



# Liquidity, resiliency and market quality around predictable trades: Theory and evidence<sup>☆☆☆</sup>



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## ABSTRACT

We extend the theory of strategic trading around a predictable liquidation by considering the role of market resiliency. Our model predicts that even a monopolist strategic trader improves market quality and increases liquidator proceeds if trades' temporary price impacts are quickly reversed, and that competition among strategic traders strictly improves market quality. We provide related empirical evidence by studying prices, liquidity, and individual account trading activity around the large and predictable "roll" trades undertaken by a large exchange-traded fund (ETF). The evidence indicates narrower bid-ask spreads, greater order book depth, and improved resiliency on roll dates. We find that a larger number of individual trading accounts provide liquidity on roll dates, and do not find evidence of the systematic use of predatory strategies. On balance, the theory and evidence imply that traders supply liquidity to rather than exploit predictable trades in resilient markets.

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## 1. Introduction

A trader who learns that another investor will transact a substantial quantity of a security can potentially profit by trading in the same direction prior to or simultaneous with the investor, before subsequently reversing the trade. Such a practice has been dubbed “predatory trading” by Brunnermeier and Pedersen (2005). Their model implies that the practice degrades market quality, in that it causes prices to temporarily overshoot the longer-term equilibrium, and is harmful in that it causes the investor to realize a less advantageous price.

Admati and Pfleiderer (1991) present an alternative theory of trading around a predictable order. In their “sunshine trading” theory, investors who intend to transact a substantial quantity publicly announce their intention to trade, thereby attracting additional liquidity suppliers as well as natural counterparties to the market. Their model implies that the public announcement of the upcoming trade results in smaller market movement and a more advantageous price to the liquidator.

In this paper, we provide a simple extension of the theory of trading around a predictable order, and present relevant empirical evidence by studying individual account trading, liquidity, and market resiliency around the time of large and predictable monthly trades undertaken by the United States Oil Fund (USO), the largest of the ETFs that are designed to provide returns that track crude oil prices.<sup>1</sup> Rather than holding crude oil inventories, which would entail substantial storage costs, USO gains exposure to crude oil prices by holding positions in New York Mercantile Exchange (NYMEX) crude oil futures contracts. Since individual NYMEX contracts periodically expire, the strategy involves regularly “rolling” positions by selling the expiring contract and purchasing contracts with more distant expiration dates. Data on crude oil ETFs’ assets-under-management are publicly available, and USO announces on its Web site the dates on which it will roll its positions.<sup>2</sup> The magnitude, direction, and timing of USO roll trades are therefore highly predictable.

USO was launched in April 2006, and by early 2009 had more than \$4.2 billion under management, equating at prevailing prices to over 90 million barrels of crude oil. The price of USO shares has lagged the level of crude oil futures prices, as displayed on Fig. 1. Some observers have suggested that predatory trading explains the USO

share price record. For example, the *Wall Street Journal* reported that “Since the fund (USO) is so big, it is unable to switch in and out of contracts....without moving markets and giving speculators an opportunity to make bets on those moves.”<sup>3</sup> The article quotes a trader as stating that “It’s like taking candy from a baby” and asserts that the “...candy comes out of returns of the investors in the fund.”

USO’s stated investment objective involves tracking futures settlement prices, which are established daily during a short 2-minute interval at the end of the normal trading day.<sup>4</sup> The magnitude of USO’s roll often exceeded NYMEX market volume during the settlement interval, and at times was over 15% of volume on the roll day. Since USO predictably demands a very large quantity of liquidity during a short trading interval, its trades provide an ideal experiment to study the economics of liquidity provision around the execution of large predictable trades.

We employ data on individual orders and trades in crude oil futures made available to us by the Chicago Mercantile Exchange, which owns and operates the NYMEX market. In addition, we use Commodity Futures Trading Commission (CFTC) data that identify the individual trading accounts associated with each crude oil futures transaction. The former data set allows us to study posted liquidity in the form of bid and ask quotes, as well as unexecuted displayed depth in the limit order book. The latter data set allows us to evaluate the strategies used by owners of specific trading accounts around the time of USO’s rolls. Our study of individual orders and trades spans the period March 1, 2008 to February 28, 2009, and therefore includes 12 monthly rolls. USO’s assets under management reached a peak during this period, implying heightened statistical power to detect the effects of USO’s large and predictable trades. We also study daily crude oil settlement price data for the longer time interval January 1990 through December 2013.

In addition to providing empirical evidence, we provide some new analysis of the economics of strategic trading around a known liquidation. Brunnermeier and Pedersen (2005) rely on the assumption that trades have permanent but not transitory effects on prices, and show that the effects of predatory trading are worst when there is a monopolist predator. We analyze the effects of strategic trading when markets are resilient, in the sense that some or all of the immediate price impact of trades is subsequently reversed. Our analysis reveals that the profit-maximizing strategy for a monopolist trader who is aware

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<sup>1</sup> During our sample period, USO accounted for 95% of the assets-under-management in crude oil ETFs. Data on ETFs’ assets-under-management are obtained from ALPS Fund Services.

<sup>2</sup> USO’s investment objective, as well as a calendar schedule of recent and future roll dates, is disseminated on the Web site <http://www.unitedstatesoilfund.com/>.

<sup>3</sup> “U.S. Oil fund finds itself at the mercy of traders,” by Gregory Meyer and Carolyn Cui, *The Wall Street Journal*, March 6, 2009, page C1.

<sup>4</sup> USO’s investment objective is stated on the company Web site <http://www.unitedstatesoilfund.com/> as follows: “The investment objective of USO is for the daily changes in percentage terms of its units’ net asset value (“NAV”) to reflect the daily changes in percentage terms of the spot price of light, sweet crude oil delivered to Cushing, Oklahoma, as measured by the changes in the price of the futures contract for light, sweet crude oil traded on the New York Mercantile Exchange (the “NYMEX”) that is the near month contract to expire, except when the near month contract is within 2 weeks of expiration, in which case it will be measured by the futures contract that is the next month contract to expire (the “Benchmark Oil Futures Contract”), less USO’s expenses.”

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