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# A leverage-based model of speculative bubbles <sup>☆</sup>

Gadi Barlevy

*Economic Research Department, Federal Reserve Bank of Chicago, 230 South LaSalle, Chicago, IL 60604,  
United States*

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## Abstract

This paper develops a model of credit-driven bubbles and asks when it gives rise to the patterns that policymakers often use to gauge the presence of a bubble. The model suggests patterns like rapid price appreciation and speculative trade do not always occur whenever a bubble is present, but they do occur when assets are especially overvalued. The model also has implications as to what type of contracts will be used to finance the purchase of bubble assets. These predictions are consistent with observations on credit terms during historical episodes often suspected to be bubbles.

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## 1. Introduction

The recent boom and bust of U.S. house prices and the financial crisis it apparently spawned have renewed interest in whether and how policymakers ought to react to asset bubbles. For

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*E-mail address:* [gbarlevy@frbchi.org](mailto:gbarlevy@frbchi.org).

example, in his capacity as Federal Reserve governor, Mishkin [29] argued that intervention may be desirable in the case of bubbles on assets purchased with credit. Mishkin [30] elaborated on this theme, drawing a distinction between *credit-driven bubbles*, in which lending against assets plays a key role in driving up asset values, and *irrational-exuberance bubbles*, which he ascribes to optimistic expectations. He goes on to argue the first type of bubble has greater potential to wreak economic havoc, and so there may be scope for intervention in those cases even though the wisdom of intervention in the latter case has often been questioned.

Given the inherent difficulty of identifying the fundamental value of most assets, policymakers contemplating acting against credit-driven bubbles would be forced to rely on indirect indicators that such a bubble is present. In practice, the indicators that are often looked to as signs of a possible bubble are a particularly rapid increase in prices and a high trade volume as the same assets change hands multiple times. However, without a guiding theoretical framework, it is difficult to gauge whether these patterns are reliable indicators of a bubble. Would a credit-driven bubble typically give rise to these distinguishing observable patterns? Are there other patterns one should look for to assess whether such a bubble may be present?

To address these questions, this paper develops a model of credit-driven bubbles along the lines of Allen and Gorton [6] and Allen and Gale [5]. As in these papers, assets in my model can become overvalued because they are purchased on credit. The model I propose yields several insights on what observable patterns one might want to look for to assess the possibility of a bubble. One result is that phenomena such as rapid price appreciation and high turnover rates for assets purchased on credit will tend to arise infrequently, and so acting only after observing these patterns can miss many instances of credit-driven bubbles. However, the model offers the possibility that these patterns may still identify those cases in which assets are most overvalued. This is reassuring, as the gains from intervention are potentially greater the more assets are overvalued; this is when price distortions that could lead to oversupply are greatest, and it is also when the potential for losses to lenders are highest should the bubble burst.

The model further suggests that evidence of a high turnover rate for assets may be a better indicator of a highly overvalued asset than the rate at which asset prices appreciate. This is because the factors that encourage faster price appreciation are not directly related to the extent of overvaluation, while the same factors that encourage speculative trading also tend to be associated with overvaluation. In addition, the model suggests certain factors are more likely to give rise to speculative trading, e.g. the riskiness of either the dividends on the underlying asset or opportunities to trade the asset. The presence of these factors may provide guidance to policymakers as to whether they are indeed witness to a bubble.

Another insight of the model concerns the type of contracts that will be used to finance asset purchases if a bubble arises. In the model, credit-driven bubbles occur because creditors reluctantly finance speculative asset purchases when they try to lend to more creditworthy prospects. This suggests creditors should design contracts to minimize their losses from speculators. When lenders can only offer a limited set of contracts, the model suggests they would charge higher premia to those who borrow against assets. When lenders can offer a richer set of contracts, lenders may paradoxically charge low premia to those who borrow against assets in order to draw speculators to loans that limit losses to lenders in other ways, e.g. to smaller loans or loans with shorter maturity. I discuss evidence suggesting episodes suspected to be credit-driven bubbles that featured low borrowing premia in fact exhibited a shift towards such contracts.

The paper is structured as follows. Section 2 reviews the existing literature to highlight the novel features of the model developed in this paper. Section 3 lays out the basic features of my model economy. Section 4 studies the implications of the model for price dynamics and

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