Unexpected Motivations behind Joining Group Purchasing Organization (GPO)

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Abstract

Group Purchasing Organizations (GPOs) are commonly motivated by larger volume discounting and cost saving opportunities through economies of scale. We show that group purchasing also has other motivations. These motivations can explain a rather puzzling procurement practice where some large buyers subscribe to the GPO membership, only to later procure directly from the same vendor selling through the GPO. Interestingly, such GPO members often succeed in negotiating a price less than the GPO-negotiated price. The “economies of scale” reasoning suggests that an individual buyer would always be better off purchasing supplies as part of a group rather than on its own. However, we show that the above mentioned practice of renegotiation by large GPO members can be explained by price uncertainties prevailing in the market. We also explain the impact of such renegotiation on the total buyer surplus as well as the surplus of individual buyers of different sizes.

1. Introduction

The concept of group purchasing has existed for decades. The practice initially started with several buyers joining up to form a consortium to negotiate a more favorable price using collective bargaining power and large demand, and to save on miscellaneous supply chain related costs, e.g., search costs, transaction costs, logistics costs, etc., through economies of scale. Anand and Aron [2003] provide an extensive list of supplier and buyer sponsored group buying entities. Over time independent supply chain entities, both for-profit and not-for-profit, have appeared based on the same economic rationale of group buying. Unlike wholesalers and distributors, these entities do not take direct part in product and payment exchange between buyers and sellers. These GPOs negotiate contracts with vendors on behalf of a group of buyers and act only as an intermediary for managing contracts between buying and selling parties. In the healthcare industry such intermediary organizations, most popularly known as Group Purchasing Organizations or GPOs, have become a significant part of the supply chain. This is not that surprising given the nature of healthcare procurement. The industry is highly fragmented, while at the same time, the hospitals’ materials requirements overlap substantially. The portfolio of healthcare products is enormous, and vendor and contract management are quite challenging. Altogether, the complexity in procurement and the potential benefit from economies of scale make it more likely for hospitals to outsource parts of their purchasing activities and to cooperate with each other to generate more cost savings.

In a typical scenario, hospitals become members of a GPO. The GPO negotiates product prices with suppliers and prepares contracts on behalf of its members. When a member purchases an item from a vendor as per the GPO contract, the GPO collects from the vendor a contract administration fee, a percentage of the total dollar value of the transaction. The GPO members are periodically rewarded by the GPO and/or the GPO vendor with rebates and discounts based on the transaction volume as well as the share of member’s total purchase going through the GPO.

The “economies of scale” reasoning suggests that the larger the aggregate demand of the purchasing group, the more favorable the product price would be for buyers. Furthermore, an individual buyer would always be better off purchasing supplies as part of a group, rather than on its own. Although a number of studies claim that GPOs generate cost savings for member hospitals [11, 3, 6], there is at least anecdotal evidence that GPO contracts do not always offer the most competitive prices to member hospitals, and that member hospitals do not always purchase their
supplies through GPOs [2]. The study by Burns and Lee (2008) indicated that some buyers, despite subscribing to the GPO membership, choose to explore the market further when it comes to making purchase decisions and eventually get better deals from some vendor (which may as well be the GPO vendor) negotiating directly on their own. Interestingly, GPO vendors who offer a lower price to GPO members must still pay to the GPO a contract administration fee, which is typically linked to the lower per-item price.

A partial explanation of the viability of a better price “elsewhere” comes from the literature that studies GPO formation, GPO stability, and GPO deflection [8, 12, 13] – the deflection is attributed to members not realizing a fair share of the total cost savings from the original group. However, the questions that still remain unanswered are: Why do some buyers still subscribe to a GPO membership despite having an intention to buy directly? How does a buyer get an even better price than the GPO-negotiated price while purchasing as an individual buyer from the same GPO vendor? Do vendors and GPOs welcome such renegotiation? The practice of offering lower price than the GPO-negotiated price to some buyers by the GPO vendor is known as custom pricing. In this paper we make an attempt to answer to these questions by analytically studying the GPO vendor’s pricing strategy, implications of allowing further negotiation, and more importantly, the heterogeneity in buyers’ motivations in joining a GPO.

