

Decentralized procurement for drugs and centralized price cap: a structural approach

Riccardo Camboni, Philippe Gagnepain, David Martimort
and Paola Valbonesi

Extended abstract. Preliminary and incomplete.
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We model the decentralised purchase of drugs for public hospitals and health care units in presence of a centralised price cap, and then test our predictions using an original dataset on Italian regional public buyers.

Our goal is to study discretion vs rules in determining the reserve price (i.e. the maximum price the public buyer is willing to pay for each drug) in purchasing auctions, and the related effects on procurement outcomes. In this aim, we exploit the Italian procurement setting for drugs where the national regulator (NR) sets a price cap on each drug; and the local public buyer (LPB) then sets a reserve price for each auction adopted to purchase that drug. The price cap bounds the LPBs' reserve price.

We develop a hierarchical model of government: at the local level, each LPB i runs a first price auction to purchase a drug that it values S_i . Crucially, we allow for the possibility that the LPB is captured by the industry. We remain agnostic on the particular mechanism at play on this front: we assume that the LPB gives weight $\alpha_i \in [0, 1]$ to the winning firm expected profit in its objective function, i.e. with $\alpha_i = 0$, LPB is not captured, while with $\alpha_i = 1$, extracting the firm's surplus is not a concern of the local government. Absent the price cap, and given S_i , α_i and n_i – the number of participants in the auction – we denote $p^u(S_i, \alpha_i, n_i)$ as the LPB's *unconstrained* optimal reserve price.

We then include in the model the optimal cap $\bar{p}^c$ set by the NR. The delegation literature has stressed how caps and floors can be used to limit the discretion of public bodies, and how these constraints can be part of optimal delegation mechanisms. In the setting we investigate, the NR is not informed on the drug's value for its local usage; and we assume the NR gives zero weight to the winning firm's profit in any auction.

Our results show that LPB's capture at the local level tends to push reserve prices up, suggesting that a national cap on reserve prices could be efficient. Prices below that cap will reflect LBP's local information; moreover, they are likely to refer to a lower S_i from that drug, and/or to LPB's lower weight α_i to the winning firm's profit. In particular, we show it exists a threshold

value $\tilde{S}(\alpha, n, \bar{p}^c)$ such that all LPBs with value $S_i \in [0, \tilde{S}(\alpha, n, \bar{p}^c)]$ choose their *unconstrained* reserve price $p^u(S_i, \alpha_i, n_i) < \bar{p}^c$, while the national cap is binding for all LPBs with a valuation $S > \tilde{S}(\alpha, n, \bar{p}^c)$.

Finally, we turn to the empirical analysis which aims to assess the welfare effect of decentralization. To do so, we begin by estimating the firms' costs and the LPBs' preferences. In this aim, our estimation strategy is organized as a three-steps procedure. First, we use the Guerre, Perrigne and Vuong (2000) approach to recover the private costs of all winning bidders. Second, we estimate the value S_i each LPB assigns to the drug it has to procure. Third, we estimate the cut-off point $\tilde{S}(\alpha, n, \bar{p}^c)$. We use these parameters to simulate an hypothetical situation where LPBs can freely choose the reserve price; we then compare the welfare in this setting with the current situation with centralized price caps.

We run our empirical analysis on an original dataset of 3812 auctions run by two large Italian regional procurement agencies: Veneto and Lombardia. Each auction includes one or more different drugs; however, within auction all drugs have the same active ingredient and differ only in the dosage, making cross-subsidization unlikely. Drugs are identified using a unique code; additionally, for each drug we know the active ingredient, the dosage, the ATC drug classification – i.e. a top down digit structure from a general to a narrow description of the pharmaceutical properties of the drug – and the size of each packet, that is how many pills or syringes are included. Auctions are awarded to the lowest price bidder. We observe the potential competition – the number of firms producing a given active ingredient or the specific combination of active ingredient and dosage –, the actual competition in the auction, the reserve price – the maximum price the LPB is willing to pay the drug – and the national cap.

Our results show that a centralized cap on the reserve price set by LPBs determines an average positive welfare effect, as compared to the case where no national cap is in force. Our findings highlight that a centralised price cap in presence of decentralised procurement can hurt LPBs who place a high value on the drug they need to buy (e.g., because they have urgency in purchasing) and who have low α_i value (e.g. in presence of multinational sellers with no local plants).