Risk Averse Supply Portfolio Selection with Supply, Demand and Spot Market Volatility

Yasemin Merzifonluoglu

PII: S0305-0483(15)00047-X
DOI: http://dx.doi.org/10.1016/j.omega.2015.03.006
Reference: OME1505

To appear in: *Omega*

Received date: 19 March 2014
Accepted date: 4 March 2015

Cite this article as: Yasemin Merzifonluoglu, Risk Averse Supply Portfolio Selection with Supply, Demand and Spot Market Volatility, *Omega,* http://dx.doi.org/10.1016/j.omega.2015.03.006

Risk Averse Supply Portfolio Selection with Supply, Demand and Spot Market Volatility

Yasemin Merzifonluoglu

Business Administration Program, Middle East Technical University, Northern Cyprus Campus, Mersin 10,Turkey

Full Contact Info:

Middle East Technical University, Northern Cyprus Campus, 99738 Kalkanlı, Güzelyurt, Mersin 10, Turkey

myasemin@metu.edu.tr

090 (392) 661 2951

Abstract
Enterprise Risk Management (ERM) has become one of the most essential subjects in business management. This paper establishes how risk modelling can be applied to supply chain management, specifically to supply portfolio procurement decisions of a firm. In a single period setting, parts can be procured via traditional forward contracts, option contracts or spot purchases. Customer demand and spot prices are random and possibly correlated and firm's primary suppliers are subject to complete disruptions and yield uncertainties. This paper analyzes several scenarios where the spot market is not available, available for buying only, and available for both buying and selling. This article develops and solves mathematical models considering the risk neutral and risk averse (CVaR) objectives independently or simultaneously. For the special case of normally distributed random variables and a risk neutral objective, optimality properties were developed. A broad numerical study examines the sensitivity of procurement strategies to key problem parameters such as, risk attitude, demand and spot price volatilities, correlation between demand and spot prices and terms of option contracts.

Keywords: Supply chain management, Procurement management, Spot markets, Supply disruptions, Conditional Value-at-Risk

1. Introduction

Supply chains are now operating in volatile and competitive business environment more than ever. Despite the recent progress in forecasting techniques, estimating customer demand accurately is generally challenging due to ever-shrinking product lifecycles and changing customer preferences. In addition to unpredictability of customer demand, there also exist volume and price uncertainties at the supply end. Effective management of demand