# Fair Pricing, Upstream Market Power, and Vertical Restraint

Stephen F. Hamilton and Benjamin Ouvrard*

**Abstract**

Fair pricing standards are used in various industries, encompassing fair trade, labor practices, and state-regulated pricing. We demonstrate that fair pricing can serve as a vertical restraint by a dominant manufacturer on its retailers to fully coordinating prices in a multi-product distribution channel with fair priced and conventional goods. We identify buyer market power by the manufacturer in the upstream market as a novel role for a manufacturer to impose a vertical restraint on retailers in the downstream market, and characterize the vertical restraint that maximizes collective rents in terms of demand-side and supply-side diversion ratios.

Keywords: Fair pricing; vertical restraint; buyer market power.

JEL Codes: L13, L14, L42, D43

*Hamilton is Professor of Economics, Orfalea College of Business, California Polytechnic State University, San Luis Obispo, San Luis Obispo, CA. Ouvrard is Research Fellow, French National Institute for Agricultural Research, Grenoble Applied Economics Laboratory (GAEL). Contact author: Hamilton, Address: Orfalea College of Business, Cal Poly, 1 Grand Ave, San Luis Obispo, 93407. Ph. 805-756-2555, email: shamilto@calpoly.edu.  Funding from the French National Institute for Agricultural Research is gratefully acknowledged.

# 1 Introduction

Fair pricing standards are employed across numerous industries in many countries with the ostensible purpose of providing more equitable remuneration for suppliers. Fair pricing is utilized in domestic and international cane sugar, cocoa, coffee, honey, nuts, tea, oilseed markets, encompasses fair labor practices in the textiles industry, and is codified in public regulations across a wide variety of food products under the EGAlim law in France.

In this paper, we demonstrate that fair pricing can be used as a vertical restraint by a dominant manufacturer to coordinate industry pricing in a multi-product distribution channel comprised of fair priced and conventional goods. Our analysis builds on previous studies of distributive fairness by Cui et al. (2007) and Caliskan-Demirag et al. (2010) that demonstrate fair pricing can align vertical incentives between a manufacturer and a monopoly retailer to eliminate the double marginalization problem. We depart from the literature by considering a multi-product setting with fair priced and conventional goods, and examine the ability of a dominant manufacturer to employ fair pricing as a vertical restraint on its retailers to jointly control upstream and downstream market prices in the distribution channel. Thus, our analysis bridges between the fair pricing literature on vertical coordination and the literature examining vertical restraints as a tool for horizontal control (Innes and Hamilton, 2006, 2009).[1]

Our observations on fair pricing as a vertical restraint makes two contributions to the literature. First, we identify fair pricing standards as a novel form of vertical restraint. Adding fair pricing to the toolbox of vertical restraints is important, because fair pricing standards are likely to have marketing appeal over alternative forms of vertical restraint such as resale price maintenance (RPM), providing cause for antitrust concern among regulators.

Second, we demonstrate that a fair pricing standard is equivalent to a constraint on buyer market power in upstream procurement markets, as expressed by the Lerner index

[1] While our focus is on the ability of a fair pricing standard to achieve full horizontal and vertical market control over upstream and downstream market prices, our broader observation is that fair pricing provides an attractive form of vertical restraint that is capable of controlling the various retail incentives outlined by Rey and Vergé (2008), while conveying the marketing advantage of consumer-perceived fairness.

of monopsony power. Upstream market power exerted by a manufacturer over its suppliers introduces a novel role for vertical restraints. Absent vertical restraint, retailers that select downstream market prices based on unit wholesale prices ignore the effect of their retail prices on the rents the manufacturer extracts from suppliers in the upstream market. This upstream market power effect (UMP) results in retail prices that are "too low" from the perspective of a vertically-integrated firm, countervailing the double marginalization effect on retail prices in the downstream market.

The use of vertical restraints is highly debated in practice. On the one hand, vertical restraints can serve anticompetitive purposes by facilitating collusion (Jullien and Rey, 2007; Rey, 2020; Hunold and Muthers, 2024), eliminating intra- and interbrand competition (Miklós-Thal et al., 2010; Rey and Vergé, 2010), softening price competition (Shaffer, 1991), and creating incentives for exclusion (Asker and Bar-Isaac, 2014; Chambolle and Molina, 2023). On the other hand, vertical restraints can serve to resolve various externalities that cause retail prices to diverge from the collective optimum, for instance by eliminating double marginalization (Spengler, 1950; Mathewson and Winter, 1984; Rey and Tirole, 1986), by providing retailers with incentives to engage in pre-sales retail services (Telser, 1960; Marvel and McCafferty, 1984; Klein and Murphy, 1988; Winter, 1993)[2], and by preventing retailers from engaging in excessive post-sale quality differentiation (Bolton and Bonanno, 1988).

We frame our analysis around a successive oligopoly market structure in which a manufacturer procures a product from competitive, upstream market suppliers and exchanges it with retailer(s) for sale in the downstream consumer market. The fair pricing standard bifurcates the distribution channel into a fair priced good produced by a dominant manufacturer and a conventional good produced by a competitive fringe. We consider the case in which both goods are sold by multi-product retailers, as when fair trade coffee is sold alongside conventional coffee on supermarket shelves.[3] Our analysis of fair pricing as a vertical

[2]Recent analyses has clarified that under some conditions the use of minimum RPM can decrease the equilibrium level of retail services (see e.g., Gabrielsen and Johansen 2017 and Hunold and Muthers 2017).

[3]Another possibility is that competing retailers separate over fair pricing practices, as in the case where a fair trade coffee shop competes against a conventional coffee shop. Such a setting would allow for vertical quality differences when consumers have preferences for fair priced goods. Here, we clarify the role of fair pricing as a vertical restraint by focusing on the case of multi-product retailers.

restraint takes into account the potential for vertical separation to occur between retailers, manufacturers, and suppliers, which allows contracts with nonlinear prices to emerge along the lines of Rey and Vergé (2008).[4]

The ostensible goal of fair pricing is to achieve distributive fairness in the share of rents allocated to suppliers in the distribution channel. We follow Cui et al. (2007) in modeling the fair pricing standard as a constraint on the share of industry rents provided to suppliers. This concept of fair pricing as a share of industry rents coincides with the food-dollar definition used to measure price fairness by the U.S. Department of Agriculture (USDA),[5] and we show that a fair pricing standard of this form is equivalent to imposing a constraint on the exercise of buyer market power in the distribution channel.

For a manufacturer with the ability to exert monopsony power over suppliers in the upstream market, a fair pricing standard that fixes the margin between the retail price and the price paid to suppliers serves as a form of margin restraint on market prices. Moreover, because the fair pricing standard controls the margin between the retail price and the upstream market price paid by the manufacturer, imposing a fair pricing standard frees up the wholesale price of the manufacturer to be employed as an instrument to control the retail price of the conventional product. Thus, fair pricing provides a dominant manufacturer with a tool that can be used to exert cross-product control over upstream and downstream market prices in a distribution channel containing fair priced and conventional goods.

Our main findings are as follows. First, we demonstrate that fair pricing allows the manufacturer to fully control upstream and downstream market prices for both fair priced and conventional goods. This outcome generalizes the results of Innes and Hamilton (2006, 2009) to demonstrate the ability of a vertical restraint to achieve "full channel control" in a multi-product distribution channel comprised of fair priced and conventional goods.

Second, we formalize the linkage between the fair pricing standard and the Lerner index of monopsony power, thereby relating the fair pricing standard to a constraint on the degree

[4]Unlike the case of non-priced retail service provision, retailers acquire rents from the sale of rival manufactured goods, which makes contract enforceability important.

[5]See Busch and Spiller (2016) and Yi et al. (2021) for examples of how USDA relies on the food-dollar concept to show how rents are divided between suppliers, manufacturers, and retailers in the food system.

of buyer market power exercised in the distribution channel.

Third, we characterize the ability of the fair pricing standard to control both the double marginalization incentive of retailers in the downstream retail market and the upstream market power effect that arises when retailers ignore the buyer market power of the manufacturer over suppliers. We show that the vertical restraint that maximizes industry rents involves setting a wholesale price set above (or below) the manufacturer's procurement price in the upstream market according to the relative magnitude of supply-side and demand-side diversion ratios. Our analysis is therefore grounded in the concept of diversion ratios that underpins the antitrust analysis of horizontal and vertical mergers (Farrell and Shapiro, 2010; Conlon and Mortimer, 2021).

