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Implementing efficient allocations in a model of financial intermediation

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Abstract

In a finite-trader version of the Diamond and Dybvig (J. Polit. Econ. 91 (1983) 401) model, the ex ante efficient allocation is implementable by a direct mechanism (i.e., each trader announces the type of his own ex post preference) in which truthful revelation is the strictly dominant strategy for each trader. When the model is modified by formalizing the sequential-service constraint (cf. Wallace (Fed. Reserve Bank Minneapolis Quart. Rev. 12 (1988) 3)), the truth-telling equilibrium implements the symmetric, ex ante efficient allocation with respect to iterated elimination of strictly dominated strategies.

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1. Introduction

This paper concerns the implementation of efficient allocations in a model of maturity transformation in financial structure. Maturity transformation is the financing of an intermediary's assets by liabilities (demand deposits at a bank, in particular) that are callable before the assets themselves mature. Bryant [1] shows that such a portfolio structure is a means of insuring the depositors against unobservable risks. He implicitly represents a bank as a rule or "allocation

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mechanism'' that specifies the outcome, in each state of nature, of each possible profile of traders' decisions regarding whether or not to exercise the call options on their deposits. Bryant observes that maturity transformation is necessary in order to implement the symmetric, ex ante efficient allocation as a Bayesian Nash equilibrium. He also shows that some mechanisms that do implement that efficient allocation—notably the mechanism that most faithfully reflects the features of a bank-deposit contract in the context of his model—also can possess bank-run equilibria.

Diamond and Dybvig [4] address a set of issues related to Bryant. They study a model that brings the role of aggregate risk into sharp focus. They prove the following main results:

1. In environments without aggregate risk, demand deposit contracts can provide efficient risk-sharing. However, they can also produce bank runs.
2. In environments without aggregate risk, there is an allocation mechanism, suggested by historical banking regimes that have permitted suspension of convertibility of deposits when a ''run'' occurs, that implements the symmetric, ex ante optimal allocation in strictly dominant strategies. This is intuitively a particularly compelling notion of implementation that implies, among other things, that the Bayesian Nash equilibrium is unique. Obviously, then, there cannot be multiple, Pareto-ranked equilibria.
3. In some environments with aggregate risk, a deposit scheme with suspension of payments cannot implement the ex ante efficient allocation. However, If a government can exercise particular capabilities that the banking sector does not possess, then it is possible to implement the efficient allocation in Bayesian Nash equilibrium by establishing a deposit insurance scheme.

Regarding the last result, Diamond and Dybvig's analysis does not establish whether or not there is any allocation mechanism that implements the efficient allocation as a unique Bayesian Nash equilibrium. Wallace [11] provides a formalization of the sequential-service constraint to which previous researchers had appealed informally. He proves the following result. If the provision of deposit insurance is genuinely regarded as a feature of the overall allocation mechanism, and if it is this overall mechanism to which the sequential-service constraint applies, then deposit insurance is not feasible to provide. Taken together, these results raise the possibility that existence of a ''bank-run'' equilibrium might be an unavoidable problem for any mechanism that implements the efficient allocation as a Bayesian Nash equilibrium in an environment with aggregate risk.

In this paper, we reconsider the implementation problem in the Diamond and Dybvig environment. We use a finite-trader version of their model both to introduce aggregate risk in a natural and explicit way, and also to provide a formulation of the sequential-service constraint. We show that a naturally defined mechanism makes it a strictly dominant strategy for each trader to communicate his type truthfully, and that this dominant strategy equilibrium implements the symmetric, ex ante efficient allocation as a unique equilibrium outcome. This is in sharp contrast to Diamond