We model strategic interactions among the GPO, the GPO vendor (vendor selling through the GPO), and buyers. We recognize that the buyers and vendors operate in a world where buyers are uncertain of the price of the product they want to buy. There are costs associated with this price discovery. Some of these costs are borne by buyers (e.g., cost of vendor search, vendor certification), some by vendors (e.g., cost of marketing), and some by both (e.g., cost of negotiation, reverse auction). The GPO, as a procurement intermediary, relieves buyers and sellers of some of these costs in exchange for a fee and also claims to get better prices through collective bargaining power. A buyer joins the GPO if the expected cost savings from the membership exceed the cost of joining. Furthermore, a GPO member continues to explore the market on its own for better price if the expected cost savings from doing so exceed the additional transaction costs.

We find that the GPO membership gives buyers an option to buy at the GPO-negotiated price, which largely limits the price uncertainty they would have faced without that knowledge. In fact, for relatively large members, the marginal gain from economies of scale does not justify their membership and the motivation behind joining the GPO is purely derived from the fact that they use the GPO-negotiated price only as a benchmark and starting point for further negotiation with the vendor(s). Large members apparently find themselves better off not committing to the GPO price and having the option to negotiate directly. However, such flexibility provided by the GPO to allow further negotiation between members and the GPO vendor leaves both small and large buyers worse off and increases the revenue of the GPO vendor. We thus find that, when such option to renegotiate further is available it is desirable for the large members to make use of that option and negotiate further directly. However despite the option’s apparent attractiveness to large members, it does generate lower cost savings for all members collectively and will come at a cost for both small and large buyers.

This research, although motivated by our observations in the healthcare industry, applies equally to dynamics of group purchasing in all industries.

Hereafter, in §2 we describe the model. In §3 and §4 we present some analyses on the market structure with and without the provision for custom pricing. In §5 we present a comparative study of the two scenarios. In §6 we conclude by summarizing our main results.

2. Model

We use a game theoretic approach to analyze the strategic interactions among the GPO, the GPO vendor, and heterogeneous buyers.

\[
\begin{align*}
\text{GPO decides membership fee for buyers} & \quad \text{GPO makes available GPO-negotiated price} \\
\text{t_0} & \quad \text{t_1} & \quad \text{t_2} & \quad \text{t_3} \\
\text{Buyers decide whether to join the GPO or not} & \quad \text{GPO members decide whether to buy at GPO-negotiated price or explore further for better price}
\end{align*}
\]

\textbf{Figure 1. Sequence of events}

The sequence of events goes as follows – First, the GPO decides on the membership fee for buyers; Then, based on the membership fee and expected cost savings from joining the GPO, the buyers decide whether to subscribe to the GPO membership; At a later point in time, after buyers have made their joining decisions, the GPO makes the GPO price available to the GPO members. The GPO price is the
price that the GPO vendor is willing to offer to GPO members exclusively. We will also refer to this price as the GPO-negotiated price as this price is often decided through negotiation between the GPO and the GPO vendor. GPO members, thereafter, decide whether to buy at the GPO-negotiated price or to negotiate further with the GPO vendor on their own, or to not buy from the GPO vendor at all.

A buyer joins the GPO if the expected cost savings from the membership exceeds the cost of joining. Furthermore, a GPO member further explores the market on their own for a better price ignoring the GPO-negotiated price. GPO members, thereafter, decide through negotiation between the GPO and sellers. However, neither GPO members nor the GPO gain any additional savings from doing so exceeds the additional transaction costs.