Finally, we extend our analysis to consider cases in which the fair pricing standard is required to provide a fairer allocation to suppliers than the benchmark market equilibrium it replaces. We identify cases in which the fair pricing constraint binds on the ability of the manufacturer to coordinate industry pricing, and characterize the optimal fair pricing standard in cases where the retail price that maximizes collective rents in the distribution channel is bound from below by the fair pricing standard on the manufacturer's good.

The remainder of the paper is structured as follows. In the next section, we provide background details on fair pricing. In Section 3, we develop a vertical model in which a dominant manufacturer exerts market power over suppliers in the upstream market and multi-product retailers set oligopoly prices to consumers in the downstream market. In Section 4, we characterize the retail pricing externalities introduced by upstream market power that motivates our study of vertical restraints. In Section 5, we examine the fair pricing standard that attains the integrated optimal pricing outcome in a multi-product distribution channel containing fair priced and conventional goods. In Section 6, we consider the optimal fair pricing standard in settings where the contracted price paid to suppliers must be higher than the benchmark equilibrium absent contracts. We conclude by discussing the policy implications of our findings in Section 7.

## 2 Background on Fair Pricing

The concept of fair pricing relates to several aspects of market prices (Hamilton et al., 2020). Depending on the context, fair pricing relates to: (i) the difference between the price paid by consumers and the unit cost of sellers; (ii) the price paid by consumers relative to the paid paid by their peers; (iii) the difference between the price offered by a seller and the price offered by other sellers; and (iv) the price sellers charge during periods of peak market demand (e.g., bottled water prices following a natural disaster). Our focus is on fair pricing standards that provide greater remuneration to sellers in upstream procurement markets, as in the case of a fair trade agreement that provides a guaranteed minimum price to coffee farmers.

The economics literature on distributive justice emphasizes the plurality of what constitutes a "fair" distribution of rents between individuals (see e.g., Konow 2000, Konow 2001, Cappelen et al. 2007, Cappelen et al. 2013), which includes, for instance, pure equality, proportionality according to individuals' efforts, and economic efficiency. We rely on these concepts here to examine fair pricing in a food distribution channel that connects farmers, manufacturers, and retailers.

Our analysis encompasses both fair pricing practices in domestic markets and fair trade practices with international suppliers. In international trade settings, fair pricing practices are certified as "fair trade" by Fairtrade Labelling Organizations (FLOs) in terms of a guaranteed minimum price (GMP) paid to farmers. Examples of traded commodities subject to fair trade certification include cane sugar, cocoa, coffee, honey, nuts, tea, oilseeds, vegetables and textiles.[6] In domestic settings, fair pricing standards are codified by the EGAlim law in France, which requires food buyers to pay procurement prices in upstream farm product markets that more than cover suppliers costs of production.[7]

We model fairness following Cui et al. (2007) in terms of the share of total industry

[6] See: https://www.fairtrade.net/standard/cp

[7] Notable exceptions to the EGAlim law include cereals, rice, sugar cane, fruits and vegetables, processed products made from fruits and vegetables, wines (except some), beekeeping products, and seed potatoes. See: https://agriculture.gouv.fr/tout-comprendre-de-la-loi-EGALIM-2

returns received by suppliers in the distribution channel between suppliers and consumers. Specifically, letting $Q$ denote the quantity of the product sold and $\pi(p,z)$ denote the total profit level in the vertical system at a retail price of $p$ and a supplier price of $z$, we describe the fairness standard ($\gamma$) as the share of industry rent that satisfies $\gamma z Q = \pi(p,z)$. Substituting $\pi(p,z) = (p - z)Q$ for retail profit and factoring terms yields the fair pricing standard in terms of the market prices, $p = (1 + \gamma)z$.

The fair pricing standard has several interpretations. First, by rearranging terms, the fair pricing standard can be expressed in terms of the share of the food dollar received by suppliers, $\frac{z}{p} = \frac{1}{1+\gamma}$. The US Department of Agriculture (USDA) relies on the concept of the "food dollar" to describe how each dollar spent by a grocery consumer is allocated across different supply chain partners as a measure of distributive fairness.[8] Accordingly, much of the literature on fair pricing has focused on the farm share of the retail food dollar (Busch and Spiller, 2016; Canning et al., 2016; Yi et al., 2021).[9]

Second, the fair pricing standard can be interpreted directly in terms of the degree of buyer marker power exerted over upstream suppliers in the distribution channel. Solving the fair pricing standard for $\gamma$ gives $\gamma = \frac{p-z}{z}$, where the term on the right-hand side is the Lerner index of monopsony market power. In a perfectly competitive distribution channel where manufacturers and retailers price at marginal cost, prices would be set such that $\gamma = 0$, whereas higher values of $\gamma$ represent larger departures from competitive pricing.

To date, much of the analysis of fair pricing has focused on the demand-enhancing aspect of fairness as a product quality attribute in consumers' utility functions (see e.g., Chambolle and Poret 2013). The ability of fair priced goods to command a price premium over conventional goods has been examined both in settings where consumers know the marginal cost of the firm (Rotemberg, 2011) and under circumstances where consumers form beliefs about the costs of the firm from observing market prices (Eyster et al., 2021). In contrast, our focus here is on how a fair pricing standard alters equilibrium outcomes in the distribution

[8] See: https://www.ers.usda.gov/data-products/food-dollar-series/quick-facts/

[9] In US agricultural production, for example, the average farmer share of the food dollar has remained relatively constant in a range between 14-16 cents over the period 2010-2021.

channel by serving as a vertical restraint on retail prices.

# 3 The Model

We consider a successive vertical market structure in which manufacturers procure a product from perfectly competitive suppliers in an upstream market, exchange the goods with multi-product retailers in a wholesale market, who in turn sell the goods to consumers in a downstream oligopoly retail market. Throughout, we refer to good 1 as a fair priced good that is produced by a dominant manufacturer, while good 2 is a conventional good produced by a competitive fringe.

We consider a three-stage game. In stage 1, the dominant manufacturer (firm 1) writes a contract with one or more retailers to market its product as fairly priced. The terms of the contract with each retailer involve a fair pricing standard ($\gamma$), a wholesale price ($w_1$), and a lump-sum transfer to redistribute rents ($F$).[10] The fair pricing standard may be part of the manufacturer's marketing strategy to emphasize values of $\gamma$ that correspond to specific principles of distributive justice. For example, expressing the fairness standard in terms of the share of the food dollar received by suppliers, $\frac{z}{p} = \frac{1}{1+\gamma}$, suppliers and the retailer receive egalitarian shares of industry rents when $\gamma = 1$.

In stage 2, each retailer selects the market prices $p_1$ for good 1 and $p_2$ for good 2 taking wholesale prices as fixed. In stage 3, market clearing occurs, $S^i(z) = D^i(p)$, $i \in \{1, 2\}$, where $z = (z_1, z_2)$ is the vector of farm prices and $p = (p_1, p_2)$ is the vector of retail prices.[11] We solve the model by first considering the stage 3 outcome.

[10] Lump-sum transfers in the form of slotting allowances between manufacturers and retailers are common in the US supermarket industry.

[11] For notational convenience, we suppress retailer subscripts on prices where possible to focus on the contract between the manufacturer and a representative retailer.

## 3.1 Stage 3 Market Clearing

In stage 3, the upstream market clears derived demand for each good based on the retail prices, $S^i(z) = D^i(p)$, $i \in \{1,2\}$. We characterize this solution in terms of the retail prices by denoting $z_i(p)$ as the procurement price pair in the upstream market that solves $D^i(p) = S^i(z)$.

We impose the following regularity conditions on upstream market supply. For each good, supply in the upstream market is upward-sloping, $S^i_i(z) > 0$, and good 1 and good 2 are substitutes in supply, $S^i_j(z) < 0$, $j \in \{1,2\}$, $j \neq i$, where subscripts denote partial derivatives. Finally, we assume that own-price effects (in absolute terms) are larger than cross-price effects in retail demand $|D^i_i| > |D^i_j|$, and in farm supply $|S^i_i| > |S^i_j|$.

The relationship between retail prices and procurement prices is determined by market-clearing conditions in each market, $D^i(p) = S^i(z)$, $i \in \{1,2\}$. Totally differentiating these equations yields the effect of retail prices on the procurement prices paid to sellers, which is

$$\begin{pmatrix} S^1_1 & S^1_2 \\ S^2_1 & S^2_2 \end{pmatrix} \begin{pmatrix} dz_1 \\ dz_2 \end{pmatrix} = \begin{pmatrix} D^1_1 \\ D^2_1 \end{pmatrix} dp_1 + \begin{pmatrix} D^1_2 \\ D^2_2 \end{pmatrix} dp_2.$$

This implies

$$\frac{\partial z_i(p)}{\partial p_i} = \frac{D^i_i S^j_j - S^i_j D^j_i}{\sigma} < 0, j \neq i, \tag{1}$$

and

$$\frac{\partial z_j(p)}{\partial p_i} = \frac{S^i_i D^j_i - S^j_i D^i_i}{\sigma} \gtreqless 0, j \neq i, \tag{2}$$

where $\sigma = S^1_1 S^2_2 - S^1_2 S^2_1 > 0$ by the regularity conditions above.

