MARKET STRUCTURE, COMPETITION, AND EQUILIBRIUM IN ELECTRONIC COMMERCE SETTING

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ABSTRACT

This paper examines the market structure and mechanism of electronic commerce from a microeconomic perspective. There are many similarities between electronic commerce setting and classical competitive market structure. The paper argues that one can attain an equilibrium in an electronic commerce setting in which supply and demand are converged at a level that maximizes firm’s revenue and consumer’s utility. Consequently, the convergence will assure an efficient allocation of economic resources.

1. INTRODUCTION

For decades, people have used various electronic means to conduct business transactions. Financial institutions have used teletypes, and most recently Electronic Fund Transfer (EFT) to enhance their operations. Businesses have implemented electronic networks to assure that their processes run efficiently, either with Point-of Sales (POS) devices in retailing or with Electronic Data Interchange (EDI) in production and merchandising. Consumers in one way or another have used electronic means to contact with their banks, such as Automatic Teller Machine (ATM), or with their suppliers, such as phone orders.

Recently, with the proliferation of using computers to access to the Internet, the World Wide Web has provided a new means to conduct online business, namely electronic commerce. This means is not only efficient with its timely and accurate transactions, but it is also affordable to everybody engaging in selling and/or buying business, from individual consumers to firms. To somebody, electronic commerce is an effective way to speed up transaction. To others, it is the foundation for a new industrial order (Hamel & Sampler, 1998).

The term electronic commerce (or e-commerce) has been used to designate the shopping on Internet, particularly the World Wide Web. Other researchers use the term electronic business (or e-business) to include many business activities other than online shopping. In this paper, these two terms are used interchangeably.

This paper examines the market structure and mechanism of electronic commerce from a microeconomic perspective. It argues that one can attain an equilibrium in an electronic commerce setting, in which supply and demand are converged at a level that maximizes firm’s revenue and consumer’s utility.
commerce setting in which supply and demand are converged at a level that maximizes firm’s revenue and consumer’s utility. Consequently, the convergence will assure an efficient allocation of economic resources.

The paper is organized as follows. The next section reviews the market structure and competition from a classical economic perspective. Then components and characteristics of e-commerce market will be presented. After that, the competition and mechanism of the electronic commerce will be analyzed to arrive at a conclusion on the existence of a classical equilibrium in electronic commerce setting.

2. MARKET STRUCTURE AND COMPETITION IN CLASSICAL MICROECONOMICS

In the following, market structure and competition will be reviewed from a classical microeconomic perspective (Marshall, 1920, Robinson, 1933). Market structure refers to all features that may affect the behavior and performance of the firms operating in an industry. The competitiveness of the market indicates the extent to which individual firm has power to influence market price or the terms on which its product is sold. The less power an individual firm has to influence the market, the more competitive the market is. In a perfectly competitive market structure, there are many firms such that an individual firm has no power to influence the market. Consequently, each firm must accept the price set by the forces of market demand and market supply.

Other things being equal, demand for a good in a perfect competitive market is defined as the various quantities that consumers will take from the market at all possible alternative prices per unit of time. The quantity taken by consumers is affected by factors such as the price of good, consumers’ tastes and preferences, the number of consumers under consideration, consumers’ incomes, the prices of related goods, and the range of goods available to customers (Leftwich, 1974). In general, the quantity taken of a good varies inversely with its price. An increase in the price of a good may also make consumers moving to the use of substitute goods. However, an increase in consumption of a good may lead to the increase in consumption of complementary ones.

In classical economic analysis, given the demand curve for a product, price elasticity of demand refers to the responsiveness of the quantity that consumers are willing to take to changes in its price. If quantity taken is responsive to price changes, a decrease in price may increase the total amount of money spent on the good. If quantity taken is not responsive to price changes, a decrease in price may decrease the total amount of money spent on the good.

Major influencing factors on the elasticity of demand are the availability of substitute goods for the commodity under consideration, the number of uses to which the commodity can be put, the price of the commodity relative to consumers’ income, and whether the price established is toward the upper end or toward the lower end of the demand curve (Stigler, 1966).
The availability of substitutes is the most important influencing factor on the consumption of a good. If substitutes are available, demand for a given commodity tends to be elastic. Cross elasticity of demand measures the extent to which various commodities are related to each other. When commodities are substitutes for each other, the cross elasticity between them is positive. An increase in price of one will increase the consumption of other as the demand will be switched to the substitute. When commodities are complementary, the cross elasticity is negative. An increase in price of one good will decrease its consumption and affect the consumption of complementary products.

