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Good morning Chairman Reed and Ranking Member Bunning. Thank you for the opportunity to offer my perspective on recent developments in U.S. equities markets. I speak as an economist who has studied equities markets for several decades from multiple vantage points -- as an options trader on the floor of the Philadelphia Stock Exchange, as a Professor of Economics at Penn State, as an Economic Fellow at the SEC, and, currently, as NASDAQ's Chief Economist.

Based on my experience, while equities markets are in a period of rapid transformation, it is important to view developments such as flash orders, dark pools, and high frequency trading through a long lens. These phenomena are, generally speaking, iterations of constant market behavior adapting to new technology. The unmatched strength of US markets is the continual ability of Congress, the SEC and self-regulatory organizations to adapt to these iterations and protect investors during periods of change as well as stability.

Markets have always harnessed the power of speed and communication to drive trading efficiency – from telegraph, to telephone to fiber optics. Transparency and price discovery are continually evolving products of technology and market conditions. They reflect ever-present tension between average investors' needs for meaningful public reference prices and institutions' desires to execute block orders while minimizing market impact.

This history reveals the following sound principles with which to assess the latest market developments.

First, maximize efficient price discovery. Markets are most efficient at promoting price discovery when the participants in the markets are numerous and diverse, with divergent objectives from their investments and divergent views on value. Discovering the true value of securities requires maximizing transparency, display and order interaction.

Second, encourage innovation and competition. Secondary markets function most efficiently when exchanges and non-exchanges compete to develop the most advanced trading technology to execute trades quickly, at the right price, and at a lower cost. Electronic markets and electronic traders, who built their business and technology to compete in this modern world, provide critical liquidity during good and bad markets.

Third, guarantee fair and equal access. The definition of "market" assumes fair and equal access to all market participants. Any step away from this principle and towards selective disclosure and access will tend to create a two-tiered market where sophisticated

investors have unfair advantages over average investors. Selective disclosure and access also creates distortions to the market, with unknowable and unintended consequences.

Fourth, prioritize sound regulation. Markets and market participants are more likely to behave in an economically rational manner when trading rules are clear, fair, and rigorously enforced. Rapid detection and enforcement through real-time and post-trade surveillance are critical to fair and orderly markets.

Only by prioritizing public markets over private and average investors over professionals can we simultaneously achieve all four of these important goals: efficient price discovery, innovation and competition, fair and equal access, and sound regulation. Consequently, orders should first attempt to execute in the public market before turning to the non-public markets. Without efficient price discovery, competition, access, and sound regulation in the public markets, there will be no accurate price for non-public market to reference.

Viewed through this lens, dark pools – meaning any market that does not offer pre-trade price transparency -- are potentially problematic on several grounds. They undermine public price discovery by shifting liquidity away from the lit markets, isolating displayed limit orders, widening public spreads, and decreasing execution quality. SEC Commissioner Elisse Walter wisely said recently: every share that gets executed in the dark does not contribute fully to price discovery. The question becomes how many dark shares are too many?

Based on comparisons between stocks with otherwise similar characteristics, execution quality begins to deteriorate when stocks experience dark trading in excess of 40 percent of total volume. At that point, the spread of the public reference price widens and execution quality deteriorates. This conclusion is based on studying snapshots of empirical data for the top 3,000 U.S. stocks by trading volume that individually trade in excess of $500,000 average daily dollar volume and 50,000 average daily shares.

This is not to say that dark pools don't have valued uses that are consistent with core market principles. The transparent markets have, since the beginning of markets, had difficulty in servicing the requirements of large "block orders" without market impact. Broker dealers have traditionally performed this necessary function, through the use of capital, trading acumen, and the transparent market. The broker dealer-operated block execution services are needed and must continue. Broker dealers have advanced their services through creative and innovative uses of technology.

NASDAQ supports the SEC's proposals, announced last week, to reposition dark pools. The SEC proposed to require full public display of "actionable indications of interest" or IOIs when dark pools execute greater than 0.25 percent of aggregate share volume. Many Dark Pools use IOIs to show trading interest to a select group of members without displaying that trading interest with the broader public. The SEC created an exception from the display requirement for block orders of $200,000 or more in value. The SEC proposals prioritize public markets, increase transparency, and encourage fair and equal

access while still respecting the need for traders to execute block trades with minimal market impact.

One question I have as an economist is whether limits on using actionable indications of interest would be a binding constraint on dark pools. Even in the absence of actionable indications of interest, some market participants may employ "pinging" strategies to probe for and discover liquidity that is not advertised by outbound messages. In other words, is it systemically beneficial for dark pools to choose to remain completely dark no matter how large they grow?

Turning away from dark pools, NASDAQ also supports the SEC's proposals to ban the use of flash orders. Flash orders originated from and remain an accepted practice of floor exchanges, with the effectiveness of the "flash" limited by the distance a human voice could travel. As technology was added to floor trading operations, automation of these flash capabilities occurred through systems such as Block Talk on the NYSE. Later, fully electronic versions of this floor flash capability were introduced by the CBSX and Direct Edge.

After full consultation with the SEC, NASDAQ OMX was one of the last to offer flash orders. Most importantly, consistent with our core principle of fair and equal access, NASDAQ created a flash order type that was available to all investors rather than a select group of members. NASDAQ was then the first exchange voluntarily to cease offering the "flash" dark order type when Chairman Schapiro announced a comprehensive review of the use of flash orders. NASDAQ will submit a comment letter supporting the SEC's proposal to ban flash orders.

Recent commentary on flash orders and dark pools has wrongly conflated these market structure concerns with questions on the validity of market participants who engage in high-volume algorithmic trading. Price discovery is most efficient when the participants in the markets are numerous and diverse, with divergent objectives from their investments and divergent views on value. This philosophical view of proper markets is codified in our rules that mandate fair and equal access to all market participants.

Any step away from this principle will create distortions to the market, with unknowable and unintended consequences. Electronic markets and electronic trading is the foundation of modern markets. The activities of electronic market makers, who built their business and technology to compete in this modern world, provide critical liquidity during good markets and bad markets. These activities benefit all investors.

Speed in the execution of transactions is another way in which markets and market participants compete, and competition is the lifeblood of efficient markets. In turn, open, transparent markets facilitate competition. So long as information is available on an equal basis to all market participants, the increased speed at which transactions are executed provides tremendous benefits to investors by enhancing liquidity and reducing transaction costs.

As we reflect on the current state of the U.S. equities markets we see that investors had and continue to have faith that public markets are discovering, displaying and making accessible the best price for each and all securities at all times. The steady, reliable performance of equities markets during this time is a result of a constant evolution of, and improvement of our markets.