In response to an increase in the retail price for good $i$, the quantity of good $i$ demanded by consumers in the retail market decreases, reducing the procurement price of good $i$ by expression (1). The sign of expression (2) is ambiguous and depends on the relative magnitude of the supply-side and demand-side diversion ratios for good $i$.

The diversion ratio in demand for good $i$ is given by $\delta_i = -\frac{D^j_i}{D^i_i} \geq 0$ (Shapiro, 1995; Werden, 1996). The diversion ratio in demand measures the effect of a selective price decrease for good $i$ on diverting good $j$ sales to the market for good $i$. Similarly, the diversion ratio in supply for good $i$ is given by $\alpha_i = -\frac{S_i^j}{S_i^i} \geq 0$, which measures the effect of a selective increase in the procurement price paid for good $i$ on diverting good $j$ suppliers to the procurement market for good $i$.

The sign of expression (2) depends on the relative magnitude of the supply and demand diversion ratios for good $i$ according to

$$\frac{\partial z_j(p)}{\partial p_i} = \frac{(\alpha_i - \delta_i) S_i^i D_i^i}{\sigma} \stackrel{s}{=} \delta_i - \alpha_i, \tag{3}$$

where " $\stackrel{s}{=}$ " denotes "equal in sign". The condition for an increase in the retail price of good $i$ to raise the procurement price of good $j$ is that the demand diversion effect of a price change for good $i$ in the downstream market exceeds the supply diversion effect of a price change for good $i$ in the upstream market.

The intuition for this outcome is as follows. A retail price increase for good $i$ diverts $\delta_i dp_i \geq 0$ units of retail demand away from purchases of good $i$ and towards purchases of good $j$ in the downstream market. The increased demand for good $j$ increases the procurement requirement for the manufacturer in the upstream market for good $j$, which raises the upstream market price for good $j$ by $dz_j \geq 0$ units. At the same time, the increase in the retail price of good $i$ decreases the procurement requirement for good $i$ in the upstream market, reducing the procurement price paid to the suppliers of good $i$ through the diversion of market supply, $\alpha_i dp_i \leq 0$. The lower procurement price paid for good $i$ diverts supply away from good $i$ and towards good $j$ in the upstream market, reducing the procurement price of good $j$ by $dz_j \leq 0$ units.

## 3.2 Stage 2 Retail Pricing

Now consider the retail-pricing stage of the game. While our observation on the ability of a fair pricing standard to fully coordinate upstream and downstream market prices for fair priced and conventional goods generalizes to alternative specifications of consumer demand, to clarify the main forces at work in the model we follow Bliss (1988) and Innes and Hamilton

(2009) in considering a "one-stop" shopping model.

A representative consumer who purchases a consumption bundle $(q_{1,k}, q_{2,k})$ from retailer $k \in \{1,2\}$ receives the utility

$$u(q_{1,k}, q_{2,k}) - \sum_{i=1,2} p_{i,k} q_{i,k},$$

where $p_{i,k}$ denotes the retail price of good $i$ at retailer $k$, $q_{i,k}$ is the associated quantity purchased, and $u(.)$ is an increasing and concave utility function. Given retail prices for each good at retailer $k$, the optimal consumption bundle yields the indirect utility

$$u_k^* \equiv u_k^*(p_{1,k}, p_{2,k}) = \max_{q_{1,k}, q_{2,k}} u(q_{1,k}, q_{2,k}) - \sum_{i=1,2} p_{i,k} q_{i,k}.$$

The representative consumer decides whether to purchase goods from retailer 1 or retailer 2 based on location. Retailer choice is determined by the preference parameter $x$, which represents the consumer's net preference for retailer 2. For analytic convenience, we assume $x$ to be uniformly distributed on the support $[-\tilde{x}, \tilde{x}]$. Thus, a consumer of type $x$ obtains the utility $u_1^*$ from retailer 1 and $u_2^* + x$ from retailer 2. Given a set of retail prices for each brand at each store, a representative consumer of type $x^*(u_1^*, u_2^*) = u_1^* - u_2^*$ is indifferent between the retailers, and the market is partitioned into consumer types $x \leq x^*(u_1^*, u_2^*)$, who purchase both goods from retailer 1, and consumer types $x > x^*(u_1^*, u_2^*)$, who purchase both goods from retailer 2. Conditional on retailer choice, we denote demand for good $i \in \{1,2\}$ as $D^i(p) \equiv \text{argmax } \{u(q_1, q_2) - \sum_{i=1,2} p_i q_i\}$.[12]

Normalizing the density of consumers to one, the demand for retailer 1 is given by the market share

$$\phi(p_1, p_2, \tilde{u_2}) = \frac{\tilde{x} + u_1^*(p_1, p_2) - \tilde{u_2}}{2\tilde{x}}$$

and it follows by Roy's identity that

[12] For expedience, we drop the retailer subscript when describing consumer choices when shopping with retailer $k$.

$$\frac{\partial \phi}{\partial p_i} = \frac{-D^i(p)}{2\tilde{x}} < 0. \tag{4}$$

Expression (4) is essential for characterizing the *business-stealing effect* of a retail price change. A selective price increase on good $i$ by retailer 1 causes the retailer to lose market share to the rival retailer, and the loss in the customer base from a price increase on good $i$ is proportional to the demand facing the retailer for good $i$.

Absent contracts, the dominant firm sets the procurement price $z_1$ in the upstream market and the wholesale price $w_1$ in the downstream market, while the competitive fringe prices at marginal cost, $w_2 = z_2$. Given the wholesale prices, duopoly retailers then compete in retail prices.

In the following Section, we examine how the vertical pricing outcome departs from the collective profit-maximizing outcome. We then characterize the role of vertical restraints in aligning the incentives of the retailers to set prices that maximize collective rents in the distribution channel in Section 5.

# 4 No contract outcome

Before turning to the oligopoly market equilibrium, it is helpful to first focus on the problem of a vertically integrated monopolist who jointly sets prices to maximize industry rents. A vertically integrated monopoly solves

$$\max_{p_1, p_2} \sum_{i=1,2} (p_i - z_i(p))\, D^i(p) \equiv \Pi_I(p_1, p_2) \tag{5}$$

where $D^i(p)$ and $z_i(p)$ are as defined above. The solution to (5) corresponds to the prices that maximize the integrated profit level in the market, and we denote the resulting profit level as $\Pi_I^* \equiv \Pi_I(p_1^*, p_2^*)$. This solution is essential to characterize the set of contracts that fully coordinate upstream and downstream market prices in the distribution channel for fair priced and conventional goods.

## 4.1 Monopoly Retailer

In a multi-product monopoly market, the monopoly retailer sets retail prices for both the manufacturer's fair priced good and the conventional good. Absent contracts, the monopoly retailer takes wholesale prices as unit cost, and given the wholesale price $w_1$ set by the dominant manufacturer the monopoly retailer solves

$$\max_{p_1,p_2} \pi_R \equiv \sum_{i=1,2} (p_i - w_i) D^i(p) = \Pi_I - (w_1 - z_1(p)) D^1(p), \tag{6}$$

where $\Pi_I$ is defined in expression (5). The first-order necessary conditions for the monopoly retailer with respect to $p_1$ and $p_2$, respectively, are

$$\frac{\partial \Pi_I}{\partial p_1} - (w_1 - z_1) D_1^1 + D^1 \frac{\partial z_1}{\partial p_1} = 0 \tag{7}$$

$$\frac{\partial \Pi_I}{\partial p_2} - (w_1 - z_1) D_2^1 + D^1 \frac{\partial z_1}{\partial p_2} = 0 \tag{8}$$

To understand the effect of the retailer's pricing decisions on the dominant manufacturer's good, consider expression (7). Conditional on the optimal retail pricing of good 2, the integrated optimal retail price $p_1^*$ can be achieved only when the first term on the left-hand side of this expression is equal to zero. The monopoly retailer's incentives therefore are aligned with the interests of the vertically-integrated entity only if the sum of the remaining terms in expression (7) is equal to zero. The second term on the left-hand side of expression (7) corresponds to the *double-marginalization effect*. This term is positive for any $w_1 > z_1$, because $D_1^1 < 0$. Absent contracts, the dominant manufacturer sets a wholesale price greater than the procurement price for good 1, $w_1 > z_1$, which induces the retailer to set a retail price above the joint profit-maximizing level of a vertically integrated firm.

