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Management Insights

Industry Level Supplier-Driven IT Spillovers

Zhuo (June) Cheng, Barrie R. Nault

In this paper, we examine the impact on customers of supplier spending on information technology (IT). We model the impact of supplier IT spending on customers as an improvement in the quality of the good moved along the supply chain. This quality improvement can come as a result of the inclusion of IT in the good moved downstream, of IT used in the production of the good moved downstream, or as a result of facilitating the supply chain relationship through the use of interorganizational systems. However, such quality improvements are often not incorporated in prices because competition among suppliers results in the benefits of IT spending being passed on to customers. Using industry-level data over a 13-year period, we find that these supplier-driven IT spillovers are substantial. Our estimates show that when a supplier increases its IT spending by \$200M, the result is that the supplying industry gains \$200M in output, and in addition transfers roughly \$70M of value to downstream customers. This suggests that when suppliers invest in IT, the resulting value of IT spillovers to customers is somewhere between one-fifth and one-quarter of the total yield from suppliers' IT spending, which in turn implies that suppliers should be including customers in their decision making about investments in IT.

The Impact of Prior Decisions on Subsequent Valuations in a Costly Contemplation Model

Elie Ofek, Muhamet Yildiz, Ernan Haruvy

We investigate how consumers make decisions about goods when they recall prior decisions they made regarding the same or similar goods. Using a simple model of decision making, we find that when an individual recalls a past choice between two goods, his or her willingness to pay for these goods will exhibit a greater variance than if no prior decision is recalled. Furthermore, an individual will tend to expend more effort on a decision when informed about a past decision. We also find that when the goods are of greater value, these effects become even more pronounced. Our findings suggest that taking into account the effort consumers expend in evaluating options and their recall of prior decisions, yields valuable insights for managers in their engagement with consumers. In particular, by controlling the access consumers

have to their past decisions, firms can increase or decrease the time and effort consumers expend on evaluating current options and, ultimately, affect consumers' willingness to pay for the various options. Such manipulations are especially relevant in the digital age, where information about past choices is typically recorded and where the shopping environment and information made available are managerial decision variables that can be customized to individuals and situations.

Effects of Information-Revelation Policies Under Market-Structure Uncertainty

Ashish Arora, Amy Greenwald, Karthik Kannan, Ramayya Krishnan

Electronic market places are growing in importance. In third-party electronic marketplaces, sellers face uncertainty about the number of competitors they face in each market session. Since typically the same set of sellers repeatedly compete across market sessions, sellers can alter their bids to learn about their competitors, depending on how the electronic market place is organized, and specifically, how bid information is disclosed. In this paper, we compare two commonly used setups—one where all bids are disclosed after the bidding round is over, and one where only the winning bid is disclosed. We show that on average the price paid by buyers is higher when only the winning bid is disclosed. As a result, buyers are better off in markets where all bids are disclosed at the conclusion of the bidding round.

The Price of Anarchy in Supply Chains: Quantifying the Efficiency of Price-Only Contracts

Georgia Perakis, Guillaume Roels

Contracting is a key element of supply chain management. Under certain types of contracts, the objectives of the different supply chain partners are conflicting, which may therefore lead to suboptimal decisions for the whole supply chain. For instance, when capacity must be committed before a selling season, the supply partners may unevenly bear the inventory risk, causing the party that bears the most inventory risk to underinvest in capacity. In this paper, we analyze the efficiency of the simplest and most common contract: the wholesale-price contract. We show that even in a two-stage supply chain, such contracts can lead to a loss of efficiency of up to 42%. We also characterize the efficiency of various supply chain configurations: serial, assembly, competitive procurement, and

competitive distribution systems, operating with a make-to-stock or make-to-order production policy. We find that make-to-stock assembly systems with many intermediaries and many components to be assembled are the least efficient. In such complex assembly systems, using more elaborate contracts (such as sales rebate and quantity discount agreements) instead of wholesale price contracts can achieve huge savings. The loss of efficiency can also often be mitigated when the production environment is shifted from make-to-stock to make-to-order, and when competition is introduced among suppliers and/or distributors.

Risk Mitigation in Newsvendor Networks: Resource Diversification, Flexibility, Sharing, and Hedging [Jan A. Van Mieghem](#)

In this paper, we study how managers can mitigate operational risk in networks through judicious resource allocation. Specifically, we show how strategic placement of safety capacity and inventory provides an operational hedge. We discuss examples of resource diversification and contingent flexible allocation that reduce profit variability risk and show that operational flexibility can even create value by exploiting upside variations. Our results suggest some rules of thumb for strategic placement of safety capacity and inventory in networks: (1) Intuitive diversification benefits accrue by increasing inexpensive dedicated resources that supply markets with low profit variance, especially if the network serves a portfolio of markets that are negatively correlated. (2) Investment in flexible resources, however, has more subtle benefits because the appropriate hedging action depends on their network position. For example, flexible resources that augment dedicated resources should be increased while flexible resources that follow dedicated resources should be decreased.