**Assumption on price uncertainty:** We assume that buyers are uniformly located along the interval $[q, q]$ and a buyer located at $q$ in this interval has a demand equal to $q$. We further assume that demands of individual buyers are inelastic. Buyers are strategic, risk-neutral, and their objective is to minimize the expected procurement cost. The expected procurement cost, excluding the GPO membership fee, for a buyer with demand $q$ can be expressed as,

$$qP_g, \text{ for a GPO member who buys at GPO-negotiated price}$$

$$qE[\tilde{p}(q)\mid P_g] + C_b, \text{ for a GPO member who negotiates further and buys directly from the GPO vendor}$$

$$QE[\tilde{p}(q)] + C_b, \text{ for a buyer who doesn’t join the GPO}$$

**Assumptions on GPO:** GPOs can be both for-profit and non-profit. However, in our study we focus on for-profit GPOs since it is a recent development in the way GPOs operate. Lately, these GPOs have attracted more government scrutiny due to their apparent conflicting goals of profit making and saving costs for hospitals, thereby making them more interesting to study. So, we model GPO as a for-profit entity. The GPO earns its revenue by collecting contract administration fee ($m_g$ percentage of total revenue) from vendors and membership fee, $M_g$, from each member. The expected revenue from the transactions between the GPO vendor and the GPO member with demand $q$ can be expressed as,

$$(qP_g)m_g, \text{ if the sale occurs at GPO-negotiated price}$$

$$(qE[\tilde{p}(q)\mid P_g])m_g, \text{ in case of direct negotiation between the GPO vendor and the GPO member}$$

The expected revenue from membership fees would be,

$$M_g \ast (\text{number of buyers joining the GPO})$$

Assumptions on GPO vendor: We assume that the GPO vendor is risk-neutral and maximizes the expected profit. We normalize the vendor’s marginal production cost to zero. The expected profit of a GPO vendor by selling to a GPO member with demand $q$ can be formulated as,

$$(qP_g)(1 - m_g), \text{ if the sale occurs at GPO-negotiated price}$$

$$(qE[\tilde{p}(q)\mid P_g])(1 - m_g) - C_g, \text{ in case of direct negotiation}$$
As we illustrate below, a number of buyers subscribe to the GPO only to have access to the GPO-negotiated price and consequently use that price information as a starting point for renegotiation with vendors. For such buyers the access to the GPO-negotiated price not only limits the price uncertainty but also contributes to cost avoidance (the additional cost that could have been incurred, without the knowledge of the GPO-negotiated price, by agreeing to the vendor to pay a higher price than the GPO-negotiated price).

As shown in Figure 2, the buyers with different demands are located along the horizontal axis (recall, we label the buyers by their demand sizes). The leftmost point on the horizontal axis represents the buyer with the lowest demand, and the rightmost the highest, \( \bar{q} \). \( p_L(\cdot) \) and \( p_H(\cdot) \) depict the band of price uncertainty for buyers with different demands. For example, the price that a buyer with demand \( q \) (located at \( q \)) would get in the market is uniformly distributed in the interval \([p_L(q), p_H(q)]\) and falls on the line segment \( AB \) as shown in Figure 2. \( E[p(\cdot)] \) depicts the expected market price. The GPO-negotiated price \( P_g \) is drawn as a horizontal straight line as it is deterministic and does not depend on the demand of an individual GPO member. \( E[p(\cdot)|P_g] \) depicts the expected market price conditional on \( P_g \), that is \( E[p(\cdot)|P_g] \) is the expected price once GPO price is known to the GPO members.

As we will see, the purchasing behaviors of buyers with different demands vary extensively. Buyers associated with region A with lower volume will always pay the GPO-negotiated price \( P_g \) and buy using the GPO contract as they do not expect to get a lower price from the open market (the lowest price they can expect from the market, while buying directly, is still higher than the GPO-negotiated price).