The remaining term corresponds to the *upstream market power (UMP) effect*. The UMP effect is negative, because $\frac{\partial z_1}{\partial p_1} < 0$ in expression (1). Absent contracts, the retailer ignores the effect of the retail price on the rents the manufacturer extracts from suppliers in the upstream procurement market. A higher retail price for good 1 benefits the manufacturer by reducing the procurement price paid to acquire good 1 in the upstream market. Thus, a retailer that ignores the UMP effect has an incentive to set the retail price "too low" with respect to the the level that maximizes the collective rents of a vertically integrated firm.

Under circumstances where the supply of good 1 is infinitely elastic in the upstream market, a monopoly retailer would set prices at the integrated optimal level only when the manufacturer set $w_1 = z_1$ to eliminate double-marginalization. With upward-sloping supply functions in the upstream market, however; it follows that $\frac{\partial z_1}{\partial p_1} < 0$, such that the third term on the left-hand side of expression (7) is negative.

The introduction of upstream market power of the monopsony manufacturer over its suppliers generates a novel *upstream market power effect* that counterbalances the *double-marginalization effect* in a vertical market system. Rearranging terms, the wholesale price that achieves the integrated optimum in expression (7) is

$$\frac{w_1 - z_1}{z_1} = \frac{1}{\epsilon_S}\left(\frac{1 - \alpha_2\delta_1}{1 - \alpha_1\alpha_2}\right) \tag{9}$$

where $\epsilon_S$ is the elasticity of supply for good 1. This leads to the following result. (Proofs of all Propositions appear in the Appendix.)

**Proposition 1.** *Suppose the monopoly retailer procures good 2 from a competitive fringe that sets $w_2 = z_2$. Then, conditional on the optimal pricing of good 2 ($p_2 = p_2^*$), the dominant firm can achieve the collective optimal pricing of good 1 ($p_1 = p_1^*$) by setting a wholesale price that jointly accounts for the Lerner index of buyer market power and the relative diversion ratios in the upstream and downstream markets such that: (i) If $\delta_1 = \alpha_1$, then $\frac{w_1^* - z_1^*}{z_1^*} = \frac{1}{\epsilon_S}$; (ii) if $\delta_1 > \alpha_1$, then $0 < \frac{w_1^* - z_1^*}{z_1^*} < \frac{1}{\epsilon_S}$; and (iii) if $\delta_1 < \alpha_1$, then $\frac{w_1^* - z_1^*}{z_1^*} > \frac{1}{\epsilon_S}$.*

The intuition for this result can be seen by considering the single-product case in which a monopoly manufacturer sells a single good to a single-product monopoly retailer. For a single-product monopoly retailer, the demand-side and supply-side diversion ratios are zero, and the wholesale price that attains the integrated optimal price of good 1 is

$$\frac{w - z(p)}{z} = \frac{1}{\epsilon_S},$$

where $z(p)$ is the upstream market price that solves $D(p) = S(z)$ in the single-product case.

The wholesale price that achieves collective optimal pricing in the case of a single retail good reduces to the Lerner index of monopsony market power. Because the monopoly retailer sets prices without concern for the impact of its retail prices on the manufacturer's margin in the upstream market, the optimal contract under successive monopoly involves setting the wholesale price at the level to fully extract monopsony rents in the upstream market at the equilibrium price level. Proposition 1 extends this intuition to the multi-product case for any market equilibrium in which $\delta_1 = \alpha_1$ at the retail price $p_1^*$.

In cases where the demand-side diversion ratio exceeds the supply-side diversion ratio, a rise in the retail price of good 1 diverts consumption away from purchases of good 1 more than the commensurate decrease in the farm price diverts supply away from the procurement market for good 1. The manufacturer responds by reducing the wholesale price of good 1, which stimulates the retailer to reduce the retail price of good 1 until the market clears at $p_1^*$.

Now consider the pricing incentive of a non-contracted monopoly retailer to set the price of good 2 in expression (8). Given that the monopoly retailer earns rents from the sale of the conventional product (good 2) in the retail market, double-marginalizing the price of good 1 provides a monopoly retailer with the incentive to selectively reduce $p_2$ in the retail market to divert sales away from good 1 towards the higher margin enjoyed on retail sales of good 2. In expression (8), a monopoly retailer in the no contract case sets the price of good 2 lower than the integrated optimal price when

$$(w_1 - z_1)D_2^1 > D^1(p)\frac{\partial z_1(p)}{\partial p_2}.$$

This inequality is satisfied for cases where the supply-side diversion effect is larger than the demand-side diversion effect of a retail price change for good 2, $\alpha_i \geq \delta_i$ (i.e., $\frac{\partial z_1(p)}{\partial p_2} < 0$). However, in cases where $\delta_i > \alpha_i$, it is possible that the the retail price for good 2 absent contracts satisfies $p_2 > p_2^*$ when the relative difference in the diversion ratios is sufficiently large.

## 4.2 Oligopoly Retailers

Now consider retailer 1's problem under oligopoly.[13] Absent contracts, the dominant manufacturer chooses a wholesale price $w_1$, while the competitive fringe sets $w_2 = z_2$. Thus, retailer 1's problem is

$$\max_{p_1,p_2} \pi_{R,1} \equiv \phi \sum_{i=1,2} (p_i - w_i)\, D^i(p) = \phi \Big[ \Pi_I - (w_1 - z_1(p))\, D^1(p) \Big],$$

where $\Pi_I$ is defined in equation (5).

The first-order necessary conditions for retailer 1 are

$$\frac{\partial \pi_R}{\partial p_1} = \phi \left[ \frac{\partial \Pi_I}{\partial p_1} - (w_1 - z_1) D^1_1 + D^1 \frac{\partial z_1}{\partial p_1} \right] + \Big[ \Pi_I - (w_1 - z_1) D^1 \Big] \frac{\partial \phi}{\partial p_1} = 0, \tag{10}$$

$$\frac{\partial \pi_R}{\partial p_2} = \phi \left[ \frac{\partial \Pi_I}{\partial p_2} - (w_1 - z_1) D^1_2 + D^1 \frac{\partial z_1}{\partial p_2} \right] + \Big[ \Pi_I - (w_1 - z_1) D^1 \Big] \frac{\partial \phi}{\partial p_2} = 0. \tag{11}$$

Expressions (10) and (11) collect incentives in the first-order conditions of retailer $i$ into two groups of terms. The terms in the first square bracket of each expression reflect the pricing incentives of the retailer on the "intraretailer margin" and the last terms on the left-hand side of each expression reflect the pricing incentives of the retailer on the "interretailer margin".

The terms on the intraretailer margin are identical to the retail price incentives in the monopoly case in expressions (7) and (8) discussed above, which are now weighted by the market share of retailer 1 in the downstream market. For an oligopoly retailer that jointly sets retail prices for fair priced and conventional goods, a selective price increase for either good results in a loss of store traffic, as customers switch to the rival retailer on the interretailer margin. The resulting loss of store traffic is undesirable for the oligopoly retailer, creating an incentive to reduce retail prices to steal business from the rival retailer. The term in the last square bracket of expressions (10) and (11) represents retail profit per customer, and the magnitude of this *business-stealing effect* is given by equation (4).

For each customer attracted to the store on the interretailer margin of expressions (10)

[13] Retailer 2's choices are symmetric, and we omit them for brevity.

and (11), the retailer retains the integrated profit level net of the manufacturer's margin on good 1. When retailer $i$ selects a higher price for either good, the retailer loses store traffic to the rival retailer $j$. This loss of store traffic is costly to the retailer but of no concern to the vertically integrated chain. The business-stealing effect provides the retailer with an incentive to set each retail price below the level that maximizes collective industry profits.

In the next Section, we examine contracts that achieve the integrated optimum when the dominant manufacturer employs a fair pricing standard as a vertical restraint. For clarity of exposition, we begin by examining the optimal contract form in the case of a monopoly retailer, and then turn to the case in which retail pricing is conditioned by price competition among retailers to acquire greater retail market share.

# 5 Manufacturer-Retailer Contracts

Now consider the case of contracts between the dominant manufacturer and its retailers. Throughout, we follow the standard approach in the bargaining literature and confine our attention to contract terms determined by bargaining (see, for example, MacLeod and Malcomson 1995). Because our interest is on the contract form that attains the collective optimum, we do not describe the precise form of the bargaining game. Instead, we simply assume that the game has a unique subgame perfect bargaining equilibrium that splits collective gains from contract implementation according to a known rule (see, e.g., Rubinstein 1982, Shaked 1987).

