Discussion of "The Demand For Programmable Payments" by Kahn and van Oordt

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Introduction

- ⋆ Interesting paper, which I really enjoyed reading!
- ⋆ Studies optimality of "programmable payments" (like escrow accounts) where:
  - ⋆ Buyers send funds into a payment system, then
  - ⋆ Payment system releases funds to sellers at a later date.
  - ⋆ So, payment system effectively introduce costly, limited commitment.
- ⋆ Comment 1: I like that the paper is precise about:
  - ⋆ How "programmability" improves commitment, and
  - ⋆ How that commitment entails costs.
- ⋆ Comment 2: I would like to better understand how this relates to standard dynamic contracting models with limited commitment and/or collateral.

Environment

- ⋆ Continuous time economy.
- ⋆ Two risk neutral agents each with discount rate $\rho > 0$:
  - ⋆ Seller can provide service at flow cost $c \geq 0$, and
  - ⋆ Buyer values service at flow utility $b(t) \geq 0$, where in many examples:

$$b(t) = \begin{cases} b, & \text{if } t < T_M \\ 0, & \text{otherwise} \end{cases}$$

- ⋆ No asymmetric information; no legal system so two-sided non-commitment.
- ⋆ Agents contract to maximize buyer value (i.e. buyers make take-it-or-leave-it offers).
- ⋆ Buyers and sellers (implicitly) have outside option of 0 if they leave contract.

Contracting Problem: Two-Sided No-Commitment

- ⋆ Buyer chooses:
  - ⋆ Payment process $D = \{D_t\}_{t \geq 0}$ to seller and stopping time S,
  - ⋆ Which implicitly give continuation value, W_t, to seller for staying in the contract,

  to solve:

$$U_0 = \max_{D,S} \mathbb{E}\Big[\int_0^S e^{-\rho s} (\underbrace{b_t dt}_{\text{benefit}} - \underbrace{dD_t}_{\text{payment}}) \Big] \quad s.t. \quad dW_t = \rho W_t + \underbrace{cdt}_{\text{effort cost}} - \underbrace{dD_t}_{\text{payment}}$$

  subject to:
  - ⋆ Buyer participation constraint: $U_t \geq 0$, and
  - ⋆ Seller participation constraint: $W_t \geq 0$

- ⋆ Two sided no-commitment and/or reputation much studied. [e.g. Thomas and Worrall (1988), Kocherlakota (1996b), Ligon, Thomas, and Worrall (2002), Abreu Pearce Stacchetti (1990)]

Authors Introduce Payment Technology

- ⋆ Step 1: Buyer can use technology to submit payment i by sending funds D_i at time T_i.
- ⋆ Step 2: Seller observes payment.
- ⋆ Step 3: Payment technology releases funds to seller at some date $S_i \geq T_i$ conditional on whether seller has provided the service. Charges fee K.
- ⋆ *Interpretation*: an escrow account where payment is held until seller provides service.
- ⋆ *Terminology:* Direct payment if $S_i = T_i$. Programmable payment if $S_t > T_i$.

Payment technology introduces costly commitment into the economy.

Contracting Problem: One Payment

- Buyer chooses:
  - T_1 = time at which they submit payment,
  - S_1 = time at which payment system releases funds to seller (and contract ends),
  - D_1 = size of payment to seller.

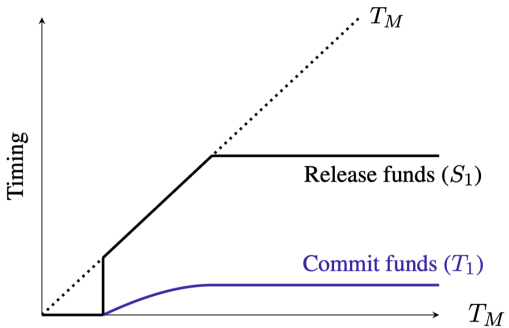
  to solve:

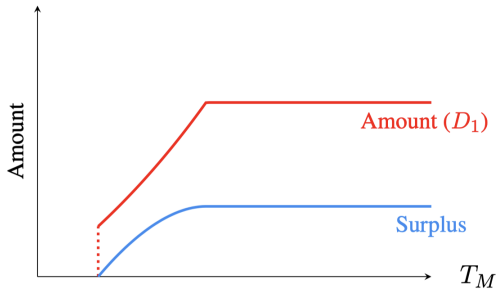
$$U_0 = \max_{T_1, S_1, D_1} \mathbb{E}\Big[\int_0^{S_1} e^{-\rho s} \underbrace{b_t dt}_{\text{benefit}} - \underbrace{(D_1 + K) e^{-\rho T_1}}_{\text{payment}} \Big] \quad s.t.$$

  - Buyer PC: must want to submit payment at T_1: $\int_{T_1}^{S_1} e^{-\rho s} b_t dt - (D_1 + K) e^{-\rho T_1} \geq 0$, and
  - Seller PC: must want to provide service S_1: $D_1 e^{-\rho S_1} - c \int_0^{S_1} e^{-\rho t} \geq 0$

- In paper, authors extend to multiple payments.

Optimal Contract Choice





My Comments: Contracting Setup

1. Payment technology puts a lot of restrictions on contracting problem:
   - ⋆ In particular, imposes discrete lump sum payments with fixed cost per payment.
   - ⋆ I agree this gives a clean problem when there is one payment.
   - ⋆ However, it gets quite complicated when they generalize to multiple payments

     . . . without necessarily delivering a lot of additional economic insight.

2. Authors could use a more general payment technology for multiple payment case:
   - ⋆ E.g. Allow buyer to commit to a sequence of payments at time 0 but require buyer to maintain balance in payment technology that could deliver value promised to seller.
   - ⋆ E.g. Allow the buyer to commit to a sequence of payments at time 0 but impose cost as a function of the continuation promise to the seller.

My Comments: General Setup

1. Perfect information is a very strong assumption:
   - ⋆ The payment system needs to be able to see whether seller has provided service.
   - ⋆ Buyer payments also need to be transparent to the seller.
2. Information needs complicate interpretation as "automated" escrow system:
   - ⋆ Unless payment system run by retail platform, it doesn't have trade information.
   - ⋆ This is why escrow accounts are often intermediated by agents who can verify actions.
3. Big question is whether programmable payments/smart contracts can pre-commit future income not just escrow payments

Conclusion

- ⋆ Interesting paper on optimality of "programmable" payments.
- ⋆ I would like to see more discussion of how it relates to other contracting problems with limited commitment.

Thank you