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MARKET MICROSTRUCTURE DESIGN AND FLASH CRASHES: A SIMULATION APPROACH

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We study consequences of regulatory interventions in limit order markets that aim at stabilizing the market after an occurrence of a "flash crash". We use a simulation platform that creates random arrivals of trade orders, that allows us to analyze subtle theoretical features of liquidity and price variability under various market structures. The simulations are performed under continuous double-auction microstructure, and under alternatives, including imposing minimum resting times, shutting off trading for a period of time, and switching to call auction mechanisms. We find that the latter is the most effective in restoring the liquidity of the book and recovery of the price level. However, one has to be cautious about possible consequences of the intervention on the traders' strategies, including an undesirable slowdown of a convergence to a new equilibrium after a change in fundamentals.

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I. Introduction

In recent years, concern has been expressed about the effect of high-frequency trading in electronic markets. In particular, the infamous "flash crash" of May 2010 has prompted regulators all over the world to consider restrictions on trading and/or and new market microstructure designs through which trading would take place. Among the objectives is the prevention of sudden large price drops, or, at least, to make them short-lived.

This paper is focused on the consequences of alternative policies for a fixed order flow. That is, the order flow remains constant, the policies are changed and the market responses to a "flash crash" causing event are studied in the context of the alternative policies. The impact of the policies on subsequent liquidity and related volatility is thus studied within a framework in which the order flow itself does not change as a consequence of the policy or subsequent volatility. Uncoordinated order flow has a direct effect on the market and that is our focus. Clearly, order flow can react to the market or the policies themselves and those relationships can be studied, but the coordination of the order flow in response to the market could rely on an additional set of principles.

The proposed interventions we study have a purpose of increased liquidity and a smoothing effect in the times of market instability. The objectives are to mitigate price changes and volatility due to flash crashes and enhance recovery after flash crashes. Specifically, we study: (i) imposing minimum resting times in limit order books (LOB), that is, banning quick cancellations of buy/sell orders when not executed at arrival; (ii) switching to call auction markets instead of the prevalent continuous double auction markets (in a call auction all orders arriving during time intervals of specified length are collected, after which pairing of buy orders and sell orders is performed and they get executed at the price that maximizes the quantity that can be traded); and (iii) other types of "circuit breakers", that is, interventions in the market with the aim of re-establishing price stability after large moves. We use a simulation approach in which the focus is on the order flow and its interaction with the market micro structure, as opposed to strategic