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Undefeated equilibria of the Shi–Trejos–Wright model under adverse selection ☆

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Abstract

Decentralized markets where assets are useful as media of exchange are also usually subject to private information. To analyze the liquidity and prices of such assets, I adapt the Shi (1995), Trejos and Wright (1995) model with Lucas trees under adverse selection. While most studies focus on either a pooling or separating equilibrium, I apply the undefeated equilibrium refinement by Mailath et al. (1993) to make the selection based on fundamentals. Under pooling, the high-quality asset holder accepts a pooled price, and under separating signals quality through asset retention. Applying the refinement results in a regime switch from no-information (pooling) to information revelation (separating) following a negative shock to the quality or quantity of lemons. This change leads to a discontinuous fall in aggregate welfare.

JEL classification: D82; D83; E44

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1. Introduction

Markets where assets are valued, in part, for their liquidity role as media of exchange are also usually subject to private information. Examples range from commodity money in Medieval

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Europe, where clipping of coins was common, to counterfeit bank notes that circulated in pre-Civil War United States. More recently in financial markets, examples of such assets include asset-backed securities and collateralized debt obligations that are useful as collateral in repo transactions. In such transactions, the holder typically has more information about the quality, as has been documented by Plantin (2009). Moreover, adverse selection has also put forward as an explanation for the recent financial market crisis of 2007–2008, by Tiróle (2012) among others, as it reduces the ability of investors to use these assets as collateral.

In this context, I analyze how adverse selection affects markets where assets have a liquidity role as media of exchange. To do so, I apply the decentralized market model by Shi (1995), Trejos and Wright (1995) where assets play an explicit liquidity role. I depart from the original framework and assume that instead of fiat money which is intrinsically useless, these assets are durable and indivisible Lucas (1978) trees, differentiated by the dividend yield every period. To capture the effect of adverse selection on liquidity, I assume that asset holders are privy to information on the asset's future dividend flow as they make take-it-or-leave-it offers to sell the asset in bilateral meetings. Furthermore, they can trade their assets probabilistically as in Berentsen et al. (2002), which is a proxy for divisibility and allows bargaining to take the form of a signaling game. This trading protocol as opposed to letting buyer of the asset make the offer ensures that the asset will have a liquidity value even under complete information.

In similar environments, it is typical to focus exclusively on either pooling (Velde et al., 1999) or separating equilibrium (Rocheteau, 2011; Nosal and Wallace, 2007). This paper's key contribution is to identify conditions on fundamentals that determine the equilibrium as pooling (where no information is revealed during trades) or separating (where information is revealed but at a cost). To do so, I apply the undefeated equilibrium refinement by Mailath et al. (1993). It can be shown that the undefeated equilibrium selects between separating and pooling equilibrium based on maximizing the high-quality asset holder's surplus, which adds to its intuitive appeal. When the quantity or quality of lemons is low enough, a pooling equilibrium exists, while with many lemons, a separating equilibrium exists.

Under pooling equilibrium, both assets trade at the same rate at their expected price, so it is optimal for the high quality asset holders to pool when there are few lemons in the market. A separating equilibrium exists when there are many lemons, as the expected value of assets is too low for pooling to be optimal. Under separating equilibrium, the high quality asset holder retains her asset to signal quality, i.e. she keeps "skin in the game". For the signal to be credible, retention should be prohibitively high for lemons such that they are better sold than retained. Evidence from the still growing empirical literature testing retention as a signal of asset quality is mixed. Garmaise and Moskowitz (2004) and Agarwal et al. (2012) do not find a strong evidence, but Begley and Purnanandam (2016) find some consistent evidence. Adelino et al. (2016) and Fuchs et al. (2016) also find evidence that assets of better quality take longer to sell.

Based on our selection criteria, if the fraction of low quality assets becomes sufficiently high, the equilibrium regime switches from pooling to separating. This is reminiscent of Gresham's Law, as it is the presence of excess lemons ("bad money") which drives many high quality assets ("good money") out of the market in the separating equilibrium. For example, if the asset is a mortgage-backed security, then such a shock could be captured by an event that causes the underlying mortgage of a fraction of these securities to lose value. And, if the shock is big enough to cause a switch from pooling to separating equilibrium characterized by asset retention, then it leads to a drop in velocity of the high quality asset leading to a discontinuous fall in aggregate output and welfare. Moreover, the model results in a region with multiple equilibria, where this switch can also be purely driven by self-fulfilling beliefs. This switch based on either