

Nobel Laureate Michael Spence on SIGNALING

*Michael Spence's work on signaling and his analyses of markets with asymmetric information – along with that of his fellow researchers **Joseph Stiglitz** of Columbia University and **George Akerlof** of the University of California at Berkeley – was honored with the 2001 Nobel Prize for Economic Sciences. He spoke at the Rotman School on October 29th in the Rotman Integrative Thinking Seminar Series.*

"**BY** staring at a head of lettuce for a while, you will know everything you need to know pretty quickly," says Nobel Laureate **A. Michael Spence** (Hon. LL.D. 2000), Philip H. Knight Professor, Emeritus and former dean, Stanford University's Graduate School of Business. "But if you stare at a person for ten minutes in an attempt to figure out if they are a good match for a job – it doesn't work. You have to rely on 'signals' – things like education and work experience," he says.

Speaking at the Rotman School on October 29th in the *Rotman Integrative Thinking Seminar Series*, Spence kicked things off by discussing the informational structure of markets. "In a world with 'perfect information', differentiation in the markets would be based only on observable attributes – but in reality, this is rarely the case," he says.

Many markets are characterized by 'informational asymmetries' and gaps, he says, whereby the individuals on one side of the transaction have much better information to work with than those on the other side. For example, borrowers know more than lenders about their repayment prospects; managers and boards know more than shareholders about the firm's profitability; and prospective

clients know more than insurance companies about their accident risk. "The same goes for markets like labor, drugs, used products, and yes, financial markets: the buyer knows less about the product than the seller – and this information gap affects the performance of markets," he says.

Spence described his fellow Nobel Laureate's Akerlof Model, which focuses on the used car market – where sellers invariably have more information than buyers. "In the world of used cars, quality and durability are important to the buyer – but they are only truly known only to the seller. The ability to effectively differentiate between 'lemons' and quality products disappears when you can't see these differences," says Spence. "With imperfect information, what often happens is that all sellers are averaged together – and the price reflects the average quality. As prices drop, quality sellers will often withdraw from the market, because they know for certain what their product is worth."

Informational asymmetries can give rise to 'adverse selection' in markets, he says. "Normally, demand and supply are a function of price – but in the case of markets with asymmetric information, there is another variable to deal with, and that's quality." Demand is a function of price and average quality, and market

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equilibrium occurs when demand and supply meet. "In an ordinary market, price falls when supply goes up. But in markets with adverse selection, quality is an increasing function of price, so it drops as supply drops. This causes demand to fall off faster than it would when prices fall, because the quality is falling, too."

Information gaps can cause an entire market to collapse or contract it into an adverse selection of low-quality products, says Spence. For instance, due to imperfect information on the part of lenders or prospective car buyers, borrowers with weak repayment prospects or sellers of low-quality cars crowd out everyone else from the market.



A timely example illustrates the idea that asymmetric information can generate adverse selection: firms in a new sector, such as the dot-com sector, might seem identical to an uninformed bystander, while some insiders may have better information about the future profitability of such firms. Firms with lower-than-average profitability will therefore be over-valued and more inclined to finance new projects by issuing their own shares than high profitability firms that are undervalued by the market. As a result, low-profitability firms tend to grow more rapidly, and the stock market will initially be dominated by 'lemons'. When uninformed investors eventually discover their mistake, share prices fall, and the 'bubble' bursts. Sound familiar?

The market can — and does — try to respond, says Spence, via 'signaling'. "Under certain conditions, well-informed agents can improve their market outcome by signaling their private information to poorly-informed agents," he says. Signaling requires economic agents to take observable and costly measures to convince other agents of their ability or, more generally, of the value or quality of their

products. "There is a clear incentive for the higher-quality sellers to try to signal that to buyers; but there is an equally clear incentive for the lower quality sellers to try to imitate the signal — therefore many potential signals self-destruct."

Effective signals are "actions that are less costly for the high quality sellers — for example, warranties in the case of used cars. The additional value added by the signal separates the high from the low quality cars."

Signals are useful in many arenas. "In the labor market, employers rely on signals such as education and work experience to evaluate a candidate's potential for success," he says. In a simplified example, these signals produces two theoretical groups — a 'high productivity group', and a 'low productivity group'. Part of the equilibrium model is that what people believe has to turn out to be right. "If beliefs are inconsistent with the end result, they'll be changed," says Spence. "It doesn't settle into 'equilibrium' until beliefs are consistent with findings, and expectations are confirmed by incoming data."

Signaling cannot succeed unless the signaling cost differs sufficiently among the 'senders', i.e., job applicants. An employer cannot distinguish the more productive applicants from those who are less productive unless the former find it sufficiently less costly to acquire an education and the latter choose a lower level of education. "The cost of education is less for the high productivity group, and intuitively, this is what is required for a signal to survive in the market. Otherwise, the signal can be imitated by the lower productivity group."

Amongst other things, asymmetric information may help explain skyrocketing borrowing rates on local Third World markets, the difficulties the elderly have finding individual medical insurance, and certain kinds of labour-market discrimination of minorities.

Moving on to the next topic in his far-reaching discussion, Spence said he believes

that from an economic point of view, the major effect of the Internet on business has been in the dramatic lowering of transaction costs — "removing time, cost and manual effort from business processes, while lowering the cost of acquiring product information and expanding the scope for outsourcing." This, he says, is what will change the global economy dramatically. "Lowering transaction costs makes intangible assets that were once isolated more valuable — including human resources and knowledge."

The Internet has already made some real progress, he says. "In the past eight years, we've seen large productivity growth in most industries. In the long run, the biggest effect of the Internet on the global economy will be the construction of 'global supply chain networks'. This won't happen overnight, but it will occur at an accelerating pace," he says.

What does he think of the bursting of the Internet bubble? "The key mistake was to think people would change their behaviour overnight," he says. "The valuations were nutty — some finance experts were skeptical, but they didn't act on it. The key problem this has left behind is a pervasive lack of trust."

Digging ourselves out of our current problems — excess capacity and debt, terrorism and war, corporate misbehaviour and pervasive public skepticism, to name a few — won't be easy, he says. "But in the longer run, I believe the idea of a truly global economy will be realized via network-based information technology infrastructure." Referring to "efficient outsourcing on a very large scale," Spence says that the potential for growth over the next 10 to 20 years is "staggering"

Michael Spence grew up in Toronto and was educated at University of Toronto Schools. After a very successful career as a professor and dean of the Faculty of Arts and Sciences at Harvard University, he served as dean of Stanford University's Graduate School of Business for ten years. He currently lives in California, but maintains ties to Toronto by serving as a corporate director of Torstar Corp. and as a director of the Rotman School's Dean's Advisory Board. RM