High-Frequency Trading Arms Race under National Market System : Welfare Analysis under CLOB and FBA

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Abstract

Budish,Cramton,Shim(2015)(BCS) develop the tractable Glosten Milgrom(GM) model. They assume the specific probability process and introduce the cost of high frequency trading into Glosten Milgrom model. They point out HFT investment causes welfare loss. My research makes a toy model of the security exchange market competition under National Market System in US, using this tractable GM model. First, I analyze the fiction-less markets. Under Continuous Limit Order Book(CLOB), which is the most popular trading system, I endogenize bid ask spread by combining the tractable Glosten-Milgrom model and price competition under National Market System between Security Exchange Markets. This equilibrium bid ask spread is increasing over the number of the security exchange markets. So severe competition between security exchange markets leads to welfare loss by the arms race for investing on high frequency trading(HFT) technologies. BCS also argues that Frequent Batch Auction(FBA) reduces this kind of welfare loss. I also shows that if the number of security exchange markets who adopt FBA is larger than 2, then no tradings occur in CLOB markets. That is, FBA dominates the CLOB if the security exchange markets prefer to the situation that the tradings occur in its own markets. Second, I add the friction into the competition among security exchange markets. I show that the equilibrium bid ask spread is decreasing over the number of security exchange markets. However, the welfare loss is still increasing over the number of security exchange markets except that the friction is extremely high. This implies that the small bid ask spread cannot be used as the benchmark for the efficient market. With friction, the bid ask spread is increasing over the number of the security exchange markets. Without friction, the bid ask spread is decreasing. In both cases, the welfare loss is increasing except such a special case. That is, under HFT arms race, the fragmentation leads to welfare loss.

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