We recognize that the buyers associated with region B will also pay the GPO-negotiated price \( P_g \) despite the fact that they can get a lower price from the open market with positive probability. The purchasing behavior of the buyers associated with region B can be explained by the transaction cost associated with buying. For these buyers, expected cost savings from exploring the market further do not justify incurring the additional transaction cost \( C_b \), i.e., for a buyer in this region with demand size \( x \),

\[
x P_g - x E[p(x)|P_g] \leq C_b
\]

The buyers associated with region C account for the most interesting purchasing behavior. These buyers join the GPO but choose to negotiate further and use the GPO-negotiated price only as a starting point for negotiations. The value from joining the GPO, for a buyer in this region with volume \( x \) can be quantified in terms of expected cost savings and can be expressed as,

\[
x E[p(x)] - x E[p(x)|P_g]
\]

The GPO membership fee \( M_g \) must be less than equal to the value of the above expression for these buyers to join the GPO.

The high volume buyers on the extreme right associated with region D buy from the vendor directly and apparently do not seem to realize any advantage from joining the GPO either. However, these buyers may still be member of the GPO if the cost of joining the GPO was negligible and/or there were other benefits, e.g., cost savings from other products and services, access to product reviews by other members, etc., from joining the GPO.

In the following two sections we carry out the equilibrium analysis and present a comparative study of two regimes – 1) The GPO contract restricts the GPO vendor from offering custom pricing (the practice of offering a price below the GPO-negotiated price to some members, selectively) to any GPO member. 2) The GPO contract allows its members to
explore better price option than the GPO-negotiated price even with the same GPO vendor and the GPO vendor is allowed to offer custom pricing to GPO members.

3. Market structure without custom pricing

Here we first analyze the case where the GPO vendor is not allowed to offer custom pricing to any GPO member. We use this case as a benchmark for our comparative analysis. When custom pricing is not allowed, GPO members can either buy from the GPO vendor at the GPO-negotiated price or buy from outside vendors. It is implicit here that the GPO vendor cannot give “take it or leave it” offer because GPO members have outside options. The game sequence is as described in Figure 1, except for the fact that in the final stage of the game, GPO members do not have the option of negotiating further with the same GPO vendor and hence have only two choices- 1) buy from the GPO vendor at the GPO-negotiated price or 2) buy from outside vendor.

The GPO vendor does not incur any additional transaction cost for any number of GPO members that buy through the GPO. On the other hand, a GPO member doesn’t incur any transaction cost while buying from the GPO vendor but does so while buying from outside vendor. The member, who expects to generate a cost savings more than the transaction cost, chooses to buy from outside vendor.

We assume that the GPO vendor is risk neutral and maximizes profit. The GPO’s problem can be expressed as,

$$\max_{p_g} \int_{q_0}^{q} xP_g(1 - m_g)dx$$

such that, $q_0P_g - q_0E[p(q_0)|P_g] \leq C_b$

Members up to $q_0$ buy at GPO-negotiated price; the rest does not buy from the GPO vendor as they expect to generate further cost savings from an outside vendor.

It is not so surprising that the GPO vendor would find it profitable to set a price such that at least the small buyers (buyers with relatively low demands) always buy through the GPO. This is because the isolated revenues that can be earned from selling directly to small buyers may not be good enough to compensate for the transaction costs. Further, since the GPO vendor incurs no additional transaction costs for selling to an additional buyer through the GPO, it would be always desirable for the GPO vendor to lower the price even further to capture additional buyers with increasing demand sizes as long as the marginal gain from doing so continues to be positive. Eventually, the GPO vendor would lower the price up to the point where it would discourage all such profitable buyers from exploring the outside market.

If the GPO were to charge a uniform membership fee it would be zero because charging even a very small membership fee would discourage the marginal buyer from joining the GPO resulting in potential loss in revenue in the form of contract administration fee. This is because the revenue generated from a very small membership fee will also be very small and hence will be always lower than the potential contract administration fees from the transaction.

