Managing Operational Flexibility Under Uncertainty

Operational flexibility can take various forms, including product flexibility (the ability to manufacture different products on the same production line) and volume flexibility (the ability to change total production volumes). In this talk, we study the use of these two flexibilities to mitigate demand uncertainty as well as respond to competition.

In the first half of the talk, we study the inter-twined nature of volume flexibility and product flexibility in response to uncertain demand. Using these two flexibilities as building blocks, we study four technologies (volume flexible only, product flexible only, both volume and product flexible and neither volume nor product flexible) in a monopolistic setting. We isolate conditions under which a firm adopts these technologies as a function of demand, market and cost parameters, in the process revealing the embedded similarities and differences between product and volume flexibilities.

In the second half of the talk, we distill the impact of competition on the adoption of flexible technologies in an environment characterized by uncertain demand. We show that not all firms adopt flexibility in equilibrium and that flexible and non-flexible technologies can co-exist.