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A theory of intermediated investment with hyperbolic discounting investors ☆

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Abstract

Financial intermediaries may reduce welfare losses caused by hyperbolic discounting investors, who may liquidate their investment prematurely when the liquidation cost is low. In a competitive equilibrium, sophisticated investors are offered contracts with perfect commitment, and first best results are achieved; naïve investors are attracted by contracts that offer seemingly attractive returns in the long run but introduce discontinuous penalties for early withdrawal. If the investor types are private information, naïve investors withdraw early and cross-subsidize sophisticated investors. When a secondary market for long-term contracts opens for trading, financial intermediaries are compelled to offer contracts that have more flexible withdrawal options with linear schemes, and the welfare of naïve investors is improved. Arbitrage-free linear contracts allow for a unique term structure for interest rates that includes a premium for naïveté. Solvency requirements may limit competition for contracts and result in positive profits; banks that have capital are able to compete more aggressively, which improves investor welfare.
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1. Introduction

Fisher (1930) regards investment as not an end in itself, but rather a process for distributing consumption over time. A number of studies suggest that agents have a time-inconsistent desire for immediate gratification and are often naïve about its consequences when making intertemporal decisions (Laibson, 1997; Frederick et al., 2002). Time inconsistent preferences often imply that consumers constrain their own future choices and generate non-desirable results.[1] In this study, we analyze investors' investment behavior through an intermediary when the investors have time-inconsistent preferences.

Our model has three dates. At date-0, there is zero time discounting between date-1 consumption and date-2 consumption. At date-1, there is positive time discounting between date-1 consumption and date-2 consumption, and this preference generates a desire for immediate gratification that creates liquidity needs. Sophistication is defined as the extent to which investors anticipate their preference changes. An investor can invest in an illiquid long-term asset that yields low returns if the investment lasts for a single period, but high returns if the investment lasts for two periods. In the autarky case, a sophisticated investor may under-invest at date-0 to avoid liquidation at date-1; a naïve investor may liquidate an investment at date-1 and receive a lower return to satisfy the desire for immediate gratification.

We focus on the role of financial intermediaries in offering financial products against early liquidation. We demonstrate that, in a competitive equilibrium,[2] financial intermediaries provide perfect commitment for sophisticated agents. However, if agents are even slightly naïve, financial intermediaries offer contracts that have seemingly attractive returns in the long run, but introduce a discontinuous penalty for early withdrawal.[3] We show that this discontinuity has adverse welfare consequences. Unsophisticated agents, even if they are nearly entirely sophisticated and are only slightly unable to predict their future behavior, fail to resist the temptation of immediate gratification, and are charged with penalties for early withdrawals.[4]

When a secondary market opens for trading long-term contracts, investors who experience a preference shock can exchange their future contract payment for present consumption. We demonstrate that this case is equivalent to the case where financial intermediaries offer a more flexible linear liquidation scheme instead of a contract with discontinuous early withdrawal penalties. Therefore, if contracts are restricted to a linear scheme, consumers have greater flexibility to transfer their consumption between two dates at a pre-specified ratio. Linear intervention

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[1] These implications include under-saving (Laibson, 1998; Diamond and Köszegi, 2003; Salanie and Treich, 2006), over-borrowing (Heidhues and Köszegi, 2010), and the use of a commitment device for saving (Basu, 2011).

[2] A competitive equilibrium is defined as a set of contracts from which competing financial intermediaries have no incentive to deviate, which is similar to the equilibrium described in Heidhues and Köszegi (2010).

[3] Early withdrawal penalties are common in CD contracts and pension funds such as IRAs and 401(k) plans (*HelloWallet*, 2013). A commonly articulated justification for early withdrawal penalties is to provide a commitment device for time-inconsistent depositors that will prevent them from making impulsive withdrawals (Laibson, 1997; Ashraf et al., 2003). However, empirical studies demonstrate that early withdrawals from CD accounts occur at an economically significant level (Gilkeson et al., 1999) and suggest that certain depositors may have time inconsistent preferences that they are not fully aware of.

[4] There are also other explanations for nonlinear deposit contracts in the literature. Lin (1996) demonstrates that when investors have random discount factors, the optimal incentive-compatible risk-sharing contract has a convex structure, i.e., the interest rate is higher when there are fewer earlier withdrawals and a larger deposit balance. Ambrus and Egorov (2012) demonstrate that withdrawal penalties (money burning) are optimal when consumers face severe and rare negative liquidity shocks.

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