Procurement of essential medicines with long-term considerations: Volume guarantees and volume splits

Global-health organizations like the Global Alliance for Vaccines and Immunization (GAVI) and the Contraceptive Implants Access Program have recently announced to award volume guarantees to pharmaceutical companies for the procurement of donor funded medicines and medical devices (e.g. pentavalent vaccine, contraceptive implants). As a result, substantial price reductions were achieved. For example, the volume guarantee for contraceptive implants negotiated by the Gates Foundation with Bayer and Merck reduced their prices per implant from approx. $18/$16.5 to $8.5. Clearly, this price decrease hugely benefits women in third world countries, simply because donors can offer approximately twice the amount of implants with the same amount of funding. The Reproductive Health Supplies Coalition (20014) estimated that “the savings from Jadelle® [the implant produced by Bayer] alone could save over 310,000 lives through reduced maternal mortality and avert more than 20 million unintended pregnancies over six years”. Price reductions of similar magnitude were also achieved for the procurement of Rotavirus Vaccine by GAVI Alliance, when UNICEF Supply Division awarded in 2012 a five year volume guarantee to GlaxoSmithKline (GSK).

Despite the significant price reductions achieved, volume guarantees are discussed controversially in the global-health community. Prices are fixed for a longer period, and recurring competition among existing manufacturers is eliminated. Furthermore, other manufacturers may be hesitant to develop competing products, invest into manufacturing capacity, and undergo the lengthy and costly process of WHO
pre-qualification. Even when not the entire donor-funded volume is committed, it is unclear how competition will evolve for the non-guaranteed part. Guaranteeing future procurement volumes involves a trade-off across time that is hard to quantify: committing high future volumes today to incumbent suppliers to enjoy production efficiencies and reduce prices has potentially a negative impact on competition and supplier entry in the future. In this paper, we study how to best set the size of the volume guarantee and the volume split among suppliers.

To this end, we develop a two–period model (procurement volume today and procurement volume in the future) that allows us to evaluate the effects of the size of the volume guarantee and the split among incumbents on competition, prices, and total costs of the buyer. To model the competitive environment we draw on auction theory. We first consider the situation in which the drug (or a perfect substitute) can only be supplied by two incumbent suppliers.

In the first part of our analysis we assume that the two incumbent suppliers behave in a myopic way, that is, they ignore how their bids for the first procurement round impact their bids for the second round and the corresponding outcomes. Manufacturers may have liquidity concerns and/or there may be uncertainty in funding and the buyer may not want to communicate how much volume of a drug he will procure in future periods. We show that, contrary to common intuition, guaranteeing future volume does not always reduce current prices but splitting the volume (in an uneven way) does. Surprisingly, there is benefit from splitting the guarantee between suppliers when there are economies of scale, even in the absence of a monopolistic threat
in the future! As expected, future prices increase for high guarantees and uneven splits. Total procurement cost may increase substantially if the buyer guarantees part of the future volume, especially if the split among incumbents is even.

We then relax our assumption of myopic suppliers and turn to the case where manufacturers explicitly account for the potential outcomes of the second round when bidding for the first tender – that is, we incorporate strategic behavior of the suppliers in our analysis. Our results suggest that the buyer is better off when suppliers behave strategically. Although this appears counterintuitive at first, we show that bids of strategic suppliers are lower than those of myopic suppliers because they anticipate and, more importantly, bid away future profits. Moreover, we observe that the results with respect to the optimal size of the volume guarantee change structurally, compared to the myopic case. Volume guarantees and highly uneven splits reduce total cost, especially if the cost difference between the suppliers is small. This implies that the success of volume guarantee depends strongly on whether or not suppliers behave strategically and that the buyer should provide information and further incentives for them to do so.

Last, we extend our analysis to account for the possibility of a new entrant in the second period. The threat of a new entrant lowers the expected future profits of (strategic) suppliers and as a consequence their bids in the first round increase. Hence, it is a dominant policy for the buyer not to announce such a possibility. A potential new entrant always lowers total procurement cost but does not structurally affect the buyer’s decision problem.