Our focus is on contracts between the dominant manufacturer and its retailers that provide retailers with the necessary incentive to set collectively-optimal prices that maximize industry rents in the distribution channel. This task would be relatively straightforward if the manufacturer's contracts with its retailers could stipulate the retail price for the fringe product ($p_2 = p_2^*$) and punish any defections from this price. However, such contracts that overtly impose direct, cross-product control over the pricing of a competing brand are likely to be ruled out by antitrust law in practice. Consequently, we consider contracts between the dominant manufacturer and its retailers that make no explicit ties to price control in the conventional market served by the competitive fringe, and instead contain only three terms: (i) a fair pricing standard that stipulates $\gamma = (p_1 - z_1)/z_1$, (ii) a wholesale price ($w_1$), and (iii) and a tariff ($F$) to redistribute rents.

Consider the retail pricing stage of the game subject to the fair pricing standard set by the dominant manufacturer. At the time retailers set retail prices, the dominant manufacturer has already set $z_1 = z_1^*$, so that $p_1 = (1 + \gamma)z_1^*$ is no longer a choice for the retailer under the fair pricing standard $\gamma$.

To understand the logic of a fair pricing standard as an instrument to fully control upstream and downstream market prices in a distribution channel with fair priced and conventional goods, suppose the dominant manufacturer imposes a vertical restraint on the retail price of $p_1 = p_1^*$ by selecting an upstream market price of $z_1 = z_1^*$ and imposing a fair pricing standard of $\gamma^* = (p_1^* - z_1^*)/z_1^*$. In this case, the integrated optimum then could be achieved whenever a wholesale price, $w_1 = w_1^*$, can be found to induce the duopoly retailers to select $p_2 = p_2^*$ in expression (11). Rearranging terms in expression (11), the wholesale price that achieves this integrated optimum is

$$w_1 - z_1 = \frac{\Pi_I^* \frac{\partial \phi}{\partial p_2} + \phi D^1 \frac{\partial z_1}{\partial p_2}}{\phi D_2^1 + D^1 \frac{\partial \phi}{\partial p_2}} \tag{12}$$

To illustrate the different effects at stake for determining the optimal contract, we first focus our attention on the case of a monopoly retailer in the following subsection, before returning to the case of oligopoly retailers.

## 5.1 Retail Monopoly

In the case of a monopoly retailer, retail market share $\phi$ is constant in expressions (10) and (11). Conditional on the use of a fair pricing standard that attains $p_1^*$ in expression (10), the wholesale price that achieves the integrated optimal price of good 2 solves equation (12) in the special case where changing retail prices has no effect on retail market share, $\frac{\partial \phi}{\partial p_2} = 0$.

The optimal wholesale price for the dominant manufacturer in the retail monopoly case satisfies

$$w_1 - z_1 \stackrel{s}{=} \frac{\partial z_1}{\partial p_2} \tag{13}$$

where the sign holds in the case considered here where the fair priced and conventional goods are substitutes, $D_2^1 > 0$. For the case of a monopoly retail sector, the departure of the dominant manufacturer's wholesale price from unit procurement cost in the upstream market depends on the sign of the upstream market power effect.

Recall that we are evaluating the retailer's pricing incentive for good 2 conditional on a fair pricing standard that attains $p_1^*$. Given this restriction on the retailer's pricing of good 1, double marginalization of good 1 provides an incentive for the retailer to reduce the retail price of good 2 below the integrated optimal price to divert retail sales away from the double-marginalized good 1 and towards the competitively-priced good 2. To the extent that the dominant manufacturer charges a wholesale price above the marginal cost of procurement for the fair priced good, the retailer has an incentive to offer a selective price discount on the conventional product to divert sales away from the fair priced good and towards the conventional good, where the margin need not be shared with the manufacturer.

In the special case where the supply function facing the dominant manufacturers in the upstream market is infinitely-elastic, the solution to equation (13) is $w_1^* = z_1$. The reason is that, absent upstream market power, only the double marginalization effect is at work, and the optimal contract between the dominant manufacturer and its monopoly retailer would eliminate the incentive for the retailer to offer a selective price discount on good 2 by setting the wholesale price equal to procurement cost. Doing so provides the entire integrated margin to the retailer from the sale of each good, resulting in the collectively-optimal price pair, $p^* = (p_1^*, p_2^*)$.

In contrast, when supply functions in the upstream market are upwards-sloping, the optimal contract diverges from marginal cost wholesale pricing according to changes in the procurement price $z_1$ arising from a change in the retail price $p_2$. An increase in $p_2$ reduces the procurement price of good 2 for the retailer, since $w_2 = z_2$ in the market supplied by the competitive fringe, which, in turn, increases the supply of good 1. From expression (2), we have

$$w_1^* - z_1(p^*) \overset{s}{=} \delta_2 - \alpha_2 \tag{14}$$

where the sign holds by expression (3). For the case of a monopoly retailer, the decision to elevate the wholesale price $w_1$ above procurement cost $z_1$ is driven by the comparison of diversion ratios in demand and supply for good 2.

The role of supply and demand diversion effects in determining retail prices can be understood by comparing retail prices absent contracts to the integrated optimum. In cases where $\delta_2 > \alpha_2$, the demand diversion effect dominates the supply diversion effect, and the right-hand side of expression (13) is positive. In this case, the monopoly retailer has an incentive to set $p_2$ higher than the integrated optimal price when the dominant manufacturer sets the wholesale price of good 1 at marginal cost. The intuition for this effect is that a higher price set by the retailer for good 2 raises the procurement price for good 1 whenever $\delta_2 > \alpha_2$, which is of no concern to the retailer when setting retail prices. The optimal contract terms for the dominant manufacturer in this case involve selecting an elevated wholesale price for good 1, $w_1^* > z_1(p^*)$ to provide an incentive for the retailer to reduce the price of good 2.

In the case where $\delta_2 < \alpha_2$, the supply diversion effect dominates the demand diversion effect, and the right-hand side of expression (13) is negative. The optimal contract of the dominant manufacturer in this case involves below-cost wholesale pricing, $w_1^* < z_1(p^*)$. The reason is that the retailer ignores the effect of diverting retail sales from good 1 to good 2 on raising the upstream market price of the manufacturer. To counteract this incentive, the dominant manufacturer discounts its wholesale price below the marginal cost of procurement in the upstream market, exchanging good 1 with the retailer below unit cost to artificially inflate the retailer's margin on good 1. Increasing the retailer's margin on good 1 makes it more costly for the retailer to offer a selective price discount on good 2 that diverts sales away from good 1 to what is now a relatively smaller retail margin on good 2.

Contrary to the conventional solution to the double marginalization problem in successive monopoly markets in which two-part tariffs are combined with marginal cost wholesale prices (i.e., $w_1^* = z_1$), a dominant manufacturer who exercises buyer market power in the upstream market has an incentive to set its wholesale price above (below) marginal cost according to the trade-off between two, opposing effects. On the one hand, the retailer has an incentive to set retail prices that are "too high" from the perspective of the integrated chain, because of the double marginalization effect. On the other hand, the retailer has an incentive to set retail prices that are "too low" from the perspective of the integrated chain, because the retailer ignores the benefit received by the manufacturer from a higher retail price in reducing unit procurement cost, $z_1(p)$, through the upstream market power effect.

When a manufacturer exercises market power over upstream market suppliers, it is no longer optimal for the dominant manufacturer to set $w_1^* = z_1$ in its contract with retailers when $\delta_2 \neq \alpha_2$. This is because marginal cost pricing in the wholesale market would guide the retailer to set prices at a level that ignores upstream market power of the manufacturer. Such myopic pricing is optimal for the integrated chain only when $\delta_2 = \alpha_2$.