Supply represents the maximum quantities per unit of time that firms will put for sale in the market at various prices. In general, a higher price will induce firms to put more goods on the market and may induce new entrants to the industry. The demand curve faced by a firm for its product show the amounts that it can sell at different possible prices, other things being equal. The nature of such a curve depends on the type of the market in which the firm sells.

Market classification is based on the importance of individual firms in relation to the entire market in which they sell and whether the products sold in a particular market are homogenous. From this taxonomy, there are four market types, namely, pure competition, pure monopoly, oligopoly, and monopolistic competition.

2.1. Perfect Competition

A perfect competitive market has the following characteristics:
- In a pure competition, all firms in a particular industry sell a homogenous product. Therefore, consumer has no reason for preferring the product of one supplier over those of other suppliers
- Consumers in this market know the nature of the product being sold and the price charged by each firm. All discrepancies in prices quoted by the suppliers will be known immediately, and consumers will buy at the lowest price.
- The impact of any buyer or seller’s decision on the price of the product is insignificant. The output that each firm can provide is small relative to total output of the industry such that the firm is a price taker and the change in their output does not have significant effect on the market price of the product. Similarly there is no individual buyer whose purchase is large enough to effect on the market price. Prices can move freely to reflect the changing conditions of supply and demand. There is no constraint on the demand for and supply of goods and services.
- There is a freedom to enter and exit the industry. Consequently, there is mobility of goods and services, and of resources in the economy. New entrants are free to enter any desired industry, and resources are free to move among alternative uses. Goods and services can be sold whenever they have the highest price. Resources will move to the employment where they are highest paid.

In pure competition, the demand curve faced by the firm is horizontal at the prevailing market or equilibrium price. Since the products in an industry are homogenous,
consumers will buy from firms charging market price if one firm raises its selling price above that level. At any price above the prevailing market price, the firm can sell nothing. As the market share of a firm is small, it can sell all of its output at the prevailing price without the need of lowering the price below that of other sellers. Firm can adjust only its output and sell its output at the prevailing price.

In the very short run, quantity of supplied goods is fixed and price serves to ration existing supplies among consumers. In the short run, individual firm output can be varied within the limits set by its fixed plant capacity. To maximize profit, individual firm produces the output at which its short run marginal cost equals to marginal revenue or product price. Market price is determined by the interaction of all consumers and all suppliers of the product. A particular firm may make profits or incur losses in the short run.

In the long run, new firms may enter the profitable industry and some existing firms may leave the losing industry. Long-run equilibrium exists in each industry when the number of suppliers is just sufficient such that no profits to be made, nor losses incurred. In the long run equilibrium, product price equals to average cost of production. To avoid loss, a firm must be operated at an optimal scale of plant and produced the optimal rate of output.

2.2. Monopoly

Pure monopoly is a market situation in which a single firm sells a product for which there is no substitute. Consequently, the firm has the whole market for itself. Cross elasticity of demand between the monopolist’s product is either null or small enough to be neglected by all firms in the economy. When the monopolist makes decision on pricing, it does not consider actions and possible retaliations of firms in other industries. The monopolist can exert some influence on price, output, and demand for its product. The market demand curve set limit for the monopolist’s market. Faced by a given demand curve, the monopolist can increase sales by lowering the product price, or increase price if it is willing to restrict its sales volume.

In the short run, the monopolist maximizes its profit or minimizes its loss by producing the output and charging the price at which marginal revenue equals short run marginal cost. It may incur losses and continues to produce as long as price exceeds its average variable cost.

In the long run, the monopolist maximizes profit at the output at which long run marginal cost equals marginal revenue. The possibility of long run profit exists because the entry is blocked in monopolistic industries. In a profitable industry, consumers pay more than the necessary cost of production. The blocked entry limits the transfer of resources from other sectors in order to expand the output in the profitable monopolized industries. Consequently, monopoly leads to output restriction and higher prices.

2.3. Oligopoly
An oligopolistic industry is the one in which there exist few suppliers such that the change in output and price of any individual firm will affect others. Consequently, other firms will react to price/output changes initiated by one firm. Usually, firms in an oligopolistic industry produce and sell differentiated products. Although goods sold in this market have high cross elasticity of demand and are substitute for each other, the product of each firm has its own characteristics either real or fancied to consumers such that the firm can carve its own market niche.

