The Role of Vendor Funds in Promotion Planning

**Introduction.** Vendor funds are an integral part of promotion planning for both manufacturers and retailers. In a vendor fund, the manufacturer offers the retailer a short-term discount on a specific product, encouraging the retailer to discount the product. Generally, vendor funds are supposed to have beneficial effects to all supply chain partners in important periods, for example around Christmas or the Olympics. The manufacturer benefits because the lower retail price attracts new customers to the product, which leads to larger sales and brand recognition. The retailer benefits because the lower retail price leads to increased sales and the manufacturer refunds up to the regular price of the product.

However, Bell and Drèze (2002) show that during vendor funds period many retailers stockpile the product for later use and cash in the discount. This forward-buying problem counteracts the manufacturer’s intentions. In fact, Bell and Drèze (2002) report that only 16% of manufacturers believe vendor funds are profitable, but still $1 trillion circulates in the market every year (Nielsen, 2014). Currently, promotion planning is guided by intuition and heuristics in most supply chains. In this research, we collaborate with Oracle Retail to grasp this opportunity and use operations management ideas to improve vendor fund management.

**Contributions.** Our main contribution lies in proposing and analyzing a new and effective vendor fund model that resolves the forward-buying problem and coordinates supply chains on the short-term. In this research, we are influenced by current practice from clients of Oracle Retail. Some of their clients only offer a discount if the retailer passes a minimal fraction of the discount through to the customer (pass-through). To the best of our knowledge, this vendor fund with pass-through has not been studied in the literature before. We show that it has great benefits for the manufacturer and the retailer in that it removes the forward-buying problem and leads to supply chain coordination.

The pass-through constraint gives the manufacturer more power, but the retailer can still decide to reject the vendor fund. Therefore, we tackle the vendor fund setting problem that the manufacturer is interested in: what discount to offer and what pass-through to require. In this problem, we also take into account that the retailer solves the vendor fund selection problem: whether to accept or reject the offer and accordingly how to price during the vendor
fund. We analyze a bi-level strategic model and find the benefits of vendor funds with pass-through. In reality, the retailer’s vendor fund selection problem is even more complex. Retailers continuously receive outside offers from other manufacturers and only want to select a limited number for operational reasons. Hence, we also devise a tool that retailers can use to solve this tactical model, for which we show near-optimal performance on Oracle Retail client data.

**Literature Review.** To the best of our knowledge, vendor funds have not been widely studied. As the main paper, Drèze and Bell (2003) document the inefficient environment surrounding vendor funds and propose scan-backs to improve this situation. Scan-backs are vendor funds in which retailers share their sales data and the manufacturer only reimburses sales that occurred during the vendor fund period. Drèze and Bell (2003) show that there exist scan-backs in which neither the manufacturer nor the retailer are worse off than in the original case without sharing. We approach the problem from a new angle, as far as we know the vendor fund with pass-through has not been studied before. Not only do we find a combination of discount and pass-through that makes all supply chain partners better off, alike scan-backs, we also show that this type of vendor fund leads to short-term supply chain coordination.

The other stream of literature that is most associated with our work is that of supply chain contracts. The focus is on the development of contracts that coordinate manufacturers and retailers to cooperate in an optimal manner for all supply chain partners. These contracts stipulate wholesale price as well as cost-sharing schemes, examples include buy-back (Pasternack, 1985) or revenue-sharing (Cachon and Lariviere, 2005) schemes. Over long periods, actual demand can deviate from the initial forecast on which the contract was built, which causes the contract to become sub-optimal. Vendor funds realign the supply chain through temporary discounts and promotion planning. Another difference is that promotions bring about the forward-buying problem. Supply chain contracts are relieved from the forward-buying problem, because they are not engaged with promotion planning.

**Results.** In more detail, the results of our research are:

- **Strategic vendor fund model:** First, we consider a supply chain in which the manufacturer offers the retailer one vendor fund and model this strategic problem as a bi-level problem. In the upper level, the manufacturer’s vendor fund setting problem is to determine what
discount to give and what pass-through to demand from the retailer. Then in the lower level, the retailer’s vendor fund selection problem is to decide whether to accept or reject the vendor fund and set the promotional price subject to a pass-through constraint if the vendor fund is accepted. Now, instead of modeling all other vendor funds received by the retailer explicitly, we initially presume the retailer has a deterministic outside option, and later relax this assumption to a stochastic outside option.

- **Solution to forward-buying:** In this setting, we show that a manufacturer offering a vendor fund with pass-through does not have to fear the forward-buying problem. Originally, the manufacturer was only able to use the discount to push the retail price in the right direction. Now, the retail price is set through the pass-through constraint, which enables the manufacturer to set the discount lower for forward-buying retailers than for non-forward-buying retailers.

- **Supply chain coordination:** In addition, we show that the vendor fund also coordinates the supply chain in the short-term. Supply chain contracts aim to coordinate the supply chain long-term. However, supply chain contracts can become less efficient over longer periods, because initial demand forecasts misalign more and more as time goes by. Hence, the vendor fund with pass-through constraints is a strong tool to realign the supply chain in the most important periods of the year.

- **Tactical vendor fund selection problem:** In reality, retailers wish to solve a more complex tactical version of the retailer’s vendor fund selection problem. The goal is to decide which vendor funds to select from a large set of offers from different manufacturers while simultaneously adapting the promotional pricing planning based on the pass-through requirements set by the vendor funds. We model this problem as a quadratic integer optimization problem, which is hard to solve. Nevertheless, we create a fast algorithm and show a provable guarantee.

- **Real-world performance:** Working together with Oracle Retail on this research, we test the model with data from a large retailer, achieving solutions within 3-5% of the optimal solution. Finally, operations management practitioners are not only satisfied with the algorithm’s performance, but also with its transparency.