Rejoinder to Kritikos and Bolle: making indenture viable — the extortionary power of pre-commitment in iterated prisoner’s dilemma

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Abstract

Kritikos and Bolle’s approach is still flawed, but a viable indenture game can still readily be structured within the context of iterated prisoner’s dilemma. © 2000 Published by Elsevier Science B.V.

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Kritikos and Bolle (1998, 1999) reassert their single-shot model of an indenture game and seek to reaffirm its viability. Two clear and specific weaknesses of their argument are immediately apparent, and need to be highlighted. First, in point 1 of their response, they argue that the indenture can not be resold because ‘there is simply nothing to be resold’. In addition to being an attempt to define away the issue (as they acknowledge later in point 2), — the statement is also — in itself — somewhat flawed. Note that, what the principal owns and may sell is the discretionary right to give the agent a bad reputation — that is why the agent did not leave immediately after getting off the boat. This right may be transferred, much as a creditor can sell an account past due to a collection agency. Upon transfer of the indenture, the old principal forgoes the right. If the agent merely needed a positive reference, the agent could presumably, by such logic, find someone else who would provide one in exchange for substantially fewer years of unpaid or underpaid service, since the boat passage has already been paid. Second, the authors’ (1999) assumption in point 2 of full observability of the agent’s job performance by ‘all potential principals’ seems quite strong. But beyond these faults, the positive question of how to structure a viable indenture game remains open.
It is well known that if one can pre-commit to a given strategy in iterated prisoner’s dilemma (IPD), one can ensure the cooperation of one’s partner until (but not including) the last round. To see this, (Kandori, 1992) consider that a player was able to commit to a ‘GRIM’ strategy — a strategy that always cooperated unless and until the other player defected, and then defected in all subsequent rounds. As Kandori eloquently argued, this would ensure cooperation by a rational self-interested opponent up to and including the second to last round of play. In the last round of play, the non-committed player would unilaterally defect. This equilibrium is stable because the payoffs for one round of the Mutual Cooperation (second to last round) plus one round of Exploitation (last round) is greater than the payoffs for one round of Exploitation (second to last round) plus one round of the Mutual Defection (last round).\(^1\)

But it is important to note that the possibility of such pre-commitment could enforce virtually any desired equilibrium as delimited in the Folk Theorem range of payoffs. One interesting feature of the power of pre-commitment in such situations, is what I will call a feudal tribute equilibrium in IPD. The pre-committing party commits to a ‘GRIM’ strategy that defects until the end of play if the opponent ever defects. This pre-commitment is common knowledge. But unlike the previously described cooperative ‘GRIM’ strategy, here, the pre-committing player (the ‘noble’) engages in a series of unilateral defections and the mutual cooperations which leaves the other player (the non-pre-committing ‘serf’) with virtually nothing — epsilon above mutual defection plus a surprisal factor.\(^2\) During the periods of unilateral defection, the pre-committed ‘noble’ extracts most of the surplus accumulated by the ‘serf’ during the periods of the mutual cooperation. In doing so, the pre-committed player gets most of both players’ gains from cooperation. Given that the total payoffs in the IPD have substantial mixed motive characteristics, pre-commitment can be a truly formidable weapon (Schelling, 1960).

Despite its flaws, Kritikos and Bolle’s second line of argumentation is quite interesting and potentially fruitful. The authors state that the renegotiated, resold indenture is worthless, because the new potential purchaser would be unable to commit to not defecting at the end. There are two key points to note here:

1. First, note that, as long as there is sufficiently high probability that any of the potential re-purchasers (possibly many generations of reselling down the line) has the capability to commit, there can be some equilibrium where the indenture (or series of indentures) hold. This is in itself encouraging for the possibility of indenture because it states that as long as some players can commit — an equilibrium could exist — albeit a potentially very unattractive one.

2. Second, note that, if we assume that none of the other potential principals has the power to pre-commit, it is unlikely to assume that the first one can credibly do so. As a result, the agent can shirk, and the transaction unwinds.

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\(^1\) Clearly extremely high discount rates might mitigate or eliminate this result, but generally the equilibrium still holds for moderate discount rates.

\(^2\) The ‘surprisal factor’ includes (1) the current stored wealth (from recent rounds of mutual cooperation) that was ‘due’ in tribute (during rounds of Sucker payoff) but not yet paid and (2) (at most) one round of Exploitation (less if the noble’s strategy is randomized). One way to reduce (1) may be for the noble to ‘collect tribute’ before engaging in rounds of mutual cooperation.
If the prospective agent knows ex-ante whether or not a given potential purchaser is capable of pre-commitment, the game is very straightforward. If the agent only finds out after entering into indenture, he will shirk work for a non-pre-committed indenture holder who will then resell the contract. In the interesting case, where the indentured player only finds out the principal’s type at the end of the period of service, it is still possible for the indenture to occur, and for the indentured person to perform the service (Kreps et al., 1982). If the indenture holder’s type were revealed to be one who could not pre-commit, the contract could still be resold, and would be — if one assumes that the indentured player’s preferences and estimate of the player-type frequencies in the population of new buyers remained the same. All of this, of course requires the possibility of a pre-committed type.

But finally, on a more positive note, we must recognize that indenture is a historical fact. This leads one to consider that perhaps pre-commitment by indenture principals is highly feasible. In fact, historically, pre-commitment was probably achieved through one of many important and prevalent mechanisms discussed in the standard IPD literature, including reputation, community enforcement, and laws.

While indenture is clearly one historical equilibrium in iterated prisoner’s dilemma, it is important to note that slavery and serfdom are also historical facts. With the power to pre-commit comes the power to extort.

References