The interdependence of suppliers in an oligopolistic market has impact on output and pricing of individual firm. Depending on whether a firm can predict the reaction to changes in price and output of other firms in the market, the individual supply curve will be determined with some degree of accuracy or totally indetermined. Generally, the oligopolist can have some certain influence to the demand curve faced, its price, and its output. The oligopolistic industries could be classified according to the degree of collusion among firms as this collusion has effect on pricing mechanism.

In the short run, perfectly collusive oligopolistic firms establish the price and output for the whole industry. In industries characterized by independent actions of individual firms, generally there exist price wars. As the industry matures, the relation among firms becomes collusive. The price may become rigid as existing firms try to avoid a price war. However, the firm of particular oligopolistic industry may engage in nonprice competition such as advertising and product differentiation.

In the long run, the firm can adjust its plant to any desired scale and new firms can enter the industry if it is not blocked. The chosen scale of plant will produce the planned output at the least possible average cost. The existing collusion may block the new entry in order to enjoy long run profits.

2.4. Monopolistic Competition

Monopolistic competition is a market in which there are many suppliers of a particular product, but the output of each supplier is somewhat differentiated from others. In this market, the output of each firm is relatively small such that the action taken by each firm has no effect on the other firms. However, these products are substitute to each other and their cross elasticities are high.

In the short run, firm maximizes profit at the price and output at which marginal cost equals its revenue. In the long run, the market equilibrium will depend on the existence of possible new entrants to the industry. If the entry is blocked, individual firms will produce and sell at the price at which long run marginal cost equals marginal revenue. If the entry is easy, new entrants will make the demand curve faced by the firm decreasing and drive the cost upward. Entry will continue as long as the profit is attractive enough to induce new entrants.
3. MARKET STRUCTURE IN ELECTRONIC COMMERCE SETTING

The study of electronic commerce can be viewed from various perspectives (Kalakota & Whinston, 1997). From a communication perspective, e-commerce is the delivery of information, products, and services and the payment for these over telephone lines, computer networks, or any other electronic means. From a business process perspective, e-commerce is the application of technology toward the automation of business transactions and workflow. From a service perspective, e-commerce is a tool to cut service costs while improving the quality of goods and increasing the speed of service delivery. From an online perspective, e-commerce provides the capability of buying and selling products and information on the Internet and other online services.

This paper considers electronic commerce as the process of buying, selling, or exchanging of products, service, and information by various agents via computer networks including Internet. As such one can study the structure and mechanism of electronic commerce from an economic perspective. In electronic commerce setting, a new market order has been realizing. However, one can recognize many similarities in the structure of this new market with those of pure competitive market described in microeconomics. Consequently, this market setting may foster a perfect competition and thus market equilibrium in a classical economic sense. This section examines the components of electronic commerce market setting and the characteristics of this market.

3.1. Infrastructure of the Electronic Commerce Market

Infrastructure of electronic commerce is network communication and computing via Internet. In this network, users can access and process information that is stored in remote places. In addition, they can communicate with other users from their personal computers. Information technology (IT) applied in electronic commerce helps reduce the buyer’s costs associated with transaction such as searching for products, suppliers, and comparison across offers. It effectively helps matching consumer’s preference with seller’s offer. As such electronic commerce makes the business transaction more efficient as it maximizes the utility of consumers (individual consumers as well as firm-buyers) and thus reduces market friction.

It has been noted that if the cost of searching is expensive, consumer has a tendency to pay a relatively high price for the first available product or service (reservation price). However, IT in electronic commerce provides timely and comprehensive information to the consumer in order to reduce the uncertainty in making choices across products and suppliers. In addition, IT also provides information about the substitute and also the possibility to customize the product to the consumer’s specific need and therefore incurs a lower cost and higher utility.

The efficient, free, and complete flow of information in the electronic commerce provides consumers as well as suppliers the value of the product as it is perceived from the other party. This helps the market mechanism become more efficient as it reduces the opportunistic behavior in conducting transactions.
While transactions are conducted through electronic channel, the transportation of products and services may be in traditional physical delivery channel such as ground delivery, and/or digital channel such as downloading digital products.

### 3.2. Products

Traditional physical goods generally have a physical, tangible presence, e.g., a printed newspaper. Traditional service products involve the performance of a task for a customer, e.g., a movie session in theater. In electronic commerce, the distinction between products and services is not always easy to define, e.g., online newspaper offered on the Internet. The key issue in electronic commerce is not to classify a product as a good or service, but to define the attribute of the good or service that can be offered on the Internet and the corresponding benefits that it provides to the consumer.