**Proposition 2.** *Suppose the monopoly retailer procures the conventional good from a competitive fringe that sets $w_2 = z_2$. Then, the dominant firm can achieve the collective optimum ($p_1 = p_1^*, p_2 = p_2^*$) using a contract that stipulates a fair pricing standard, $\gamma^* = (p_1^* - z_1^*)/z_1^*$, and setting: (i) $w_1^* > z_1^*$ when the demand diversion effect dominates the supply diversion effect ($\delta_2 > \alpha_2$); (ii) $w_1^* = z_1^*$ when the demand and supply diversion ratios are equal ($\delta_2 = \alpha_2$) and (iii) $w_1^* < z_1^*$ when the supply diversion effect dominates the demand diversion effect ($\delta_2 < \alpha_2$).*

Table 1 summarizes the outcome for the fair pricing contract in the case of a monopoly retailer. When the demand-side and supply-side diversion ratios are equal ($\delta_2 = \alpha_2$), the optimal fair pricing standard that maximizes collective industry rents involves selecting $\gamma^* = (p_1^* - z_1^*)/z_1^*$ and $w_1^* = z_1^*$ to eliminate double-marginalization of good 1, which provides the retailer with the incentive to select $p_2^*$ in the downstream consumer market. When the supply-side diversion ratio exceeds the demand-side diversion ratio ($\delta_2 < \alpha_2$), the monopoly retailer has an incentive to set the retail price of good 2 below the collective optimal level at the optimal fair pricing standard, $\gamma^* = (p_1^* - z_1^*)/z_1^*$. The dominant manufacturer controls the incentive of the retailer to offer a selective price discount on good 2 by increasing the retail margin on good 1 through the choice of a wholesale price that satisfies $w_1^* < z_1^*$. In contrast, when the demand-side diversion ratio exceeds the supply-side diversion ratio ($\delta_2 > \alpha_2$), the monopoly retailer has an incentive to set the retail price of good 2 higher than the collective optimal level at $\gamma^* = (p_1^* - z_1^*)/z_1^*$. The manufacturer adjusts the optimal contract in this case by narrowing the retail margin on good 1, selecting $w_1^* > z_1^*$ to reduce the retailers incentive shift consumption away from good 2 towards good 1 by raising the retail price of good 2.

Table 1: Summary of the contract outcomes in the monopoly retailer case

| Sign of the channel diversion effect ($\frac{\partial z_1(p)}{\partial p_2}$) | Wholesale price |
|---|---|
| $\frac{\partial z_1(p)}{\partial p_2} > 0 \Leftrightarrow \delta_2 > \alpha_2$ | $w_1 > z_1$ |
| $\frac{\partial z_1(p)}{\partial p_2} = 0 \Leftrightarrow \delta_2 = \alpha_2$ | $w_1 = z_1$ |
| $\frac{\partial z_1(p)}{\partial p_2} < 0 \Leftrightarrow \delta_2 < \alpha_2$ | $w_1 < z_1$ |

## 5.2 Retail Oligopoly

Under oligopoly, each retailer is concerned with losing customers on the interretailer margin from a selective price increase in good $i$. Competition between retailers for store traffic alters the nature of the optimal vertical restraint in two ways, introducing two new effects in equation (12).

First, in the numerator of equation (12), the optimal contract must now reduce the wholesale price of good 1 below procurement cost to prevent the retailer from discounting the price of good 2. Reducing the wholesale price of good 1 below the procurement cost of good 1 widens the retailer's margin on the fair priced good, thereby reducing the retailer's incentive to discount the price of the conventional good to generate store traffic. Second, in the denominator of equation (12), the optimal contract must now elevate the wholesale price of good 1 above procurement cost according to an effect that is proportional to demand for good 1, $D^1 \frac{\partial \phi}{\partial p_2}$.

To better capture the intuition for the interplay of these two effects under oligopoly, consider the case of symmetric retailers, i.e., $\phi = 0.5$. For symmetric oligopoly retailers, equation (12) reduces to

$$w_1 - z_1^* = \frac{\sigma \Pi_I^* D_2^* + \kappa}{\eta}, \tag{15}$$

where $D_2^* = D^2(p_1^*, p_2^*)$ is the equilibrium quantity of good 2 sold by the retailer in the collective optimum, $\Pi_I^* = \Pi_I(p_1^*, p_2^*)$ is the integrated profit level that solves problem (5), $\kappa \equiv \tilde{x} D_1^* (\delta_2 - \alpha_2) D_2^2 S_2^2$; and $\eta \equiv \sigma \left( D_1^* D_2^* - \tilde{x} D_2^1 \right)$.

The interpretation of expression (15) relates to that of Innes and Hamilton (2009), who identify the sign of $\eta$ as reflecting the tension between the *business-stealing effect* of reducing the price of good 2 to acquire greater retail market share, and the retailers' incentive to shift consumers towards higher margin goods within the store by adjusting relative prices. In line with these two effects, the sign of $\eta$ depends on the degree of substitutability between fair priced and conventional goods. We refer to goods 1 and 2 as *weak substitutes* when $\eta > 0$ (i.e., the business stealing effect dominates the demand diversion effect), and we refer to the goods as *strong substitutes* when $\eta < 0$ (i.e., the demand diversion effect dominates the business stealing effect).

Our analysis departs from Innes and Hamilton (2009) by considering a manufacturer with upstream market power. The upstream market power effect depends on the sign of $\kappa$, which depends on the relative magnitude of the supply-side and demand-side diversion ratios.

In cases where the supply diversion effect of good 2 at least weekly dominates the demand diversion effect of good 2 ($\alpha_2 \geq \delta_2$), the numerator in equation (15) is positive. Alternatively, in cases where the demand diversion effect of good 2 dominates the supply diversion effect of good 2 ($\delta_2 > \alpha_2$), the sign of numerator in expression (15) can be negative when the demand-side diversion effect is sufficiently large. The outcome for wholesale pricing reflects the tension between the *business-stealing effect* and the *upstream market power effect*.

Reducing the retail price of good 2 attracts customers to the store through the business-stealing effect, providing each retailer with the incentive to reduce the price of good 2. Setting a wholesale price below procurement cost for good 1 provides the manufacturer with a remedy to prevent retailers from selectively discounting the price of good 2 to attract customers from the rival retailer on the interretailer margin, as increasing the retail margin for the fair priced good makes it more costly for the retailer to discount the price of the conventional good. At the same time, the retailers ignore the ability of the manufacturer to extract rents from suppliers, and the upstream market power effect causes retailers to set the retail price of good 2 "too high" from the perspective of the integrated firm, creating an incentive for the manufacturer to raise $w_1$ in the fair pricing contract for the reasons discussed under monopoly.

We refer to goods 1 and 2 as having *strong demand diversion* effects when $\delta_2 \geq \delta_2^* > \alpha_2$ is sufficiently large that the numerator of equation (15) is negative, and we refer to the goods as having *weak demand diversion* effects when $\delta_2 < \delta_2^*$.

The comparison of the signs of the numerator and of the denominator of expression (15) allows us to draw some conclusions regarding the wholesale price implemented by the dominant manufacturer in the optimal contract. In contrast to the monopoly retailer case, we show that a strong *business-stealing effect* can induce opposite effects on the wholesale price in the dominant manufacturer's contract. For example, in the monopoly retailer case, when the supply diversion effect exactly compensates the demand diversion effect for good 2 ($\alpha_2 = \delta_2$), the dominant manufacturer sets an above-cost wholesale price $w_1 > z_1$ in its contract with a monopoly retailer. However, when oligopoly retailers set prices in a category with strong substitutes ($\eta < 0$), then the dominant manufacturer sets a below-cost wholesale price $w_1 < z_1$ with its retailers when the supply diversion effect exactly compensates the demand diversion effect for good 2.

In contrast to the monopoly retailer case, the outcome where the retailer sets a below-cost wholesale price ($w_1^* < z_1$) is more likely to occur with oligopoly retailers. The reason is that the *business-stealing effect* and the supply diversion effect reinforce each other under oligopoly, making a selective price discount on good 2 more attractive to retailers.

**Proposition 3.** *Suppose oligopoly retailers procure the conventional good from a competitive fringe that sets* $w_2 = z_2$*. Then, the dominant firm can achieve the collective optimum* ($p_1 = p_1^*, p_2 = p_2^*$) *using a contract that stipulates a fair pricing standard* $\gamma^* = (p_1^* - z_1^*)/z_1^*$ *and setting the wholesale price such that: (i)* $w_1^* > z_1^*$ *when the two goods have weak (strong) demand diversion effects,* $\delta_2 < \delta_2^*$ ($\delta_2 \geq \delta_2^*$)*, and are weak (strong) substitutes,* $\eta > 0$ ($\eta < 0$)*; and (ii)* $w_1^* < z_1^*$ *when the two goods have weak (strong) demand diversion effects,* $\delta_2 < \delta_2^*$ ($\delta_2 \geq \delta_2^*$)*, and are strong (weak) substitutes,* $\eta < 0$ ($\eta > 0$)*.*

These outcomes are summarized in Table 2 .

