OM 392: Economic Supply Chain Models
Fall, 2011, Unique Number 04230
CBA 4.336
Wednesday 2:00-5:00
Professor Stephen M. Gilbert

Both the operations management and the marketing communities have developed rich bodies of literature on how firms interact with one another to create and deliver products to consumers. Although there are subtle differences between the Supply Chain Management and the Distribution Channels literatures, both are primarily concerned with how a firm's strategic and tactical decisions are affected by its interaction with self-interested supply chain / channel partners.

In this course we will study the academic literature that is based on analytical models of supply chain and channel management. In particular we will be concerned with models that capture the economics that govern the interaction among the firms in a supply chain/distribution channel. Since this topic is of interest to both the marketing and operations management communities, we will draw upon readings from both areas. One of our objectives will be to identify opportunities for building bridges between these two bodies of knowledge. Readings on the following topics will be included:

- Foundations of Distribution Channels Modeling
- Foundations of Supply Chain Management Modeling
- Contractual Mechanisms to Coordinate the Channel
  - Quantity Discounts
  - Returns Policies
- Information Flows in Decentralized Supply Chains
- Supply Chain / Distribution Channel Structure and the Implications for:
  - Capacity Investment
  - Product-Line Design
  - Product Durability

This course is designed primarily for doctoral students who are interested in doing research in supply chain or distribution channel management. Although it may also be of interest to other graduate students in management or engineering, it is expected that all students have a sufficient grounding in stochastic processes, math programming, and micro-economics to be able to read and understand the academic literature from journals such as *Management Science*, *Marketing Science*, and *Manufacturing and Service Operations Management (M&SOM)*.

Course Format
Because the course is intended to prepare students to perform academic research in this area, it will be run in a manner that simulates an academic research conference. Each week we will consider 2-3 papers that are related to one another. We will all take turns making formal presentations of papers. The formal presentation of each paper should last for 30-45 minutes. Following these presentations, we will engage in discussion of the

papers. In these discussions we will address the practical implications, the restrictiveness of the modeling assumptions and the role that they play in obtaining theoretical results, and the potential for extensions.

It is expected that, regardless of whose turn it is to present, everyone will thoroughly study the papers for each session. In order for our discussions to be productive, it is critical that everyone be prepared to participate.

GRADING

The grades for the course will be based on class participation, presentations, written paper summaries, and on a final paper. The weighting of the grades will be as follows:

Class Participation	25%
Individual Presentations	20%
Paper Reviews	20%
Final Paper	35%

CLASS PARTICIPATION: A grade will be assigned based on the extent to which each student contributes meaningful comments to the class discussion. It is expected that everyone make a serious attempt to read and understand the papers that are assigned for each class. To help me understand how well you are absorbing the material, I may also give a few short in-class quizzes, and these will be incorporated into your class participation grade.

INDIVIDUAL PRESENTATIONS: Each student will have an opportunity to present 3-5 papers to the class. The presentations will be graded based on the extent to which the presenter has attempted to understand and explain the paper.

PAPER REVIEWS: Each week, there will be one paper assigned. It is expected that everyone <u>who is not presenting</u> that week will turn in a <u>one-page</u> review of the paper that has been assigned. The review should briefly summarize the problem that is being studied as well as the major results that are obtained. In addition, the review should provide some indication as to the significance of the contribution or how it might lead to additional research. For each session of the course, the paper that is to be reviewed is identified by an arrow (➔) in the syllabus.

FINAL PAPER

The final paper is intended to be an opportunity for students to explore one of the topics covered in the course a bit more thoroughly. There are two alternatives:

1) *Original Extension*: Under this option, a student explores an extension to one or more of the papers covered in the course. The objective is to obtain some original results that add to the published results in the area. This is the first step toward performing original research, and doctoral students are strongly encouraged to pursue this option.

2) *Review of the Literature*: Under this option, a student identifies several (3-4) additional papers related to one of the course topics, and prepares a critical assessment of them. In the assessment, students should address the following:

- What are the major modeling assumptions? How restrictive are they? How do they facilitate the analysis? How sensitive are the results to the specific assumptions?

