Additive manufacturing (AM), also known as 3D printing, has the potential to shift supply chains from global networks that rely on centralized production with traditional manufacturing technologies to largely digital networks with decentralized, local 3D printing, i.e., digital inventory. One type of firm that is particularly well positioned to drive this transition are original equipment manufacturers (OEMs), who design and produce capital goods. In this talk, I present two attempts to analyze this potential impact.

The first paper develops an analytical framework to aid an OEM to manage a variety of spare parts in a single market, in the presence of 3D printing technology. The central question is: Which parts should be supplied using the traditional procure/manufacture-to-stock channel, and which parts should use a local 3D printer to print-on-demand? We show that a hybrid approach is optimal for most companies. Abandoning all spare parts inventory is too risky, but printing certain parts on demand can save a lot of money. (Joint work with Yue Zhang.)

The second paper considers an OEM supplying a single part to multiple buyers. We propose that the OEM acts as an intellectual property (IP) licensor by selling spare parts designs, rather than physical spare parts. With these designs a buyer can print spare parts locally at much shorter lead times and at lower setup costs. We characterize the optimal IP license contract. Our results show that IP licensing by OEMs can become a major enabler in the transition to digital networks with decentralized 3D printing. (Joint work with B. Westerweel and R.J.I. Basten.)