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## Clearly erroneous executions

Stephen N. Jurich<sup>a,\*</sup>, David A. Maslar<sup>b</sup>, Brian S. Roseman<sup>c</sup><sup>a</sup> School of Business, Dalton State College, Dalton, GA 30720, United States<sup>b</sup> Haslam College of Business, The University of Tennessee, Knoxville, TN 37996, United States<sup>c</sup> Mihaylo College of Business and Economics, California State University Fullerton, Fullerton, CA 92834, United States

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## ABSTRACT

We examine the cancellation of erroneous executions on equity exchanges in the United States. Self-regulatory organizations of the National Market System are able to cancel large numbers of trades that are deemed to be clearly erroneous. We explore the market response to cancellations by comparing erroneous trades against matched trades that are eligible to be deemed erroneous, but are never reported as erroneous. We analyze the relation between the cancellation of erroneous executions and the market environment, paying particular attention to the information dissemination process from exchange officials to market participants. We find that clearly erroneous executions have detrimental effects on market quality.

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## 1. Introduction

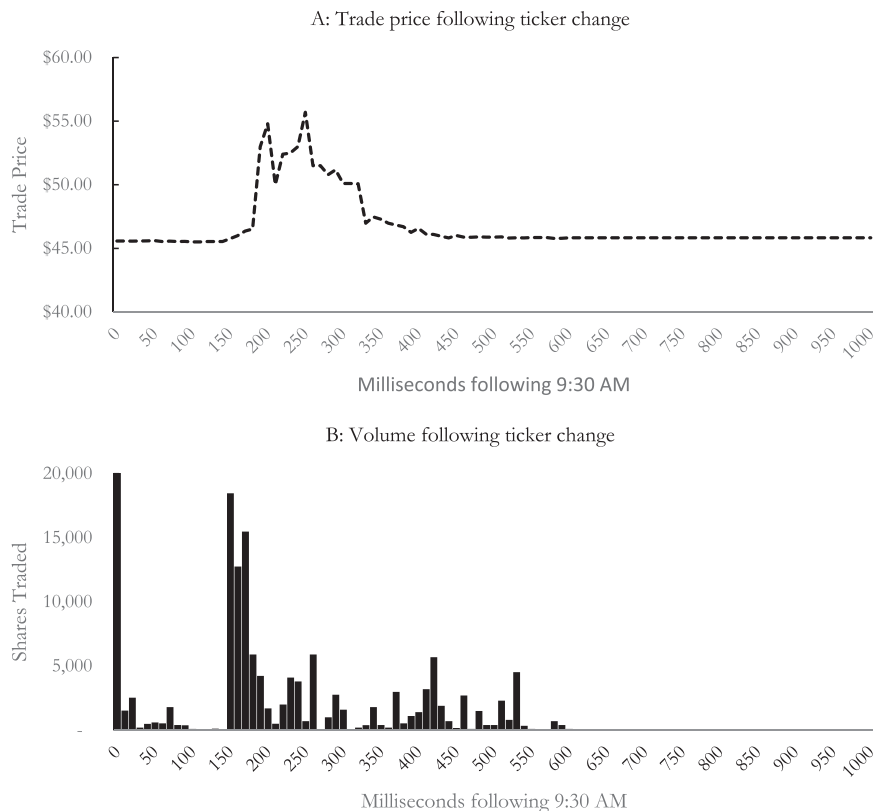
Malfunctions in financial market trading mechanisms have long been an area of concern. On August 9, 1919, a spike in stock prices was escalated by a delay between market prices and the ticker tape. During the crash of 1929, the ticker tape ran several hours late and investors did not know whether their order had been executed or at what price.<sup>1</sup> In both cases, market participants expressed concern over the uncertainty of the execution status of outstanding orders. Given the possibility of trading errors, exchange officials have historically implemented policies that allow for the cancellation of erroneous executions. In April 1990, the U.S. Securities and Exchange Commission (SEC) approved a National Association of Securities Dealers (NASD) proposal permitting the NASD to declare clearly erroneous transactions null and void if they arise out of the use or operation of any automated quotation, execution, or communication system owned or operated by the NASD (SEC Release No. 34-39550). Inevitably, market structures continue to change.