The main difference to traditional transaction is that products and services offered in the electronic commerce market could be digitized and delivered via the electronic channels. These digital products require minimum or even no inventories and warehouse. Selling these products and services do not require physical front-stores. Consequently, most of the costs are fixed and the variable cost is very small (Choi et al., 1997).

With physical products, the cost curves are *parabolic* with an optimal production quantity as defined in classical microeconomics. As the quantity increases, the average cost will decline up to a point due to the growth of variable costs on administration and marketing. In contrast, digital products have *hyperbolic* cost curves. Variable costs of digital products are very low or almost fixed. As the quantity increases, average cost will decline due to the distribution of fixed cost over larger amount of units. In addition, the marginal cost of digital products is minimal. Consequently, as the sales increases, profit will increase rapidly.

Digital products lack normal wear and tear. The life cycle of a digital product is relatively short as it is subject to the fast-paced development of IT. Therefore it may shape a new behavior to its consumers.

### 3.3. Agents in Electronic Commerce Market

#### 3.3.1. Suppliers

In business to business transaction, procurement processing costs can be lowered by consolidating purchases, developing relationships with key suppliers, negotiating volume discounts, and greater integration of the manufacturing process. Reduction of inventories and associated costs in storage, handling, insurance, and administrative costs can be achieved by sharing updated production plans and inventory projection between firm-buyer and suppliers so that both parties can coordinate their productions and delivery schedules.
With electronic commerce, more business partners of all sizes can get involved and transact with one another than with the traditional EDI systems. Data transmission cost via Internet is lower such that partnership with other firms becomes more affordable. The cost of items purchased can also be lower due to the ability to seek out and negotiate with a greater number of suppliers. In the acquisition of semi-products necessary for production, electronic bidding is cheaper and faster than using traditional means. In addition, electronic commerce and its related IT make the production process flexible and adaptable for timely changes at a low cost as it takes a lower cycle time to build a product. Electronic commerce is changing the current mass production manufacturing system to a demand driven, customized, and just-in-time system. New production systems are integrated with other organizational functional systems such as finance, marketing, as well as with business partner and customers in ERP systems. As such the production cycle time may be reduced significantly, especially when the production involved partner from geographically remote sites and countries. Consequently, suppliers can meet the current market demand and satisfy the need of their customers, individual as well as firm-buyers, in a timely manner. In business to consumer transactions, IT helps reducing the overhead costs traditionally incurred in sales and marketing as the access to the Internet storefront does not require physical facilities and staffing.

In addition, one observes an elimination of barriers to entry, which allows new entrants to compete efficiently along with global giants for a market share. In this environment, suppliers compete to each other for the consumer’s awareness of their products and services. Consequently, a consumer, either an individual or a firm-buyer, can obtain instant information on an interested product, or its substitutes and complements, from many suppliers in order to make a rational choice.

### 3.3.2. Consumers

In an electronic commerce setting, many suppliers and consumers transact with each other on an online and real time basis. The ease of access to vast information on products, suppliers, and prices in electronic commerce will empower the consumer with powerful bargaining power. Sophisticated search engines and intelligent agents available on the Internet make the process of product search and price comparison increasingly easier. The electronic commerce will fundamentally change customers’ expectations about convenience, speed, comparability, price, and service.

In electronic commerce, consumers are not passively being conditioned by the limited and censored information that suppliers give them on mass media such as television, radio, and/or newspapers. They actively seek for information on the Internet about the product that they are in need. They do it with all the freedom, and control (Hamel & Sampler, 1998)

No more customer ignorance about price and performance of substitute products is the source of profit for many companies. Internet facilitates the comparison across multiple offers. Sophisticated search engines help customer search for the best bargain across
products and suppliers. Skeptical customers can read unbiased product reviews, participate in discussion group on the Internet before making the decision to buy.

In electronic commerce, better customer service will be the business focus since customers can access information before, during, and after the sale. In this setting, consumers can provide the suppliers with product specifications besides the agreed delivery and pricing. Then consumers can access the supplier’s information and verify instantly the status of their orders.