Existence of Coordinating Transshipment Prices in a Two-Location Inventory Model [Xinxin Hu, Izak Duenyas, Roman Kapuscinski](#)

A key problem that many manufacturers face is coordination of production and transshipment across multiple plants at different locations. The firm would like each location to help other locations when higher-than-expected demand or lower-than-expected production results in shortages in one location and excess in another. Furthermore, the firm would like each location to select their production quantity given such help may be needed. When plant managers make their own uncoordinated decisions, the whole company may perform fairly poorly, but it is unrealistic to expect a central body to make production level and transshipment decisions for all locations globally. Thus, a key question is whether the firm can set simple linear transfer prices between the units to

coordinate transshipment and production decisions. Such linear transfer prices are common in practice, but in this paper, we show that there is no guarantee that they will coordinate the locations. Our results suggest that in many situations linear transshipment prices are unlikely to achieve coordination of production and transportation.

Fairness and Channel Coordination [Tony Haitao Cui, Jagmohan S. Raju, Z. John Zhang](#)

While previous research emphatically argues for the need of complex nonlinear contracts, we often observe that real-world contracts between manufacturers and their distributors are quite simple. This makes one wonder why there is a difference. In this paper, we analyze a model of a distribution channel in which two parties (a manufacturer and a retailer) care about fairness; a variable found to be an important driver in empirical research on human behavior in general, and distribution channels in particular, but not included previously in analytical models in this area. We find that in this setting, a simpler contract (a constant wholesale price contract) indeed turns out to be optimal. We also observe that as we make the context we analyze richer and more complex, the required coordination mechanisms become simpler, rather than more complex. Hence, our results provide one possible explanation for why businesses continue to use simple contracts successfully.

Learning from Experience in Software Development: A Multilevel Analysis [Wai Fong Boh, Sandra A. Slaughter, J. Alberto Espinosa](#)

Labor is the largest component of software development and maintenance costs. Managers can influence this labor cost by how they assign developers to work on projects or systems. A key decision is whether to assign developers to work on the same systems or to rotate them across systems. We analyze this trade-off by studying the effects of different types of experience on individual, group, and organizational unit productivity in software development at a large telecommunications company. For organizations using an evolutionary approach to develop large software products where time to market is critical, even small improvements in software development productivity can yield substantial benefits for financial and competitive performance. Our study reveals that specialization in a system maximizes individual productivity. In contrast, diverse experience in related systems enhances the ability of teams and organizational units to handle larger and more complex tasks, thus providing greater long-term flexibility for task assignments. Our results also reveal productivity benefits from assigning developers to work with others, as this enables

developers to learn from others and to learn about working with others. Our study can help managers decide when it is more beneficial to assign developers to work on the same systems, to work on different systems, and to work alone or in teams.

Does Transaction Misalignment Matter for Firm Survival at All Stages of the Industry Life Cycle?
Nicholas Argyres, Lyda Bigelow

Make-or-buy decisions are thought to be efficient when idiosyncratic components are made internally while generic components are purchased on the market. In this paper, we address the question: When, and for which kinds of firms, are inefficient make-or-buy choices most harmful to firms' survival chances? Using data from the early U.S. auto industry, we find that inefficient make-or-buy choices reduced firms' chances of survival much more during the industry shakeout than in earlier periods. This may be because in early stages of an industry's development, cost competition is weaker than during a shakeout period, in which such competition is thought to be at its most severe because firms' products share broad design features. We also find that larger firms were less affected by inefficient make-or-buy choices during the shakeout than were smaller firms. Make-or-buy decisions for key components may therefore be less important early in an industry's life cycle but may become much more critical during a shakeout, especially for smaller firms.

A Market-Based Optimization Algorithm for Distributed Systems

Zhiling Guo, Gary J. Koehler, Andrew B. Whinston

Many resource allocation decisions within or across organizational boundaries are now made using auctions in distributed trading environments, often over the Internet. We present a double-auction mechanism to allow resources such as manpower, raw material and finished inventory, etc. to be bought and sold in a marketplace, as are stocks in the New York Stock Exchange. Unlike most markets, however, we allow bundle trading in which buyers and sellers submit consolidated orders to buy and sell packages of resources, in different quantities, such that trades retain these relative quantities in the purchased bundles. We show that our mechanism finds an overall optimal allocation after a finite number of trades. We also investigate the sensitivity of the process to various types of agent gaming showing that it is robust against many strategic activities. Our proposed mechanism can be implemented in many settings, including within a supply chain with different participants buying and selling various resources. This market-based framework is particularly useful for management practice in that 1) it aligns self-interested agents' goal of wealth maximization with the overall system objectives, and 2) it allows a decentralized information system to handle information exchange requirements that effectively coordinates distributed agents without divulging their private information.