- What are the major results? What is the practical and theoretical significance of the results? Do the results have implications other than those discussed by the authors?

- What additional issues would be worthwhile to explore? What approaches could be taken to studying these issues?

Under either of the above two options, the paper that is turned in should be 8-10 pages in length. On the last day of class, each student will present his paper to the class. (This will be the first opportunity to present material that the audience has not read.)

READINGS
Session

1. August 24 **Introduction to the Course**

(skim) Spengler, Joseph, J., "Vertical Integration and Antitrust Policy", *The Journal of Political Economy*, V. 58, N. 4, pp. 347-352, 1950.

Jeuland, Abel P. and Steven Shugan, "Managing Channel Profits," *Marketing Science*, V. 2, N. 3, pp. 239-272, 1983.

2. August 31 **Foundations of Distribution Channels Modeling**

McGuire, Timothy, and Richard Staelin, "An Industry Equilibrium Analysis of Downstream Vertical Integration," *Marketing Science*, V. 2, N. 2, pp. 161-191, 1983.

➔Liu, Yunchuan and Rajeev Tiagi, "The Benefits of Competitive Upward Channel Decentralization," *Management Science*, Vo. 57, No. 4, pp. 741-751, 2011.

(skim) Arya, Anil, Brian Mittendorf, and David M. Sappington, "The Bright Side of Supplier Encroachment", *Marketing Science*, V. 26, N. 5, pp. 651-659, 2007.

3. Sept. 7 **Foundations of Supply Chain Management Modeling**

(skim) Monahan, James P., "A Quantity Discount Pricing Model to Increase Vendor Profits," *Management Science*, V. 30, N. 6, pp. 720-726, June, 1984.

➔Pasternack, B. "Optimal Pricing and Return Policies for Perishable Commodities," *Marketing Science*, V. 4, N. 2, pp. 166-176, 1985.

Weng, Z. Kevin, "Channel Coordination and Quantity Discounts," *Management Science*, V. 41, N. 9, pp. 1509-1522, September, 1995.

4. Sept. 14 **Selling to a Newsvendor**

(skim) Petruzzi, N.C. and M. Dada, "Pricing and the Newsvendor Problem: A Review with Extensions," *Operations Research*, V. 47, N. 2, pp. 183-194, 1999.

Arya, A. and B. Mittendorf, "Using Return Policies to Elicit Retailer Information," *Rand Journal of Economics*, V. 35, N. 3, pp. 617-630, 2004.

➔Taylor, Terry and Wenqiang Xiao, "Does a Manufacturer Benefit from Selling to a Better-Forecasting Retailer?" *Management Science*, V. 56, N. 9, pp. 1584-1598, 2010.

5. Sept. 21 **Price only Newsvendor Contracts**

(skim) Burnetas, A.; S. Gilbert, and C. Smith, "Quantity Discounts in Single Period Supply Contracts with Asymmetric Demand," *IIE Transactions*, V. 39, N. 5, pp. 465-480, 2007.

Lariviere, Martin and Evan Porteus, "Selling to the Newsvendor: An Analysis of Price-Only Contracts," *Manufacturing and Service Operations Management*, V. 3, N. 4, pp. 293-305, 2001.

➔Cachon, G., "The Allocation of Inventory Risk in a Supply Chain: Push, Pull, and Advance-Purchase Discount Contracts," *Management Science*, V. 50, N. 2, pp. 222-238, 2004.

6. Sept. 28 **Strategic Effects of Inventory**

➔Anand, Krishnan, Ravi Anupindi, and Yehuda Bassok, "Strategic Inventories in Vertical Contracts," *Management Science*, V. 54, N. 10, pp. 1792-1804, 2008.

Lai, Guoming, Laurens Debo, and Lin Nan, "Channel Stuffing with Short-term Interest in Market Value," *Management Science* 57(2), 332-346, 2011.

7. October 5 **Capacity Investment**

(skim)Taylor, Terry, and Erica Plambeck, "Simple Relational Contracts to Motivate Capacity Investment: Price Only vs. Price and Quantity," *M&SOM*, V. 9, N. 1, pp. 94-113, 2007.

