,
- number of separable dyadic interactions between negotiators,

- type of the dyadic interactions determined by the resources involved in them, duration, patterns of dynamics, frequency,
- strength of dyadic interactions measured with their quantitative characteristics – duration, frequency, dynamics,
- number of bargaining issues constituting an interaction,
- number and strength of overlaps of dyadic interactions.

Two additional explanations are necessary. First, although in multiple actor systems, the interactions are of more complex character yet for the sake of simplicity of analysis only dyadic direct interactions are distinguished. Second, an interaction is any type of relation between the units not necessarily including negotiation while the latter is always a part of interaction and may concern single or multiple issues. Cognitive complexity embodies the following quantitative and qualitative characters of negotiators and their interactions:

- structure of interaction – negotiable and non-negotiable issues,
- structure of bargaining – number of issues, resources,
- types of bargaining – one time, repeated,
- information possessed by negotiators,
- characteristics of negotiators – beliefs, perceptions, utilities, preferences, criteria of choice, equilibria).

The above concepts provide a framework for different interpretations of complexity of negotiation proposed in theoretical considerations. Similarly as in other areas, where the term ‘complexity’ is applied, several interpretations of this notion can be found, ranging from slogans, through more or less precise definitions and ending with proposals directly referring to ‘hard’ and ‘soft’ complexity known from other areas (Table 2).

Table 2. Complexity as an attribute of debt restructuring negotiation

Complexity-related concept	Description	Relevance to debt restructuring negotiations	Sources
1	2	3	4
General considerations on conflicts and systemic complexity	Characteristics and complexity of social systems, multi-actor negotiation, non-linearity, limits of prediction, unintended consequences, self-organization	Applicable to all types of debt restructuring negotiations with multiple and multiply-related participants	Hughes [2004]
Complexity of decision making in negotiation	Number of issues, relations between issues. Reduction of complexity by decision heuristics. Application of ideas from behavioral economics	Relevance to most of debt restructuring negotiations	Kahneman & Tversky [1979]; van der Schalk et al. [2010]
Complexity of conflict	Complexity defined as a number of potential contracts; protracted, intractable conflicts, multi-level approach – psychological, social, economic, conflicts/negotiation as dynamical systems	Multi-actor debt renegotiations with limited prospects of long-lasting solutions, e.g. Greece debt crisis	Coleman [2006]

Table 2 cont.

1	2	3	4
Complexity of coalitions in negotiation	Mathematical modelling of coalitions in multi-actor bargaining. Complexity of coalitions	Potential applications in modelling debt restructuring negotiations creating coalitions	Deng & Papadimitriou [1994]
Complexity of strategy	In the literature on repeated games played by automata the number of states of the machine (that implements a strategy) is often used as a measure of complexity	Possible direction of applications of repeated games models applied in studying sovereign debt restructuring	Rubinstein [1986]; Kletzer & Wright [1998]; Lee & Sabourian [2005]
Negotiation in multi agent modelling	Applications of agent based models in voting, resource allocation and persuasion	Applicable in all types of multi-party debt negotiation agreements	Maudet [2010]
Negotiation in multi agent resource allocation	Simulation with application of agent-based models in modelling multi-party negotiation	Applicable in multi-party debt negotiation with resource allocation	An [2011]
Computational complexity of algorithms of modeling advanced models taken from game theory and multi-agent modelling	Computational complexity as a barrier of all mathematical models applied in decision theory, game theory, simulation models	Already acknowledged in game models, e.g. analysis of some of Nash equilibria by Papadimitriou. Potentially applicable in advanced game theory models of debt restructuring bargaining	Papadimitriou [1992; 1994]; Biggiero [2001]; Chaitin [2001]

Conclusions

The preliminary studies of the links between the ideas taken from complexity studies and sovereign debt restructuring negotiation allow for drawing the following conclusions.

1. Consequences of increasing complexity and uncertainty of moderns financial markets have not yet been sufficiently considered in the theories relating to the sovereign debt management and to the negotiation associated with that debt.
2. Complexity of debt restructuring negotiation, similarly as other types of negotiation can be characterized with structural and cognitive features.
3. Debt restructuring negotiation theory and policy should include the state-of-the-art ideas of complexity of negotiation.
4. The ideas of complexity of negotiation should include models taken from game theory in which complexity is defined and from other areas of the studies of complex systems.

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