

**Cai, Jianhu; Hu, Xiaoqing; Tadikamalla, Pandu R.; Shang, Jennifer**

**Flexible contract design for VMI supply chain with service-sensitive demand: revenue-sharing and supplier subsidy.** (English) Zbl 1403.90089

*Eur. J. Oper. Res.* 261, No. 1, 143-153 (2017).

**Summary:** To coordinate a VMI (vendor-managed inventory) supply chain with service-level sensitive customers, we relate retailer's service level to customer demand. We establish the dynamic game relationship under a revenue-sharing contract. A pure revenue-sharing contract, focusing on revenue-sharing ratio, often forms a competitive relationship among SC members, as the optimal sharing ratio is determined by the game leader and may fail to optimize SC performance. An improved mechanism is necessary to avoid sub-optimality. In this research, we propose three flexible subsidy contracts for VMI supply chains: (i) subsidizing all surplus products; (ii) subsidizing the inventory that exceeds the target level and unsold; (iii) subsidizing the inventory that exceeds target regardless it is sold or not. These contracts help SC members to arrive at optimal price, revenue-sharing ratio, inventory target, subsidy rate; and to commit inventory early. The proposed mechanism can better ensure SC collaboration, and bring the SC to Pareto improvement by allowing members to negotiate, share profit, subsidize suppliers for their risks, and select from alternative contracts under each VMI setting. They enhance service levels, maximize SC performance, and share SC profits fairly. Numerical examples are provided to validate our findings and to derive managerial implications.

**MSC:**

**90B06** Transportation, logistics and supply chain management

**90B05** Inventory, storage, reservoirs

Cited in **9** Documents

**Keywords:**

supply chain management; flexible contract; supplier subsidy; revenue-sharing; service-sensitive demand

**Full Text:** [DOI](#)

**References:**

- [1] Cachon, G. P., The allocation of inventory risk in a supply chain: push, pull and advanced purchase discount contracts, *Management Science*, 50, 2, 222-238, (2004) · [Zbl 1232.90027](#)
- [2] Cachon, G. P.; Lariviere, M. A., Supply chain coordination with revenue-sharing contracts: strengths and limitations, *Management Science*, 51, 1, 30-44, (2005) · [Zbl 1232.90173](#)
- [3] Cachon, G. P.; Swinney, R., Purchasing, pricing, and quick response in the presence of strategic consumers, *Management Science*, 55, 3, 497-511, (2009) · [Zbl 1232.91418](#)
- [4] Cetiner, D.; Kimms, A., Assessing fairness of selfish revenue sharing mechanisms for airline alliances, *Omega*, 41, 4, 641-652, (2013)
- [5] Chakraborty, A.; Chatterjee, A. K.; Mateen, A., A vendor-managed inventory scheme as a supply chain coordination mechanism, *International Journal of Production Research*, 53, 1, 13-24, (2015)
- [6] Choi, T.-M., Coordination and risk analysis of VMI supply chains with RFID technology, *IEEE Transactions on Industrial Informatics*, 7, 3, 497-504, (2011)
- [7] Corsten, D.; Gruen, T. W., Stock-outs cause walkouts, *Harvard Business Review*, 82, 5, 26-28, (2004)
- [8] Darwish, M. A.; Odah, O. M., Vendor managed inventory model for single-vendor multi-retailer supply chains, *European Journal of Operational Research*, 204, 3, 473-484, (2010) · [Zbl 1181.90011](#)
- [9] Durango-Cohen, E. J.; Yano, C. A., Supplier commitment and production decisions under a forecast-commitment contract, *Management Science*, 52, 1, 54-67, (2006)
- [10] Feng, X.; Moon, I.; Ryu, K., Revenue-sharing contracts in an  $N$ -stage supply chain with reliability considerations, *International Journal of Production Economics*, 147, 20-29, (2014), January
- [11] Fitzsimons, G. J., Consumer response to stockouts, *Journal of Consumer Research*, 27, 2, 249-266, (2000)
- [12] Giannoccaro, I.; Pontrandolfo, P., Negotiation of the revenue sharing contract: an agent-based systems approach, *International Journal of Production Economics*, 122, 2, 558-566, (2009)