Subramaniam, Venkat, "Efficient Sourcing and Debt Financing in Imperfect Product Markets," *Management Science*, V. 44, N. 9, pp. 1167-1178, 1998.

➔Swinney, Robert, Gerard Cachon, and Serguei Netessine, "Capacity Investment Timing by Start-ups and Established Firms in New Markets," *Management Science*, V. 57, N. 4, pp. 753-777, 2011.

8. October 12 **Information Flow in Decentralized Supply Chains**

➔Krishnan, S. Anand and Manu Goyal, "Managing the Leakage of Strategic Information in a Supply Chain," *Management Science*, V. 55, N. 3, pp. 438-452, 2009.

Ha, Albert, Shilu Tong, and Hongtao Zhang, "Sharing Demand

Information in Competing Supply Chains with Production Diseconomies," *Management Science*, V. 57, N. 3, pp. 566-581, 2011.

9. October 19 **Product Line Design – Vertical Differentiation**
(skim) Mussa, Michael and Sherwin Rosen, "Monopoly and Product Quality", *Journal of Economic Theory*, V. 18, pp. 301-317, 1978.

➔Conner, K. R. , "Obtaining Strategic Advantage from being Imitated: When can Encouraging Clones Pay?" *Management Science*, V. 41, N. 2, pp. 209-225, 1995.

Denekere, Raymond J. and R. Preston McAfee, "Damaged Goods," *Journal of Economics and Management Strategy*, V. 5, N. 2, pp. 149-174, 1996.

10. Oct. 26 **Product Line Design and Supply Chain Issues**
(skim) Dukes, Anthony, Tansev Geylani, and Kannan Srinivasan, "Strategic Assortment Reduction by a Dominant Retailer," *Marketing Science*, V. 28, N. 2, pp. 309-319, 2009.

Villas-Boas, J. Miguel, "Product Line Design for a Distribution Channel," *Marketing Science*, V. 17, N. 2, pp. 156-169, 1998.

Netessine, S. and T. Taylor, "Product Line Design and Production Technology," *Marketing Science* V. 26, N. 1, pp. 101-117, 2007.

11. Nov. 2 **Product Durability**
(skim) Bulow, Jeremy, "Durable Goods Monopolists", *Journal of Political Economy*, V. 90, N. 2, pp. 314-332, 1982.

➔Levinthal, Daniel and Devavrat Purohit, "Durable Goods and Product Obsolescence," *Marketing Science*, V. 8, N. 1, pp. 35-56, 1989.

Bhaskaran, Sreekumar and Stephen M. Gilbert, "Selling and Leasing Strategies for Durable Goods with Complementary Products," *Management Science*, V. 51, N. 8, pp. 1278-1290, 2005.

12. Nov. 9 **Product Durability and Supply Chain / Channel Structure**
(skim) Purohit, Devavrat, "Marketing Channels and the Durable Goods Monopolist: Renting vs. Selling Reconsidered," *Journal of Economics and Management Strategy*, V. 4, N. 1, pp. 69-84, 1995.

➔Arya, A. and B. Mittendorf, "Benefits of Channel Discord in the Sale of Durable Goods," *Marketing Science*, V. 25, pp. 91-96, 2006.

Gilbert, Stephen M. and Sreekumar Bhaskaran-Nair, "Implications of

Channel Structure for Leasing or Selling Durable Goods," *Marketing Science*, V. 28, N. 5, pp. 918-934, 2009.

November 16 INFORMS

13. Nov.23 **Two-Part Pricing and Competition Revisited**

➔Cachon, Gerard and A. Gurhan Kok, "Competing Manufacturers in a Retail Supply Chain: On Contractual Form and Coordination," *Management Science*, V. 56, N. 3, pp. 571-589, 2010.

Gilbert, Stephen M. and Sree Jonnalagedda, "Durable Products, Time Inconsistency, and Lock-in," forthcoming in *Management Science*.

14. Nov. 30 **Presentations**