Table 2: Fair pricing outcomes with oligopoly retailers

| Strength of demand diversion | Retail goods are | Wholesale price |
|---|---|---|
| $\delta_2 < \delta_2^*$ | Strong substitutes ($\eta < 0$) | $w_1^* < z_1^*$ |
| $\delta_2 < \delta_2^*$ | Weak substitutes ($\eta > 0$) | $w_1^* > z_1^*$ |
| $\delta_2 > \delta_2^*$ | Strong substitutes ($\eta < 0$) | $w_1^* > z_1^*$ |
| $\delta_2 > \delta_2^*$ | Weak substitutes ($\eta > 0$) | $w_1^* < z_1^*$ |

In markets where fair priced goods compete against conventional goods with similar attribute profiles, it is likely that the demand-side diversion ratio is high. However, fair trade markets that provide higher prices to suppliers in relatively homogeneous agricultural commodity markets such as cocoa or coffee nevertheless may have supply-side diversion ratios that dominate the demand-side diversion ratios, as in the first two rows of table 2.

So far, we have considered cases in which the fair pricing standard of a dominant retailer can be used as a vertical restraint to attain the integrated optimum. In the case of a monopoly retailer, it is possible to show that the fair pricing standard that maximizes collective industry rents provides superior remuneration to suppliers than the benchmark equilibrium it replaces; however, this is no longer true in general under oligopoly. With sufficiently strong retail price competition on the interretailer margin, the retailers would set retail prices for the fair priced good below the collective optimal level $p_1 < p_1^*$ absent contracts. In the next section, we limit our attention to cases in which the fair pricing standard must provide a "fairer price" to suppliers than in the no-contract case.

# 6 Constrained fair pricing

Absent fair pricing, it is possible that the market equilibrium involves fairer prices than the collective optimal price level for good 1, $p_1 < p_1^*$. In this case, the dominant manufacturer may be prevented from implementing a fair pricing contract at $z_1^* < z_1$ that reduces the share of retail sales revenue allocated to suppliers. While the manufacturer could employ an alternative form of vertical restraint to fair pricing such as resale price maintenance (RPM), fair pricing may have marketing advantages over other forms of retail price control. Indeed, in models where fair pricing is an argument in consumer utility functions, fair priced goods may command a price premium over conventional products, in equilibrium, that serves to relax such a constraint.

Suppose the fair pricing standard must leave suppliers with at least as large a share of rents in the distribution channel for the fair priced good as they would receive absent fair pricing. Specifically, we consider fair pricing under the constraint that satisfies

$$\gamma \leq \gamma^c \equiv (p_1^c - z_1^c)/z_1^c$$

where $p_1^c$ is the non-contracted retail price of good 1 and $z_1^c$ is the non-contracted upstream market price in the benchmark equilibrium without fair pricing.

There are two cases to consider. First, in cases where $\gamma^* \equiv (p_1^* - z_1^*)/z_1^* \leq \gamma^c$, suppliers receive a higher share of industry rents under a contract that achieves the collective optimum than they receive in the benchmark market equilibrium absent contracts. Such an outcome can occur in markets with relatively lax retail price competition due to the double-marginalization of good 1. In this case, the fairness constraint does not bind and the manufacturer is free to select contract terms that achieve the integrated optimum described above.

In the second case, the integrated optimum satisfies $\gamma^* > \gamma^c$, and the fairness constraint binds. In this case, the manufacturer is confined to setting a fair pricing standard that provides suppliers with a share of industry rents that, at least weakly, exceeds the share of industry rents suppliers receive in the benchmark case. Given that the collective industry profit level is monotonically decreasing in $\gamma$, it follows that the dominant manufacturer selects a fair pricing standard that satisfies $\gamma = \gamma^c$.[14] A vertical restraint that leaves the retail price of good 1 unchanged from the non-contracted level ($\gamma = \gamma^c$) is desirable for the dominant manufacturer, because the fair pricing standard can be used to coordinate pricing in the distribution channel by altering retailers' incentives for pricing good 2.

A vertically integrated monopoly that sets retail prices under a binding fair pricing constraint solves

$$\max_{p_1,p_2} \gamma^c z_1(p) D^1(p) + (p_2 - z_2(p)) D^2(p) \equiv \Pi_c(p_1, p_2)$$

where $D^i(p)$ and $z_i(p)$ are as defined above. The first-order necessary conditions to maximize industry profit under a binding fair pricing standard are

$$\frac{\partial \Pi_c}{\partial p_1} = \gamma^c \left[ D^1 \frac{\partial z_1}{\partial p_1} + z_1 D_1^1 \right] + (p_2 - z_2) D_1^2 + D_2 \frac{\partial z_2}{\partial p_1} = 0, \tag{16}$$

$$\frac{\partial \Pi_c}{\partial p_2} = \gamma^c \left[ D^1 \frac{\partial z_1}{\partial p_2} + z_1 D_2^2 \right] + (p_2 - z_2) D_2^2 + D_2 \left( 1 - \frac{\partial z_2}{\partial p_2} \right) = 0. \tag{17}$$

The simultaneous solution to expressions (16) and (17) corresponds to the prices that maximize the integrated profit level in the distribution channel subject to a fair pricing constraint that maintains the industry margin for good 1 at the non-contracted level, $\gamma^c$. We denote the constrained optimal prices and resulting profit level that solves this problem as $p_1^c$, $p_2^c$, and $\Pi_c^* \equiv \Pi_c(p_1^c, p_2^c) < \Pi_I^*$, respectively. As before, this solution is essential to characterize the set of contracts that fully coordinate the marketing channel for the standard product and the fair priced good.

Now consider retailer 1's choice problem. Conditional on the dominant manufacturer's choice of fairness standard ($\gamma = \gamma^c$), wholesale price ($w_1$), and upstream procurement price

[14] Alternatively, the manufacturer could use an alternative form of vertical restraint such as RPM. To clarify the role of fair pricing as a vertical restraint, we have suppressed consumer utility effects from fairness that have the potential to raise market demand for fair priced goods. The present model can be extended along these lines to consider when a (constrained) fair pricing standard that falls short of fully coordinating prices at the integrated optimal level would be preferred to the use of a conventional vertical restraint such as RPM that does not have such a fairness requirement.

$(z_1^c)$, retailer 1's problem can be written

$$\max_{p_2} \pi_{R,c} \equiv \phi \sum_{i=1,2} (p_i - w_i)\, D^i(p) = \phi \Big[\Pi_c + \big(p_1 - w_1 - \gamma^c z_1(p)\big)\, D^1(p)\Big],$$

where $\Pi_c$ is defined in expression (6).

The first-order necessary condition for the representative retailer's choice of $p_2$ is

$$\frac{\partial \pi_{R,c}}{\partial p_2} = \phi\left[\frac{\partial \Pi_c}{\partial p_2} - (w_1 - z_1)D_2^1 + D^1 \frac{\partial z_1}{\partial p_2}\right] + \left[\Pi_c - (w_1 - z_1)D^1\right]\frac{\partial \phi}{\partial p_2} = 0 \tag{18}$$

This expression is qualitatively identical to expression (11), with the exception that $\Pi_c < \Pi_I$ in expression (18) under a binding fairness constraint. The profit level at the collective optimum ($\Pi_c$) is now derived under the constraint that the margin for good 1 is left unchanged from the non-contracted level by the fair pricing standard.

In the retail pricing stage of the game, the dominant manufacturer has already set $z_1 = z_1^c$, so that $p_1 = (1 + \gamma^c)z_1^c$ is no longer a choice variable for the retailer under the fair pricing standard. Rearranging terms in expression (18), the wholesale price that achieves the integrated optimum in the case of constrained fair pricing is

$$w_1 - z_1^c = \frac{\Pi_c^* \frac{\partial \phi}{\partial p_2} + \phi D^1 \frac{\partial z_1}{\partial p_2}}{\phi D_2^1 + D^1 \frac{\partial \phi}{\partial p_2}} \tag{19}$$

This equation is qualitatively identical to equation (12) with the exception that $\Pi_c^*$ has replaced $\Pi_I^*$ in the numerator of (19). The constraint on the fair pricing standard results in an equilibrium profit level that is less than the integrated optimum, which weakens the *business-stealing effect* by reducing net revenue per customer below the collective optimum.

To better understand this outcome, consider the case of symmetric retailers, i.e., $\phi = 0.5$. For symmetric oligopoly retailers, equation (19) reduces to

$$w_1 - z_1^c = \frac{\sigma \Pi_c^* D_2^c + \kappa^c}{\eta^c}, \tag{20}$$

where $D_2^c = D^2(p_1^c, p_2^c)$ is the equilibrium quantity of good 2 in the integrated optimum under the binding fair pricing constraint, $\Pi_c^* = \Pi_I(p_1^c, p_2^c)$ is the integrated profit level that solves problem (6) under the pricing constraint, $\kappa^c \equiv \tilde{x} D_1^c(\delta_2 - \alpha_2) D_2^2 S_2^2$; and $\eta^c \equiv \sigma\left(D_1^c D_2^c - \tilde{x} D_2^1\right)$.