- [13] Giovanni, P. D.; Roselli, M., Overcoming the drawbacks of a revenue-sharing contract through a support program, *Annals of Operations Research*, 196, 1, 201-222, (2012) · [Zbl 1259.91052](#)
- [14] Govindan, K., The optimal replenishment policy for time-varying stochastic demand under vendor managed inventory, *European Journal of Operational Research*, 242, 2, 402-423, (2015) · [Zbl 1341.90004](#)
- [15] Guan, R.; Zhao, X., On contracts for VMI program with continuous review ( $(r, Q)$ ) policy, *European Journal of Operational Research*, 207, 2, 656-667, (2010) · [Zbl 1205.91104](#)
- [16] Hou, J.; Zeng, A. Z.; Zhao, L., Achieving better coordination through revenue sharing and bargaining in a two-stage supply chain, *Computers & Industrial Engineering*, 57, 1, 383-394, (2009)
- [17] Huynh, C. H.; Pan, W., Operational strategies for supplier and retailer with risk preference under VMI contract, *International Journal of Production Economics*, 169, 413-421, (2015), November
- [18] Iman, N.; Ali, S. N., Designing a supply contract to coordinate Supplier's production, considering customer oriented production, *Computers & Industrial Engineering*, 74, 26-36, (2014)
- [19] Kiesmüller, G. P.; Broekmeulen, R. A.C. M., The benefit of VMI strategies in a stochastic multi-product serial two echelon system, *Computer & Operations Research*, 37, 2, 406-416, (2010) · [Zbl 1175.90024](#)
- [20] Krishnan, H.; Winter, R. A., On the role of revenue-sharing contracts in supply chains, *Operations Research Letters*, 39, 1, 28-31, (2011) · [Zbl 1208.90020](#)
- [21] Lee, J.-Y.; Cho, R. K., Contracting for vendor-managed inventory with consignment stock and stockout-cost sharing, *International Journal of Production Economics*, 151, 158-173, (2014), May
- [22] Levin, Y.; McGill, J.; Nediak, M., Dynamic pricing in the presence of strategic consumers and oligopolistic competition, *Management Science*, 55, 1, 32-46, (2009) · [Zbl 1232.91251](#)
- [23] Li, S.; Zhu, Z.; Huang, L., Supply chain coordination and decision making under consignment contract with revenue sharing, *International Journal of Production Economics*, 120, 1, 88-99, (2009)
- [24] Lin, Z.; Cai, C.; Xu, B., Supply chain coordination with insurance contract, *European Journal of Operational Research*, 205, 2, 339-345, (2010) · [Zbl 1188.90034](#)
- [25] Liu, Y.; Fry, M. J.; Raturi, A. S., Retail price markup commitment in decentralized supply chains, *European Journal of Operational Research*, 192, 1, 277-292, (2009) · [Zbl 1205.90037](#)
- [26] Mateen, A.; Chatterjee, A. K.; Mitra, S., VMI for single-vendor multi-retailer supply chains under stochastic demand, *Computers & Industrial Engineering*, 79, 95-102, (2015), January
- [27] Palsule-Desai, O. D., Supply chain coordination using revenue-dependent revenue sharing contracts, *Omega*, 41, 4, 780-796, (2013)
- [28] Pan, K.; Lai, K. K.; Leung, S. C.H.; Xiao, D., Revenue-sharing versus wholesale price mechanisms under different channel power structures, *European Journal of Operational Research*, 203, 2, 532-538, (2010) · [Zbl 1177.91075](#)
- [29] Su, X., Inter-temporal pricing with strategic customer behavior, *Management Science*, 53, 5, 726-741, (2007) · [Zbl 1232.91435](#)
- [30] Su, X.; Zhang, F., Strategic customer behavior, commitment, and supply chain performance, *Management Science*, 54, 10, 1759-1773, (2008) · [Zbl 1232.91262](#)
- [31] Su, X.; Zhang, F., On the value of commitment and availability guarantees when selling to strategic consumers, *Management Science*, 55, 5, 713-726, (2009) · [Zbl 1232.91436](#)
- [32] Sun, D.; Ryan, J. K.; Shin, H., Why do we observe stockless operations on the Internet? stockless operations under competition, *Production and operations management*, 17, 2, 139-149, (2008)
- [33] Turner, M. L., *Kmart's ten deadly sins: how incompetence tainted an American icon*, (2003), John Wiley & Sons Hoboken
- [34] Taylor, T. A.; Plambeck, E. L., Simple relational contracts to motivate capacity investment: price only vs. price and quantity, *Management Science*, 9, 1, 94-113, (2007)
- [35] Wang, Y. Y.; Lau, H. S.; Hua, Z. S., Three revenue-sharing variants: their significant performance differences under system-parameter uncertainties, *Journal of the Operational Research Society*, 63, 1752-1764, (2012)
- [36] Yang, H., Impact of discounting and competition on benefit of decentralization with strategic customers, *Operations Research Letters*, 40, 2, 123-127, (2012) · [Zbl 1242.91109](#)
- [37] Yu, Y.; Chu, F.; Chen, H., A Stackelberg game and its improvement in a VMI system with a manufacturing vendor, *European Journal of Operational Research*, 192, 3, 929-948, (2009) · [Zbl 1157.91320](#)
- [38] Yu, Y.; Huang, G. Q.; Liang, L., Stackelberg game-theoretic model for optimizing advertising, pricing and inventory policies in vendor managed inventory (VMI), *Computers & Industrial Engineering*, 57, 1, 368-382, (2009)
- [39] Zaroni, S.; Jaber, M. Y.; Zavanella, L. E., Vendor managed inventory (VMI) with consignment considering learning and forgetting effects, *International Journal of Production Economics*, 140, 2, 721-730, (2012)
- [40] Zhang, T.; Yao, J., How to solve the problems of auto parts shortage in 4S shops, *China Logistics & Purchasing*, 2, 70-71, (2009)
- [41] Zhang, W. G.; Fu, J.; Li, H.; Xu, W., Coordination of supply chain with a revenue-sharing contract under demand disruptions when retailers compete, *International Journal of Production Economics*, 138, 1, 68-75, (2012)
- [42] Zhao, X.; Xie, J.; Wei, J. C., The value of early order commitment in a two-level supply chain, *European Journal of Operational Research*, 180, 1, 194-214, (2007) · [Zbl 1114.90309](#)

This reference list is based on information provided by the publisher or from digital mathematics libraries. Its items are heuristically matched to zbMATH identifiers and may contain data conversion errors. It attempts to reflect the references listed in the original

paper as accurately as possible without claiming the completeness or perfect precision of the matching.