The market structure is not sensitive to very low price uncertainty. As the price uncertainty increases ($P_g(.)$ and $p_L(.)$ move further apart from $E[p(.)]$), the GPO price as well as the total revenue of the GPO vendor decreases (see Figure 3 below).

![Figure 3. Market structure without custom pricing](image)

The reason is – as the price uncertainty increases, members expect to generate more cost savings from exploring the outside market, forcing the GPO vendor to lower the GPO price further. Consequently, the revenue of the GPO vendor decreases with the increase in price uncertainty.

If the GPO is collecting fees as a percentage of the total revenue from the GPO vendor, it would be desirable for the GPO to reduce the price uncertainty faced by the members as much as possible by making more price information available to the GPO members. We indeed observe GPOs making aggregate price information available to the members.
4. Market structure with custom pricing

In this setting, we analyze the case where GPO members can further negotiate prices with the same GPO vendor and the GPO vendor is allowed to offer custom price (a price lower than the GPO-negotiated price) to individual members. The game sequence is same as the previous case except for the fact that in the final stage of the game the members have the option to negotiate further with the same GPO vendor in addition to the option of buying at GPO-negotiated price and buying from outside vendor.

As before, neither the GPO vendor nor the members incur any additional transaction cost if transaction occurs at GPO-negotiated price. Both the member and the vendor incur additional transaction cost only if they engage in further price negotiation. A member who expects to generate more cost savings than the transaction cost would further engage in price negotiation with the same GPO vendor as well as outside vendors.

We assume that the GPO vendor is risk neutral and makes pricing decision based on the expectation that in the event of member-initiated further price negotiation the GPO vendor will be able to negotiate with the member the price which equals to the “expected price conditional on GPO price” for that member. The expected price is the closest approximation of the outcome of the price discovery mechanism. The GPO vendor’s problem can be expressed as,

$$\max_{P_g} \left( \int_{q}^{q_0} xP_g(1-m_g)dx + \int_{q_0}^{q_m} (\mathbb{E}[\bar{p}(x)|P_g](1-m_g) - C_g)dx \right)$$

such that, $$q_0 P_g - q_0 \mathbb{E}[\bar{p}(q_0)|P_g] \leq C_b$$

Buyers up to $$q_m$$ are essentially GPO members; members up to $$q_0$$ buy at the GPO-negotiated price; members in between $$q_0$$ and $$q_m$$ are expected to engage in further price negotiation and buy directly from the GPO vendor.

Recall that the buyers from the region on extreme right (region D in figure 2) had no incentive in joining the GPO unless the cost of joining was negligible. When custom pricing is allowed, these buyers, if joined, are expected to buy directly from the GPO vendor. Even a very small membership fee will discourage these buyers from joining the GPO causing a loss of potential revenue in the form of contract administration fees. This is because the revenue generated from a very small membership fee will also be very small and hence will be always lower than the potential contract administration fees from the transaction. We conclude that if the GPO were to charge a uniform membership fee to all buyers, the optimum strategy for the GPO would be to give away free membership to all buyers and get all buyers on board. To conclude, with the provision for custom pricing, all buyers become member of the GPO although not all members pay the GPO-negotiated price when it comes to buying.

Ideally, the GPO vendor would want to sell to all buyers, GPO members or not, directly, as long as the transaction cost is negligible so as to extract the surplus (surplus compared to buyer’s outside option) of each buyer. Given that the transaction cost ($$C_g$$) is more often positive than not, the revenue from selling to small buyers is not enough to compensate for the transaction cost. This explains why the GPO vendor sets such a GPO price where relatively small buyers (region A and B in figure 2) would buy through the GPO even when the GPO vendor as well as the buyers could negotiate further directly. However, the GPO price will be small enough only to get the small buyers to buy at the GPO price. With the added provision for custom pricing the GPO vendor would not lower the GPO price any further to get an additional member when the marginal gain from selling the product to the additional member at the GPO-negotiated price is less than what the GPO vendor can expect to earn through a direct negotiation. The GPO vendor would set a higher price anticipating that some members will eventually renegotiate. As a result, the GPO price as well as the total revenue of the GPO vendor would be higher than what it would be without the provision for custom pricing.