3.3.3. Intermediaries

In traditional business, intermediaries (agents, wholesalers, and retailers) serve as bridges between producers and ultimate consumers. They are involved in logistic and distribution process to store and deliver goods or services to customers when needed. Similarly, in electronic commerce, intermediaries create online services, help in matching sellers and consumers, provide some infrastructure services, and help consumer/sellers to institute/consummate transactions. For instance, electronic commerce intermediaries can compile information from multiple merchants across the Web to provide consumers a comprehensive comparison. Instead of search through many sites, consumers would be able to obtain from a single source the information on substitute and complementary products offered by competitive suppliers.

Although intermediaries are still existing in electronic commerce, individual consumers or firm-buyers now have abundant and timely information on services and terms that these intermediaries can offer. The efficient communication between business parties and the ease of doing business in the electronic commerce will reduce the number of intermediate layers and ultimately the friction in market. This market structure nurtures a competitive environment favoring the benefit to both suppliers and consumers.

4. COMPETITION IN ELECTRONIC COMMERCE MARKET

In many ways, electronic commerce facilitates the realization of classical assumptions on perfect competitive market. The competition in electronic commerce market has the following characteristics.

In electronic commerce, the size of the firms may not be a significant competitive advantage. The ease of entry to a profitable industry and the efficient communication channel on the Internet allow new small entrants to compete efficiently with larger firms for market share, build up corporate brand and image.

In addition, the geographical barriers, even language barriers, have been eliminated in business to business as well as in business to consumer transactions. The delivery cost of digitized product is reduced significantly. Online ordering has facilitated the routing of order to remote production sites.
There is no need for a physical location where buyers and sellers have face-to-face meeting for transaction. Then the goods do not require a physical delivery from a store to the customer’s home. It reduces the costs of warehousing, packaging of traditional distribution channels. Electronic commerce also offers consumers with the convenience of shopping at home.

Consumers do not have only a few megabrands but many substitute products to make their choice. Electronic commerce provides lower information search cost for buyers and timely comparison among products and sellers. A greater amount of information can be accessed on the Internet. Because of the development of sophisticated search engines, consumers can easily compare prices of many products offered. In most cases, customers can calculate the cost of their orders.

On-line auction is a popular method for selling on Internet. In this method, one can set a minimum price and let consumers bid the price up to the fair price. Or one let the consumers offering the price they want to pay and the product will be sold for highest bid. With the increasing use of Internet for price comparison, the final transaction price will be lower than without online transaction. Those businesses that charge a premium to their customers now have the challenge of providing their electronic commerce clients with premium services and goods.

Electronic commerce creates new distribution channels through direct contact, information rich, and bidirectional communication with consumers. Internet promotes many-to-many dialogues about attributes of goods and services instead of the one-way dialog from seller and customers. In this communication, information is no more being filtered by sellers. Product promotion will be conducted through target, one-to-one interactive marketing and advertisement, in contrast to traditional in-store display.

Customer services play an important role in competition in electronic commerce. Customer services include customization, personal differentiation, besides the traditional after-sales services. Enhancing customer service is the prime concern to firms since customers can find related information on goods and services from Internet, and specify their need for support online. Consequently, to be successful, the strategy of the firms should be mass customization, instead of mass production. This customization provides a competitive advantage as well as an increase in overall demand of goods and services.

With the above characteristics, electronic commerce may support efficient market and could result in the classical perfect competition. In such perfect competitive market, a commodity is produced when the consumer’s willingness to pay equals the marginal cost of producing the commodity and neither individual sellers nor buyers can influence market supply or demand.

Competitive behavior in an electronic commerce setting forces the firm to change from a monopolistic competition to an oligopolistic one. As new entrants provide customers with substitute products and services, the competition will become increasingly more
perfect. Ultimately, this will make the market become efficient by matching supply and demand at a level that maximizes the supplier’s as well as consumer’s surplus.

5. CONCLUSION

Internet is not just another marketing channel, another advertising medium, and a means to speed up business transactions. In creating electronic commerce, it also creates the foundation for a new industrial order (Hamel & Sampler, 1998). Electronic commerce is not only a technology to facilitate efficiently business but an effective way to conduct business that has potential impact on the firm’s value chain. However, if electronic commerce is not implemented properly and aligned with the overall business strategy of the firm, it is likely to fail. New business models are needed to integrate electronic commerce with overall business goal. Then electronic commerce will benefit to suppliers as well as consumers in maximizing the firms’ revenue and consumers’ utility. Consequently, the convergence of supply and demand at the optimal level will assure an efficient allocation of economic resources.

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