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# Rational panics and stock market crashes

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## Abstract

This paper offers an explanation for stock market crashes which focuses on the role of rational but uninformed traders. We show that uninformed traders can precipitate a price crash because as prices decline, they surmise that informed traders received negative information, which leads them to reduce their demand for assets and drive the price of stocks even lower. The model yields several implications, such as that crashes can occur even when the fundamentals are strong, and that the magnitude of the crash depends on the fraction of uninformed investors and the amount of unsophisticated passive investing present in the market.

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## Introduction

Investors are often preoccupied with the possibility that the stocks they own will arbitrarily and unexpectedly plummet in value. These fears may not be entirely unwarranted given recent historical episodes such as the October 1987 crash, when the Dow Jones index declined by 23% in a single day without any obvious corresponding changes in the underlying economic fundamentals. Not surprisingly, then, economists have devoted considerable effort to understand what forces might

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cause stock prices to change so dramatically in the face of seemingly small changes in fundamentals, and whether such forces are still present in markets today. At least with regard to the 1987 crash, the consensus among both policymakers and academics has converged on the culpability of then-popular hedging strategies advanced by portfolio insurance models, which dictated selling stocks when their prices began to decline. This was the theme of the Brady Report [4] commissioned to investigate the causes of the crash, and was later formalized in work by Gennotte and Leland [8]. The latter develop an equilibrium model in which crashes are impossible in the absence of portfolio insurance. They then demonstrate that a relatively small amount of portfolio insurance gives rise to a discontinuous equilibrium price function in which the equilibrium price of the risky asset jumps discretely as the underlying fundamentals change continuously.<sup>1</sup> Since the direct use of stocks for portfolio insurance purposes has all but disappeared, some have concluded from this analysis that markets today are less vulnerable to price crashes of similar magnitudes as in the 1987 crash.

The purpose of this paper is to take issue with this conclusion by demonstrating that the phenomenon described by Gennotte and Leland does not require the presence of exogenous portfolio insurance. We consider a market that is populated both by agents who are informed about the underlying fundamentals as well as agents who are uninformed. This asymmetric information plays a crucial role in our setup, in contrast with Gennotte and Leland's model where such asymmetry plays no essential role given the presence of exogenous portfolio insurance. In particular, uninformed agents in our model can end up acting in the same way as portfolio insurers are assumed to act in Gennotte and Leland's model: they are willing to buy stocks at relatively high prices but avoid them at relatively low prices. The reason for this is that uninformed agents are aware that there are informed agents operating in the market, which gives them incentive to use prices to make inference about the underlying fundamentals. In what follows, we assume there are many informed agents active in the market, so no informed agent has incentive to hide his information. This avoids situations as in [14] or [15] where informed traders take into account the information their actions reveal and accordingly act to conceal it. Since informed traders fail to act strategically and bid up the price of stocks when they learn fundamentals are favorable, uninformed traders correctly infer that high stock prices are more likely when fundamentals are favorable. If this effect is strong enough, uninformed agents could end up avoiding stocks altogether when stock prices are too low but not when prices are high. Thus, the demand of uninformed agents will be upward-sloping. However, the demand of uninformed traders will eventually assume a downward sloping shape at high prices, both because these traders cannot afford to buy as many assets as prices continue to rise as well as because high prices eventually lead to a low rate of return. The demand of uninformed traders will therefore be upward-sloping in our framework only locally.

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<sup>1</sup>Gennotte and Leland further argue that the magnitude of these jumps is particularly large if traders unaware of the presence of such strategies in the market. A similar idea is also pursued by Jacklin et al. [12].

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