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Automating the Price Discovery Process: Some  
International Comparisons and Regulatory Implications

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Abstract

Automated trade execution systems are examined with respect to the degree to which they automate the price discovery process. Seven levels of automation of price discovery are identified, and 47 systems are classified according to these criteria. Systems operating at various levels of automation are compared with respect to age, geographical location, and type of securities traded. Information provided to market participants, and asymmetries of information between traders with direct access to the automated market and outside investors also are examined. It is found, for example, that the degree of asymmetric information increases with the level of automation of price discovery. The potential for trading abuses related to prearranged trading, noncompetitive execution, and trading ahead of customers is analyzed for each level of automation. Certain levels of automation widen the opportunities for trading abuses in some respects, but may narrow them in others.

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### Summary

Computerized trade execution systems automate the price discovery process by determining prices and quantity allocations. The systems operate according to a programmed set of rules that process bids, offers, and other information into market transactions. In practice, there is considerable diversity in the way this process works. Seven levels of automation of the price discovery process are considered in this paper: (1) passive pricing with prices obtained from another market; (2) use of price improvement rules; (3) negotiation capability, which dilutes the automation of the pricing process; (4) participation in trades by responding to quotes on a screen at the touch of a button; (5) automated continuous auctions supported by electronic limit order books; (6) periodic auctions in which all orders are executed at a single price determined by the system; and (7) automated auctions combined with securities pricing models.

On an international basis, 47 automated trade computerized financial markets are classified according to the degree to which they automate the price discovery process. Systems operating at each level are analyzed with respect to age, geographical location, and types of financial instruments traded. The age profile of system automation reveals some convergence to the continuous automated auction design; some persistent differences can be traced to the types of securities traded on these systems.

Differences in the degree of automation of price discovery are examined with respect to variations in the type of information provided to system traders and to asymmetries in information provided to participants with direct system access, compared with that provided to outside investors. It is found that the degree of asymmetric information generally grows as the level of automation increases, although automated systems have the capability of equalizing information to all participants.

The level of automation is proposed as a key factor in determining the potential for trading abuses. In particular, prearranged trading, noncompetitive execution of trades, and trading ahead by customers who do not have direct access to the automated market are examined within a framework that relates the level of automation to the potential for abuse. At some levels, notably in automated continuous auctions supported by electronic limit order books, possibilities for abuse may be wider than under conventional open outcry pit trading. It is argued that direct regulation of the form of the program governing trade execution is not desirable for some levels of automation, however, because such regulation could seriously hamper liquidity provision to the market. Overall, the level of system automation should affect the way in which regulatory authorities carry out their obligations.