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Interfaces with Other Disciplines

Multidimensional auctions for long-term procurement contracts with early-exit options: The case of conservation contracts

Luca Di Corato^{a,*}, Cesare Dosi^{b,c}, Michele Moretto^{b,d}^a Dipartimento Jonico, Università degli Studi di Bari, Via Duomo, 259, Taranto 74123, Italy^b Department of Economics and Management, University of Padova, Via del Santo, 33, Padova 35123, Italy^c Centro di Ricerca Interuniversitario sull'Economia Pubblica (CRIEP), Italy^d Fondazione Eni Enrico Mattei (FEEM) and Centro Studi Levi-Cases, Italy

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ABSTRACT

Conservation contracts, aimed at encouraging preservation and maintenance of natural areas, generally involve long-term obligations. Yet, contractors can find it profitable to breach the agreement when the opportunity cost of keeping their land idle for environmental purposes increases, and contracts do not provide for adequate early termination penalties. In this paper, we study how exit options can affect bidding behavior and the buyer's and the seller's expected payoffs in multidimensional procurement auctions. First, we show that bidders' payoff is lower when competing for contracts with unenforceable contract terms. Second, we show that neglecting the risk of opportunistic behavior by sellers can lead to contract awards that do not maximize the buyer's potential payoff. Third, we make suggestions about how to mitigate potential misallocations by pointing out the role of eligibility rules and competition among bidders.

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1. Introduction

Procurement contracts can be broadly divided into two categories. On the one hand, there are contracts governing a single transaction, such as those related to the construction of public infrastructure facilities without operational duties. On the other hand, there are contracts where sellers commit themselves to supply a flow of goods or services over an extended period of time.

Conservation contracts (or "Payments for ecosystem services", PES)¹ fit the latter category, as they typically require long-term

commitments to preserve natural habitats or to set-aside croplands, in order to provide environmental services (ES), such as maintenance of biodiversity, carbon sequestration, soil erosion control or visual amenities. Meanwhile, landowners² will be entitled to receive a flow of payments for the forgone market earnings and the direct additional costs related to conservation management activities.³

Traditionally, governments have offered flat-rate payments for compliance with a predetermined combination of management

lic goods, which reduces the chances for private sector involvement in funding PES (Tacconi, 2012; Vatn, 2010). In this paper, we will restrict ourselves to government-financed PES.

² PES schemes generally involve "a contract between the conservation agent and the landowner [where] the term "landowner" denotes any entity that is in the position (de jure or de facto) to supply environmental services through its influence on the ecosystem" (Ferraro, 2008, p. 810). For example, in the US, the Conservation Reserve Program (CRP) provides payments for "agricultural producers", where the term "producers" has to be intended as including "an owner, operator, or tenant of the land for at least 12 months prior to the close of the CRP sign-up period, and show control of the land for the duration of the contract" (Stubbs, 2012, pp. 2–3).

³ Some PES schemes simply require "no action", i.e. preserving natural/semi-natural resources (e.g. forestlands, wetlands) in their current state (or removing cropland from production). Other programs, however, also require on-site activities aimed at restoring or enhancing environmental/ecosystem services (e.g., native plant restoration, placement of buffer strips, etc.). Examples of "active" conservation initiatives include the CRP in the U.S. and several agri-environmental schemes in the EU. In this paper, we will consider the latter situation.

* Corresponding author.

E-mail addresses: luca.dicorato@uniba.it (L. Di Corato), cesare.dosi@unipd.it (C. Dosi), michele.moretto@unipd.it (M. Moretto).

¹ Following Engel (2016, p. 133), a PES can be defined as "a positive economic incentive where environmental service (ES) providers can voluntarily apply for a payment that is conditional either on ES provision or on an activity clearly linked to ES provision". This broad definition allows to cover both "Coasean" (Pagiola & Platais, 2007) and "government-financed" schemes (Wunder, 2015). The former, also referred to as "private" (Wunder, 2005) or "user-financed" PES (Engel, Pagiola, & Wunder, 2008) result from direct negotiations between providers and beneficiaries (see e.g. Depres, Golleau, & Mzoughi, 2008). By contrast, in government-financed (or "Pigouvian") schemes, "payments are made by a government agency out of earmarked user fees [...] or general tax funds" (Engel, 2016, p. 136). Although the private sector is becoming increasingly involved in PES schemes, the main conservation agent is still the public sector ((2011), Food and Agriculture Organization of the United Nations; Schomers and Matzford, 2013). One reason is that ES are often pub-

prescriptions. However, following a general trend in the public procurement sector, interest in bidding mechanisms has gradually grown, in order to increase the cost-effectiveness, transparency and political acceptance of environmental payments (Latacz-Lohmann & Schilizzi, 2005). Competitive bidding, when used, often comes in the form of multi-dimensional auctions where bidders are asked to submit proposals on both price and conservation activities, and offers are ranked according to pre-specified scoring rules. Examples of competitive tendering can be found in the US, where bidding mechanisms have been pioneered under the Conservation Reserve Program (CRP), in Australia (Bush Tender and Auction for Landscape Recovery), Germany (Grassland Conservation Pilot Tender) and Scotland (Challenge Funds) (Zandersen, Braten, & Lindhjem, 2009).

Starting with the seminal paper by Che (1993), there is by now a large body of theoretical literature on scoring procurement auctions and several studies have specifically focused on the design and evaluation of conservation tenders. An issue, however, which has not received much attention in either the general literature on multi-dimensional auctions or conservation literature is the impact of premature termination of supply on bidding behavior and on auction performance. This is largely explained by the fact that the standard auction theory has mainly focused on single transactions, in so doing directing attention to contract breaches stemming from failure to comply with quality and/or quantity specifications.⁴ Conservation auction models, in turn, though recognizing the long-term nature of PES schemes, are generally built on the implicit assumption that time commitments, set forth in the agreement, will be honored by contract winners (see, e.g., Claassen, Cattaneo, & Johansson, 2008; Espinosa-Arredondo, 2008; Kirwan, Lubowski, & Roberts, 2005; Vukina, Zheng, Marra, & Levy, 2008; Wu & Lin, 2010).