Recently there have been several notable instances of erroneous executions, as well as mass cancellations. A noteworthy incident occurred when Kraft Foods Inc. changed its name to [Mondelez International Inc. on October 1, 2012](#), and completed the spin-off of Kraft Foods Group on the same day. The scenario was ideal for erroneous executions as Kraft Foods Group

\* Corresponding author.

E-mail address: [sjurich@daltonstate.edu](mailto:sjurich@daltonstate.edu) (S.N. Jurich).

<sup>1</sup> In a testimony before the Senate Subcommittee on Securities, Insurance, and Investment and the Senate Permanent Subcommittee on Investigations on the topic of "Examining Efficiency, Stability, and Integrity of the U.S. Capital Markets," [Angel \(2010\)](#) explains that even before the use of computer trading, financial market history contains many events in which the market mechanism broke down.



**Fig. 1.** Trading following Kraft ticker change. Trade price and volume following the Kraft ticker change on October 3, 2012. The one-minute interval reported on the x-axis represents the 1000 ms between 9:30:00 a.m. and 9:31:00 a.m. Panel A presents the evolution of the trade price following the Kraft ticker symbol change. Panel B reports the volume traded following the ticker symbol change.

adopted the ticker symbol (KRFT), Mondelez International Inc. adopted the ticker symbol (MDLZ), and the original ticker symbol (KFT) was removed. As shown in Fig. 1, following the market open on October 3, 2012, Kraft Foods Inc. (KRFT) rose from \$45.58 per share to \$58.54, a 28% increase, before reverting to \$45.83. The entire 28% increase and subsequent reversal took place in less than one minute. Multiple exchanges were affected including NASDAQ OMX Group, BATS, Direct Edge, and the NYSE Arca. As a result of the price jump, the exchanges mutually determined that 177 trades, totaling 106,495 shares, were erroneous executions. All trades above \$47.82 were later cancelled by the affected exchanges. Ben Schwartz, chief market strategist with Light speed Trading LLC, said the trading error reinforced the need for a fail-proof system to offer new company shares (WSJ, Scaggs, Oct. 3, 2012). However, this is not an isolated incident as we show in this study.

The most notable example of erroneous executions took place on May 6, 2010. The SEC-CFTC joint report explains that one of the reasons that market participants withdrew from the market during the Flash Crash is that they feared some of their trades would be cancelled after the fact, which could decimate their risk parameters and leave them with unwanted positions. The prevailing rule was for trades to be broken when they were "clearly erroneous" (SEC, 2010a).

The high-frequency trading environment has the potential to generate errors and losses at a speed and magnitude far greater than that in a floor or screen-based trading environment (Clark, 2010). Because the markets today are so fast, automated, and interconnected, an erroneous trade on one market can very rapidly trigger a wave of similarly erroneous trades on other markets (SEC, 1998). In his testimony before a Senate subcommittee, Angel (2010) explains that if an algorithm at a large financial institution misfires, whether because of an honest malfunction or sabotage, it could create an enormous critical chain reaction. For example, if the last trade in a stock is \$20, and a computer malfunction at one firm causes a series of trades to occur on multiple exchanges at prices exceeding \$50, the automated systems of other firms may quickly follow, with erroneous trades rapidly impacting multiple markets and market participants (SEC Release 2009-215). Thus an initial error, whether caused by human error or algorithmic misfiring, can lead to a cascading effect. In response, exchange rules permit post-trade cancellations following investigations of potentially erroneous trades. The rule change is part of a regulatory and market response in which exchanges are granted the authority to cancel large numbers of trades identified as clearly erroneous executions (CEEs).

In this paper, we describe the process of cancelling trades that have been deemed clearly erroneous and the impact of such policies in use at the major U.S. equity exchanges from July 2011 through June 2013. In addition, we identify the determinants of CEE episodes, the reaction to these periods of uncertainty, and the effect on market quality. The findings are beneficial to exchange officials and regulators seeking to maintain investor confidence and promote market efficiency. We

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