The above results have further implication on the policy of the GPO. We anticipate that a for-profit GPO, that earns its revenue through sharing a percentage of the seller’s revenue, would be more likely to allow custom pricing.

The market structure is also driven by the extent of price uncertainty prevailing in the market. The market structure is not sensitive to very low price uncertainty. With low price uncertainty the region C doesn’t exist. As the price uncertainty increases ($$p_u(\cdot)$$ and $$p_l(\cdot)$$ move further apart from $$\mathbb{E}$$), the region C (see Figure 4 below) increases whereas region A and B decrease. Recall that the buyers in region C are those whose sole motivation of joining the GPO was reducing price uncertainty.
It is also interesting to note that unlike in the previous scenario, where custom pricing was not allowed, the GPO price actually increases with the increase in price uncertainty. The reason is – as the price uncertainty increases, the members expect to generate more cost savings from further negotiation. Now, unlike in the previous case, the GPO vendor does not have to reduce the price to keep business of these members because these members will come back to negotiate with the GPO vendor anyway. In fact, the GPO price increases anticipating such movement. However, the total revenue of the GPO vendor still decreases with the increase in price uncertainty.

5. Comparative analysis

In this section, we present a comparative analysis of the two scenarios discussed above.

We have already seen that the GPO price as well as the total revenue of the GPO vendor is high with the provision for custom pricing.

In Figure 5 below, we graphically compare the buyer surplus (same as cost savings) of the two scenarios – with and without the provision for custom pricing, from joining the GPO.

It can be easily concluded from the diagram above (Figure 5) that the total buyer surplus is lower with custom pricing. The individual surplus in either case decreases with increase in buyer size. The buyers from region A & B still buy through the GPO and pay the GPO price. However, their surplus is lower with custom pricing as they pay relatively higher GPO price. The buyers from region C realize the surplus through reducing price uncertainty only. The surplus of buyers from region D goes to zero with custom pricing. As we have mentioned earlier, the motivation of buyers from region D to still remain with the GPO may be benefits from other product and services and/or free membership fee. It is interesting to note that despite having the flexibility of negotiating directly with the vendor no buyer is better off with the provision for custom pricing. With the provision for custom pricing, the GPO vendor offers a higher price through the GPO anticipating buyers would renegotiate. As a result small as well as large buyers are worse off and incur a higher procurement cost. Small buyers are worse off because they pay a higher GPO price. The large buyers are also worse off because they pay the expected market price which is higher than what the GPO price would have been without the provision for custom pricing.

6. Conclusion

In this paper we illustrate some implications of price uncertainty on the buyers’ and seller’s decisions in the context of group purchasing. We explain why it makes perfect sense for some buyers to join the GPO however not buy at GPO price. For such buyers the sole motivation from joining the GPO comes from reducing the price uncertainty through having access to the GPO price. These buyers join the GPO to have an access to the GPO-negotiated price and
use that price as a starting point for further negotiation only. With higher price uncertainty in the market fewer buyers buy through the GPO and more buyers buy directly from the GPO vendor negotiating on their own despite having the GPO membership. We also show that the option of negotiating further with the GPO vendor, even though sounds attractive may not be always good for buyers individually as well as collectively. With the provision for custom pricing, the total revenue of the GPO vendor increases, whereas the consumer surplus for each buyer decreases. We also show that the price uncertainty has an interesting impact on the GPO price. Without the provision for custom pricing, the GPO price decreases with the increase in price uncertainty, however, it is quite the opposite when custom pricing is allowed. The total revenue of GPO vendor reduces with the increase in price uncertainty in either case making it always desirable for the GPO to reduce price uncertainty in the market by providing members with more price information.

7. References