Yet, premature termination of procurement contracts and public-private partnerships is not uncommon.⁵ For instance, breaches of contract can be tied, on the one hand, to unanticipated reductions in private profits, and on the other to the lack of adequate incentives against opportunistic behavior by suppliers, notably the absence of reputational mechanisms (Kelman, 1990; Spagnolo, 2012), the weakness of penalties for contract infringements, or the weak enforcement of contractual claims (Dosi & Moretto, 2015).

In the case of conservation agreements, early termination can be traced to changes in the private opportunity cost of keeping land idle for environmental purposes (e.g., sharp rises in crop prices, increases in land price to urban expansion). In turn, governments can face political pressure, or other outside influences, to soft early termination fees. For example, in the USA, agricultural associations have frequently lobbied for reducing payments for early release of CRP acres and in 2011 some Members of the Congress asked President Obama to release CRP land without

penalty for the purpose of grain production (Stubbs, 2012). Moreover, legal remedies for breach of contracts can be threatened by institutional failures leading to costly litigation or inefficient settlement processes (Guash, Laffont, & Straub, 2006). For instance, institutional failures weakening the effectiveness of contractual claims have been pointed out by several studies analyzing PES programs aimed at reducing degradation of tropical forests in developing countries (see, e.g., Cordero Salas, 2013; Cordero Salas & Roe, 2012; Palmer, 2011).

This study contributes to the literature on procurement and conservation auctions by investigating the effects of “exit options” on bidding behavior in multi-dimensional tenders for long-term supply contracts. Given the focus of the paper, we will restrict the analysis to the effects of the lack of sufficiently strong and credible exit “penalties”,⁶ by leaving aside topics addressed by other authors in the conservation literature such as (i) the imperfect monitoring of conservation activities (or final environmental outputs)⁷ and (ii) bidding behavior in budget-constrained conservation tenders (Latacz-Lohmann & van der Hamsvoort, 1997).

Up to our knowledge, ours is the first paper examining in a dynamic framework the impact of the moral hazard associated with the exercise of the option to breach a supply contract. The main findings can be summarized as follows. First, we show that bidders’ payoff is lower when competing for contracts which do not provide for enforceable time commitments. Secondly, that neglecting the risk of ex post opportunistic behavior by sellers can lead to contract awards that do not maximize the buyer’s potential payoff. Finally, we make suggestions about how to mitigate potential misallocations, by pointing out the role of eligibility rules and competition.

The remainder is organized as follows. The next section provides a brief overview of the related literatures. In Section 3, we set up the model. Section 4 illustrates the benchmark case in which the contractual duration is enforceable. In Section 5, we derive the equilibrium of the auction game when bidders do not face sufficiently strong incentives against early-exit and in Section 6, we discuss the impacts of ignoring the risk of a premature termination of contracts and possible remedies. We conclude in Section 7. The Appendix contains the proofs omitted from the text.

2. Related literature

This article is related to several lines of literature which have been developed in a largely independent fashion.

The first is the literature on multidimensional auctions in which bidders compete on both price and quality dimensions (see, for instance, Asker & Cantillon, 2008; 2010; Bushnell & Oren, 1994; Che, 1993; Lorentziadis, 2010; Wang, 2013), where the term “quality” conveys different meanings depending on the nature of the exchange being made. The guarantee of supply over the stipulated contract period clearly represents an important element of the quality mix in a long-term procurement setting. However, as already noted, the possibility that the seller could prematurely walk away has not been deeply addressed in the auction literature, which has mostly focused on single (“one-shot”) transactions rather than on long-term supply contracts. In his seminal paper,

⁶ The term “penalty” is used here in a broad sense, to encompass both informal and formal remedies against contract infringements and, as far as the latter are concerned, both contractual provisions aimed at enforcing compliance with contractual obligations (penalties *stricto sensu*) or at protecting the promisee from the expected costs of breach (“liquidated damages” in the legal jargon). On the distinction between penalties and liquidated damages in Contract Law see, e.g., DiMatteo (2001).

⁷ On the analysis of imperfect monitoring and non-compliance of agricultural contracts in a static setting see, among others, Giannakas and Kaplan (2005), Hart and Latacz-Lohmann (2005) and Kawasaki, Fujie, Koito, Inoue, and Sasaki (2012).

⁴ Outside the literature on multidimensional auction design, there are papers dealing with premature termination of service provision or delays in project implementation by suppliers (e.g., Chillemi & Mezzetti, 2014; Dosi & Moretto, 2013; 2015; Waehrer, 1995). In a different vein, the case where the buyer may default and breach the contract is examined in Lorentziadis (2014).

⁵ An illustrative example is the rail franchise between Edinburgh and London awarded in 2007 to National Express on the basis that it would pay the Department for Transport £1.4 billion over seven and a half years. However, just two years later, National Express announced that it wanted to opt out the contract, and in November 2009 the Department accepted to terminate the franchise and received £120 million from the company. In evaluating the case, the House of Commons’ Committee of Public Accounts noted that, by telling that the termination would not be held against the company if it bid for future franchises, “the Department has potentially incentivised other holding companies with loss-making franchises to terminate [their contract] as they know doing so [...] will not affect their ability to compete for other contracts” (House of Commons – Committee of Public Accounts, 2011, p. 6).

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