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Transaction risk in electronic commerce

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Abstract

Electronic commerce business models can add value by elimination of control and risk-bearing borne by channel intermediaries. But such markets may be less robust encouraging risky behavior. We explore a model of transaction risk in the migration from broker-mediated to electronic markets. The research finds that: (1) the risk of falsely accepting 'bad' orders is the critical risk measure for optimal control choice; (2) control policies and operational policies must be established simultaneously; (3) optimal control choice is strongly influenced by risk preferences; (4) at the margin, the decrease in risk from an additional increment of control is proportional to the market's transaction volume; and (5) the discretionary budget sets the upper limit to control.

Keywords: Electronic commerce; Electronic market structure; Accounting control; Transaction risk; Networks

1. Transaction risk in markets

This paper provides a model for examining the importance of properly controlling transaction risk in electronic commerce. The paper addresses the question "what level of managerial control is required to reliably assure that payment and services will be rendered, goods delivered, and quality will be adequate."

Transaction risk results when markets fail to provide one or more of these when processing a transaction. *Controls* are subsystems that limit the frequency or magnitude of damage from failed transactions. This paper assumes that control is applied at the order level and draws conclusions about the level of risk and control required to provide a viable market.

Control of transaction risk in electronic commerce has become important because electronic commerce often adds value over its physical counterparts by allowing high transaction volumes at significant operating economies, but at the cost of less flexibility, robustness and control over risk, due to the loss of human channel intermediaries (brokers) in physical markets, usually relegating them to digital surrogates, or just transmission bandwidth. The problem has been highlighted in the recent U.S. Federal Bureau of Investigation inquiry into whether rings of shill bidders on eBay have committed fraud by bidding up the prices of one another's online auction offerings [3]. The problem is considered widespread in Web-based auctions.

The control of transaction risk is of increasing concern as electronic markets become pervasive.

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Electronic markets discard many broker-based controls inherent in traditional markets. The brokerage function has been especially important in high-volume markets such as stock exchanges. The broker's agency[1] relationship with the trader allows securities markets to operate at high capacity with high reliability and low risk. In these markets, monitoring of individual transactions is transferred to many individual brokers, leaving the market to concentrate on matching orders.

In U.S. securities markets, controls are highly developed with several stages of indemnification. Individuals do not trade directly in these markets, but must trade through brokers who guarantee to the market that the individual can deliver goods or services, and that settlement can be made [2]. The broker may engage a clearing agent on the market floor to assure the broker that buy and sell orders will be matched. The clearing agent is indemnified by a clearinghouse, which assures his or her performance.

Counterparts to the brokerage function appear in markets for many non-financial goods and services. Food, for example, is sold by grocery stores that are responsible for purchase, delivery, and assurance of quality and freshness. Liquidity and matching demand with supply are particularly important with perishables. Building contractors procure subcontractors who provide specialized labor for construction as well as assurances that a construction project will be completed properly, on-time and within budget.

To assure that brokers can effectively control transaction risk, securities markets set minimum earnings and capital requirements for firms that list their securities on their exchanges, and monitor these brokers extensively. Exchanges that have set slack listing requirements—in recent history the Denver Exchange and the Vancouver Exchange are examples—have seen their reputations erode, and have watched their traders move elsewhere to conduct business.

Markets for goods and services over the past decade have invested significantly in automation of various market components through electronic data interchange and other technologies.[2] Without automation, markets are constrained to operate at the speed of their human facilitators—frequently too slow for complex or high-volume market services. In order to speed up transaction processing, traditional markets may be stripped of all but market matching functions, and other functions dispersed to brokers, clearing houses and similar operations.

Electronic markets have naturally focused on the particular services that are well suited to technology—matching and information dissemination. Much of design has been ad hoc-based more on what technology can do rather than what technology needs to do to provide an efficient, reliable market. There is little research on design to guide appropriate investment [3].

Electronic markets generally assume a direct information link with buyers and sellers—e.g., through VDTs, television sets or kiosks. The structure and implications of this direct linkage have been discussed extensively in the prior literature, e.g., in Refs. [1,2,4–7,11,14,15], and Ref. [12]. Such an architecture eliminates broker control or risk-bearing, and relegates transaction risk control to surrogates built into the electronic market systems. Being software algorithms, surrogate broker systems are not likely to be perfect (or necessarily even close) substitutes for human brokers. Brokers can maintain personal contact with customers, using intuition, experience and judgment to winnow good business from bad. Thus, stakeholders in electronic commerce systems should be interested in the cost of increased transaction risk, and prospects for its control.

The subsequent analysis examines risk-bearing and control as markets evolve from broker-mediated to electronic. Section 2 explores the contrasting architectures of broker-mediated and electronic markets. Section 3 presents a formal model of supply and demand for market services. Section 4 discusses risk assessments by market participants. Section 5 com-

[1] Though the agency relationship is important to this analysis, it is not couched in terms of optimal employment contracts with asymmetric information and shirking. In contrast, this analysis examines two existing market structures, and the implications of the different manners in which they handle risk. The current model is best suited to address the latter problem.

[2] Securities markets applying some level of automation have appeared in one form or another for almost 100 years, e.g., stock tickers have provided automated real-time reporting of securities prices for nearly a century. Recent developments in computer and communications technology have made plausible the complete automation of market functions. The ultimate form, which these electronic markets will take, is still being defined.