TO HEDGE OR NOT TO HEDGE: Contracts, Hedges and Volatile Commodity Prices

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SEMINAR ABSTRACT

In this seminar, we will explore three main issues in decentralized, risk neutral bilateral supply chains facing uncertain demand and stochastic input costs (volatile commodity prices):

Should we hedge, and why?
How does the nature of the supply chain contract (wholesale, pass-through, revenue sharing) affect the hedging policies of the firms in the supply chain?
What is the rationale of using pass-through contracts in these environments?

We start by building a “selling-to-the-newsvendor” model with stochastic input costs. The firms’ operations are intertwined (i.e., the downstream buyer depends on the upstream supplier for delivery, and the supplier depends on the buyer for purchase). We show for this setting that to the extent hedging can ensure continuation in supply, it can have value to at least some members of the supply chain. We identify conditions under which the risk of the supply chain breakdown will cause the supply chain members to hedge their input costs. To sustain hedging in equilibrium, both firms must hedge. The equilibrium hedging policy will (in general) be a partial hedging policy, but in the presence of limited working capital and need for financing full hedging policy emerges.

We then study in more detail the impact that supply chain contracts have in this environment. The firms contract as follows: Either they use the pass-through contract under which the upstream supplier passes her entire commodity input costs onto the downstream assembler, or they use an appropriately adapted revenue sharing contract under which the firms split both the production costs and the operating revenues. In the absence of financing needs for either firm, the pass-through contract is dominated by the revenue sharing contract. However, when working capital limitations drive financing needs in the chain, the financial frictions break the coordinating nature of the revenue sharing contract, and the created double marginalization inefficiencies and financing costs for firms with differential working capital and financing needs weaken the profit performance of the contract. Pass-through contracts do dominate revenue sharing ones when there are low (or no) working capital suppliers, with suppliers having high expectations of profits (or high margins), and the buyer has reasonable working capital availability. Hedging behavior can be justified even in the absence of financing frictions for pass through contracts, and it only involves the buyer. Hedging behavior in revenue sharing contracts happens when financing is needed, and either firms both hedge, or neither hedges, all commodity purchases in the supply chain. Double marginalization inefficiencies versus financing costs are the main factors in driving the effectiveness of the contracts, with financing cost dominated environments favoring the pass-through contract.