MATTI LISKI

Dynamic Competition

In many important industries, a small number of specialized suppliers face a single large buyer. The buyer is often a government awarding construction projects such as airports, bridges, highways, or purchasing military equipment like airplanes. Alternatively, the buyer can be a shipping company ordering cruise ships, a telecommunication operator ordering network infrastructure, or a cohesive buyer group (for example, a national monopoly of alcohol sales) making large orders of wine or other commodities. In most cases competition among suppliers is oligopolistic, that is, the number of suppliers is small enough to imply strategic interactions and thereby some imperfections in competition among suppliers. Oligopolistic competition is found in most sectors of industrialized economies and it has therefore been extensively studied.[1] What has received less attention is the above-mentioned presence of a large buyer who can (and has incentives to) 'manage' the competition among suppliers to best exploit the economic value that suppliers can provide.[2]

Dr. Matti Liski
Department of Economics,
Helsinki School of Economics, Finland
E-mail: Matti.Liski@hse.fi
CAS Fellow 2005/2006

Competition among suppliers is often dynamic by nature for two main reasons. First, large specialized projects take time to complete so a supplier committing resources to a project today cannot participate in a competition tomorrow. Given suppliers' time-to-build constraint, buyers can alter the competitive positions of sellers by timing their purchases based on how many suppliers are currently ready to participate in competition. The trade-off for the buyer is that waiting improves competitive positions but is also costly as projects should be started when needs arrive. The second reason for dynamic competition is that the economic value of a particular supplier usually depends on how often the supplier has been actively supplying in the past. In high-tech markets such as data processing, aeronautics and defence, suppliers learn from their production experience which makes them more effective suppliers in the future. The trade-off for the buyer is then that using the same supplier frequently improves efficiency, but at the same time may make the supplier too dominant in competition with rival suppliers.[3]

It is important to understand how the above-described dynamic competition creates economic value for society. Competition may be too severe so that suppliers do not receive a proper share of the economic value they produce. This can distort the incentives to enter the industry or to make investments that would be valuable for society. On the other hand, the dynamic nature of the competition may provide paths to suppliers to

---

1: See, for example, Schmalensee and Willig (1989).

2: Bergemann and Välimäki (1996, 2006) are among the few exceptions.

3: This trade-off is explained and analyzed in Lewis and Yildrim (2002).

extract an excessive share of the economic value in a way that is costly for society. It is particularly important for governments to understand how dynamic competition should be managed to minimize the costs of public procurement, or to design guidelines for the competition authorities.

One way to understand dynamic competition is to find regularities from past experience through case studies or more general empirical analyses. However, lessons from industries vary markedly, so it is extremely difficult to draw general conclusions without having a conceptual framework. Such a framework can pin down general principles applying across cases and provide structure for empirical work. Economists' approach to a conceptual framework is to use abstractions, reducing information and retaining only what is important for the purpose of understanding general principles of dynamic competition. Mathematical models are such abstractions. While they are widely used in other disciplines, for example, in studies of industrial processes, it is important to emphasize that economic modelling often seeks to abstract from institutional frameworks as well. This means that an ideal economic model of dynamic competition is not a model of shipbuilding or defence equipment procurement *per se*, but something more general, providing a tool for thinking about principles that apply across cases. Abstracting from institutions is important. First, institutional frameworks vary more than in most other disciplines that use mathematical modelling. Second, willingness to accept the institutional abstraction allows one to explore its usefulness in producing potential results and then later test if the results have validity across cases.

Let us illustrate the economists' approach by considering a simple model of dynamic competition with one buyer and two sellers. Each seller has one commodity to sell, but after making a sale it takes two periods before that seller can serve the buyer again. We can envisage that the good keeps well but needs time to mature. The buyer has a constant valuation for consuming the goods and sellers have no other costs of production than the cost of waiting. It is socially efficient to consume goods during every period and this can be achieved by letting the two sellers take turns supplying the goods. However, already within this simple framework, we can show that spot price competition among sellers leads to distributional inefficiency in the sense that sellers do not receive the true social value of their product as their payoff. The reason is that the buyer is tempted to delay purchases to enhance competition, allowing him to extract an inefficiently large share of the overall economic value of consumption.

The example illustrates that the buyer has incentives to destroy social value (that is, to postpone purchases) in managing dynamic competition to increase his share of the social value. The lesson is that competition among suppliers should not be organized as a pure spot price competition where money transfers are made only in connection with actual purchase. The reason is that under spot price competition, sellers not yet ready to supply cannot compete with suppliers in a mature state, implying that the market cannot intermediate the social value of goods still maturing. While we used a simple model of two producers and goods to find out the result, it is clear that the observation holds more generally in situations where the buyer is in a position to destroy social value in the above sense.

Liski and Välimäki (2006) have started a project where the focus is on the distributional aspects of dynamic price competition given suppliers' time-to-build constraints. The objective is to follow the above-described

procedure of abstraction to eliminate all but the fundamentals determining the distribution of economic value. Preliminary results suggest that a new distributional pattern emerges from the dynamic demand-supply structure characterizing the timing of buyer's need for the service and the producers' production lags. The results can provide insights into what might be prudent public policy in procurement sectors with a certain dynamic demand-supply structure. For example, preliminary results suggest that we can identify situations where subsidizing weak suppliers is socially valuable or where the buyer's ownership of some suppliers should be separated from the management of these firms.

References

Bergemann, D., and J. Välimäki, "Dynamic price competition", *Journal of Economic Theory*, vol. 127, No. 1., 2006.

Bergemann, D., and J. Välimäki, "Learning and strategic pricing", *Econometrica*, vol. 64, 1996.

Lewis, T.R., and H. Yildrim, "Managing dynamic Competition", *American Economic Review*, vol. 92, No. 4, 2002.

Liski, M., and J. Välimäki, "Dynamic pricing and time-to-build", work-in-progress, 2006.

Schmalensee, R., and R. Willig, *Handbook of Industrial Organization, Vol. II*, 1989.