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# Trading dynamics in decentralized markets with adverse selection ☆

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**Abstract**

We study a dynamic, decentralized lemons market with one-time entry and characterize its set of equilibria. Our framework offers a theory of how "frozen" markets suffering from adverse selection recover or "thaw" over time endogenously; given an initial fraction of lemons, our model delivers sharp predictions about the length of time it takes for the market to recover, and how prices and the composition of assets in the market behave over this horizon. We use our framework to analyze a form of government intervention introduced during the recent financial crisis in order to help unfreeze the market for asset-backed securities. We find that, depending on the fraction of lemons in the market, such an intervention can speed up *or slow down* market recovery. More generally, our analysis highlights that the success of an intervention in a lemons market depends on both its size *and duration*.

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## 1. Introduction

Since the seminal work of Akerlof [1], it is well known that the introduction of low-quality assets, or "lemons," into a market with asymmetrically informed buyers and sellers can disrupt the process of trade; the typical result is that sellers with high-quality assets are unwilling to sell at depressed prices, and thus only low-quality assets are exchanged in equilibrium. Given this result, the problem of adverse selection is often used to explain why the market for high-quality assets can break down or *freeze*. However, perhaps surprisingly, much less is known about how and when the exchange of these assets resumes, or how this market *thaws*.

In this paper, we develop a simple model of trade under adverse selection and use it to study how the severity of the lemons problem (i.e., the initial fraction of lemons in the market) affects the patterns of trade over time. In contrast to much of the existing literature, in which unfreezing a market requires an exogenous event or intervention, we incorporate several natural features of many asset markets that allow this process of recovery to occur endogenously. Thus, given any initial fraction of lemons, our model delivers sharp predictions about the length of time it takes for the market to recover, and how prices and the composition of assets remaining in the market behave over this horizon.

We find that the patterns of trade depend systematically on the initial fraction of lemons. When the lemons problem is mild, trades are executed quickly and at relatively uniform prices. On the other hand, when the lemons problem is more severe, trade can take a substantial amount of time and the terms of trade can vary significantly, both across agents and over time. Since our framework describes explicitly how markets can recover over time on their own, it also provides a natural setting to analyze policies aimed at speeding up market recovery. We provide a specific example related to the recent financial crisis and illustrate how our environment can offer unique (and perhaps counter-intuitive) insights into the efficacy of such policy interventions.

We take as a starting point the classic lemons market of Akerlof [1] and make a few simple modifications. First, in order to study how a frozen market can recover over time, the environment must be *dynamic* and equilibria must be *non-stationary*. Hence, we consider a discrete-time, infinite-horizon model in which a fixed set of buyers and sellers have the opportunity to trade in each period. In addition, we assume that agents permanently exit the market after trading, with no new entrants. As a result, a central aspect of our analysis is how the composition of assets remaining in the market evolves over time, and how this interacts with agents' incentives to trade at a particular point in time. Thus, in our model there is a formal sense in which trade may be sluggish because agents are waiting for market conditions to improve, which seems to be an important feature of many frozen markets that cannot be captured in a static or stationary setting.

Second, we focus on markets in which trade is *decentralized*; in contrast to the competitive paradigm, where agents are bound by the law of one price, we assume that buyers and sellers are matched in pairs and decide bilaterally whether to trade and at what price. This assumption is consistent with the trading structure in many important asset markets, such as the markets for asset-backed securities, corporate bonds, derivatives, real estate, and even certain equities.[3]

[3] By now, the literature on decentralized or "over-the-counter" asset markets has grown quite large; see, e.g., Duffie et al. [12], Vayanos and Weill [40], and Lagos and Rocheteau [32].