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Value of Reverse Factoring (RF) in Multi-stage Supply Chains

Abstract
We develop a mathematical model for integration, analysis, and optimization of operational and financial processes within a supply chain. Specifically, we consider commercial transactions of a large corporate customer with a small- or medium-sized supplier. We show how application of reverse factoring (RF) – an increasingly popular product within the broad field of supply chain finance – influences the operational and financial decisions of these firms. While some empirical work on supply chain finance solutions exists within research literature, our model constitutes the first analytic treatment of the problem, using the value framework of financial theory. We determine the individual benefit that each firm can obtain from a given reverse factoring arrangement, and then proceed to characterize their participation constraints, and ultimately the combined benefit implications for the supply chain. We provide results for make-to-order and make-to-stock environments. In both cases, our framework shows how the value of reverse factoring results from and is conditioned by (1) the spread in external financing costs, (2) the operating characteristics of the supplier, including the implied working capital policy (WCP), and (3) the risk-free interest rate. Thus, in addition to providing managerial insights that integrate operational and financial perspectives, our findings disclose an important relation of these elements to the broader macro-economic context.

Keywords: *Supply Chain Finance; Joint Production and Financial Decisions; Reverse Factoring; Informational Asymmetries.*