The interpretation of expression (20) is similar to that of expression (15). Specifically, in that constrained fair pricing case, we refer to goods 1 and 2 as having *strong demand diversion* effects when $\delta_2 \geq \delta_2^c > \alpha_2$ is sufficiently large that the numerator of equation (20) is negative, and we refer to the goods as having *weak demand diversion* effects when $\delta_2 < \delta_2^c$. We achieve a similar observation as in Proposition 4.

**Proposition 4.** *Suppose oligopoly retailers procure the conventional good from a competitive fringe that sets $w_2 = z_2$. Then, in the constrained fair pricing case the dominant firm can achieve the collectively optimal constrained prices ($p_1 = p_1^c, p_2 = p_2^c$) using a contract that stipulates a fair pricing standard $\gamma^c = (p_1^c - z_1^c)/z_1^c$ and setting the wholesale price such that: (i) $w_1^c > z_1^c$ when the two goods have weak (strong) demand diversion effects, $\delta_2 < \delta_2^c$ ($\delta_2 \geq \delta_2^c$), and are weak (strong) substitutes, $\eta^c > 0$ ($\eta^c < 0$); and (ii) $w_1^c < z_1^c$ when the two goods have weak (strong) demand diversion effects, $\delta_2 < \delta_2^c$ ($\delta_2 \geq \delta_2^c$), and are strong (weak) substitutes, $\eta^c < 0$ ($\eta^c > 0$).*

# 7 Conclusion

In this paper, we have shown that a fair pricing standard can be used as a vertical restraint by a manufacturer on its retailers. Such a fair pricing standard is capable of fully coordinating upstream and downstream market prices in the distribution channel for fair priced and conventional goods. When combined with lump-sum transfers between the manufacturer and its retailers, the fair pricing standard on the dominant manufacturer's good can be used to control the retailer's pricing of the fair priced good, freeing up the wholesale price of the manufacturer to be used as an instrument to jointly exert horizontal and vertical market control of the pricing of the conventional ("unfair") product.

We have demonstrated that the presence of monopsony power by manufacturers in upstream procurement markets introduces a novel role for vertical restraints. Absent upstream market power, a manufacturer could correct the double-marginalization problem by setting a wholesale price equal to marginal cost; however, when the manufacturer exercises buyer market power in the upstream market, such a wholesale price is too low from the perspective of an integrated firm. We show that the optimal contract departs from marginal cost pricing in the wholesale market by elevating (reducing) the wholesale price above (below) unit procurement cost in cases where the demand-side diversion effect on the competitive good is greater than (less than) the supply-side diversion effect. Diversion effects in demand are important for antitrust analysis of horizontal mergers, and our analysis clarifies the role of supply-side diversion effects for market pricing in vertical markets.

Fair pricing standards have advantages over other forms of vertical restraint. A manufacturer who implements a fair pricing standard in contracts with its downstream retailers may facilitate greater demand for the fair priced good, fostering category sales when consumers have preferences for fair priced goods in a manner that would not occur under resale price maintenance (RPM). To the extent that fair pricing is an argument of consumer utility functions, goods sold under a fair pricing label may result in higher prices paid to suppliers than in the case absent contracts, relaxing the constraint that the prices that maximize collective rents involve "fairer" prices paid to suppliers.

In cases where the fair pricing standard that maximizes collective rents is constrained by the non-contract market equilibrium, other forms of vertical restraint such as RPM potentially can be used to achieve higher collective rents. In cases where consumer utility effects from fairness increase market demand for fair priced goods, a trade-off is likely to emerge between the use of fair pricing and other forms of vertical restraint. Further research is needed to examine the relative attractiveness of fair pricing standards over other forms of vertical restraint under circumstances where consumers derive utility from paying fair prices but the fair pricing standard is constrained from fully coordinating market prices at the collective optimal profit level.

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# A Proofs

■ *Proof of Proposition 1*

Absent contract in the monopoly retailer case, the wholesale price that achieves the integrated optimum in expression (7) is such that

$$\frac{w_1 - z_1}{z_1} = \frac{1}{\epsilon_S}\left(\frac{1 - \alpha_2\delta_1}{1 - \alpha_1\alpha_2}\right)$$

Then, properties (i), (ii) and (iii) follow from the comparison of the left-hand and right-hand sides of this expression.

For Property (i), replacing $\delta_1$ by $\alpha_1$, it follows that the optimal prices must be such that

$$\frac{w_1^* - z_1^*}{z_1^*} = \frac{1}{\epsilon_S}.$$

For Property (ii), if $\delta_1 > \alpha_1$, then it follows that

$$\frac{1 - \alpha_2\delta_1}{1 - \alpha_1\alpha_2} < 1,$$

which, in turn, implies that the optimal prices must be such that

$$\frac{w_1^* - z_1^*}{z_1^*} < \frac{1}{\epsilon_S}.$$

For Property (iii), if $\delta_1 < \alpha_1$, then it follows that

$$\frac{1 - \alpha_2\delta_1}{1 - \alpha_1\alpha_2} > 1,$$

which, in turn, implies that the optimal prices must be such that

$$\frac{w_1^* - z_1^*}{z_1^*} > \frac{1}{\epsilon_S}.$$

*Q.E.D.*

■ *Proof of Proposition 2*

In the case of a manufacturer-(monopoly) retailer contract that stipulates (i) a fair pricing standard with $\gamma = (p_1 - z_1)/z_1)$, (ii) a wholesale price $(w_1)$, and (iii) and a tariff $(F)$ to redistribute rents, the collective optimum is achieved if

$$w_1^* - z_1(p^*) \overset{s}{=} \delta_2 - \alpha_2.$$

Then, it is immediate that Properties (i), (ii) and (iii) — that indicate whether the optimal wholesale price $w_1^*$ is above, equal to, or lower than the upstream market price $z_1(p^*)$; follow from the comparison of the diversion ratios.

*Q.E.D.*

■ *Proof of Proposition 3*

In the case of a manufacturer-(oligopoly) retailers contract, the collective optimum is achieved if

$$w_1 - z_1 = \frac{\sigma \Pi_I^* D_2^* + \kappa}{\eta},$$

where $D_2^* = D^2(p_1^*, p_2^*)$ is the equilibrium quantity of good 2 sold by the retailer in the collective optimum, $\Pi_I^* = \Pi_I(p_1^*, p_2^*)$ is the integrated profit level that solves problem (5), $\kappa \equiv \tilde{x} D_1^*(\delta_2 - \alpha_2) D_2^2 S_2^2$; and $\eta \equiv \sigma \left( D_1^* D_2^* - \tilde{x} D_2^1 \right)$.

Property (i): When the two goods have weak (resp. strong) demand diversion effects, $\delta_2 < \delta_2^*$ (resp. $\delta_2 \geq \delta_2^*$), then the numerator of this expression is positive (resp. negative). Therefore, the wholesale price is such that $w_1 > z_1$ if the denominator of this expression is positive (resp. negative), that is, if the two goods are weak (resp. strong) substitutes, $\eta > 0$ (resp. $\eta < 0$).

Property (ii): When the two goods have weak (resp. strong) demand diversion effects, $\delta_2 < \delta_2^*$ (resp. $\delta_2 \geq \delta_2^*$), then the numerator of this expression is positive (resp. negative). Therefore, the wholesale price is such that $w_1 < z_1$ (resp. $w_1 < z_1$) if the denominator of this expression is negative (resp. positive), that is, if the two goods are strong (resp. weak) substitutes, $\eta < 0$ (resp. $\eta > 0$).

*Q.E.D.*

■ *Proof of Proposition 4*

In the case of a manufacturer-(oligopoly) retailers contract with constrained fair pricing, the collective optimum is achieved if

$$w_1 - z_1 = \frac{\sigma \Pi_c^* D_2^c + \kappa^c}{\eta^c},$$

where $D_2^c = D^2(p_1^c, p_2^c)$ is the equilibrium quantity of good 2 in the integrated optimum under the binding fair pricing constraint, $\Pi_c^* = \Pi_I(p_1^c, p_2^c)$ is the integrated profit level that solves problem (6) under the pricing constraint, $\kappa^c \equiv \tilde{x} D_1^c(\delta_2 - \alpha_2) D_2^2 S_2^2$; and $\eta^c \equiv \sigma\left(D_1^c D_2^c - \tilde{x} D_2^1\right)$. Then, Properties (i) and (ii) follow the same steps as in the previous proof comparing the sign of the numerator and of the denominator of this expression (as a function the diversion effects and of weak/strong substitutes), to deduce whether the optimal wholesale price $w_1$ is above or lower than the upstream market price $z_1$.

*Q.E.D.*