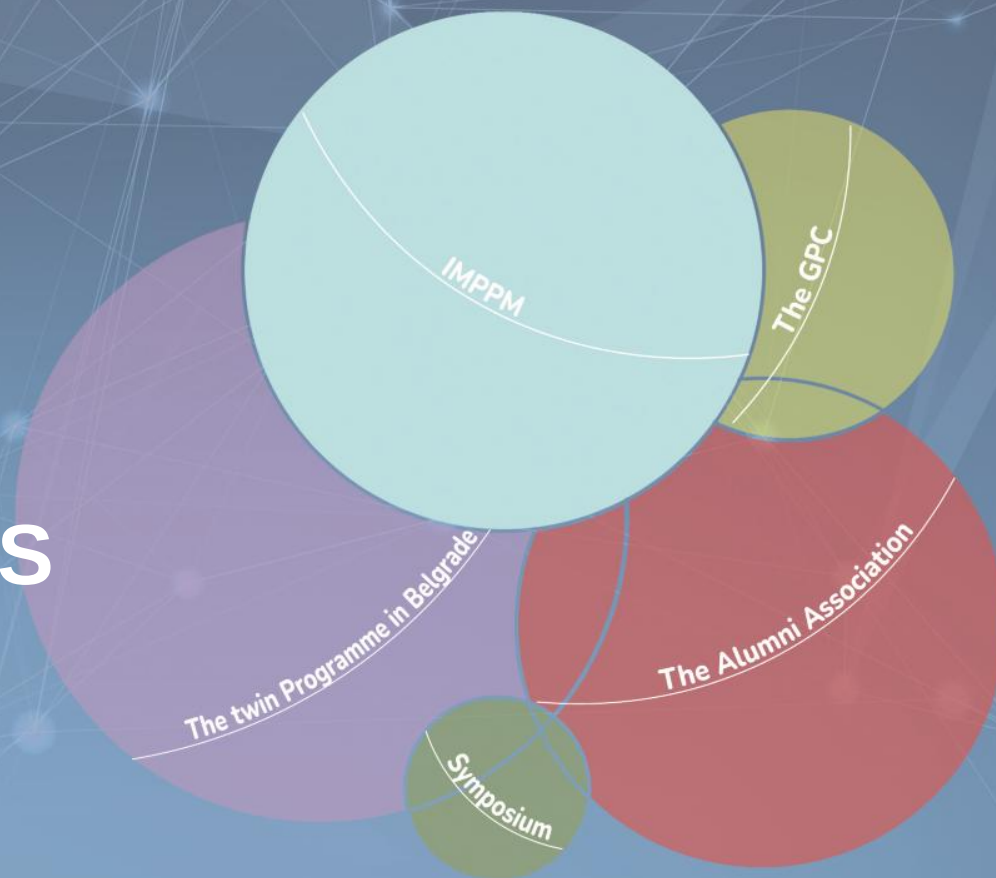


IMPPM

International Master
in Public Procurement
Management

An Introduction to SCORING AUCTIONS

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An introduction to SCORING AUCTIONS

- In a previous lecture we made the observation that price is not everything for effective procurement. This lecture takes this point
- It is more and more frequent that procurement contracts are awarded via Most Economic Advantageous Tenders (MEAT) rather than via price-only competitions.
- Che (1993), Asker-Cantillon (2007-8), Abbas (2019)
- This occurs when a buyer is willing to trade-off price for quality, providing potential suppliers with the flexibility to best express their characteristics. Indeed, some firms might prefer to offer higher quality at higher prices, other firms would prefer lower quality at lower price.



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- MEAT offers are typically determined by introducing a scoring formula, which transforms a “price-technical” bid into a score. The highest score wins the auction.
- Typically, the general structure of such formula is

$$S(\mathbf{p}, \mathbf{q}) = S(\mathbf{q}) + S(\mathbf{p})$$

- The type of scoring rule $S(\mathbf{p}, \mathbf{q})$ then represents the buyer’s preferences.



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- The price, p , component of the bid and the non-price, quality-quantity q , component of the offer are in general vectors, since offers may be multi-dimensional.
- In practical procurement, one could distinguish between two broad types of formulae: (so called) *independent* and *inter-dependent*.



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- (1) *Independent* formulae assign a score to an offer which does not depend upon what the other competitors bid.
- (2) *Inter-dependent* formulae instead assign a score that depends upon the competitors' offer.

Therefore, (2) have a stronger strategic connotation.



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Independent Formulae Often Used in Practice
(Price Score)

- Linear Formula
- Parabolic Formula



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- *LINEAR FORMULA (LF)*
- In a one-dimensional price offer the structure of the formula is

$$S(p) = \beta[P_r - p] / [P_r - P_t] \text{ if } P_r \geq p \geq P_t$$

and

$$S(p) = \beta \quad \text{if } p < P_t$$

- Where P_r is the reserve price, p the submitted price P_t is a price threshold, below which the price score would be maximum, and equal to $\beta > 0$.
- Then P_t is inserted to mitigate competition on price. If no need to mitigate price competition, then $P_t = 0$.



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- *LINEAR FORMULA (LF)*
- Notice that $S(p)$ could be written as

$$S(p) = A - Bp \quad \text{if } P_r \geq p \geq P_t$$

and

$$S(p) = \beta \quad \text{if } p < P_t$$

- where $A, B > 0$ are constants. Interestingly, this is basically the price component of the Che (1993), Asker-Cantillon (2006-7) scoring rule, with general form $S(p, q) = V(q) - p$



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- *Monetary Value of a Point (MVP) with Linear Formula*
- It may be interesting to define the monetary value of a further point, namely the cost for the firm to “acquire” an extra point, in the price score, by marginally decreasing its price bid (inverse slope of the scoring formula)

$$MVP = [P_r - P_t] / \beta \text{ if } P_r \geq p \geq P_t$$

and

$$MVP = \infty \quad \text{if } p < P_t$$



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- *Monetary Value of a Point (MVP) with Linear Formula*
- The MVP would be useful to firms when, given their budget constraint, they have to decide how aggressively to bid on the price component, vs the non-price component of the offer.
- The lower the price threshold, the higher the MVP, the more convenient would be for a firm to compete on the non-price component.



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- “Parabolic” Formula (PF)
- Sometimes it is used a formula such as

$$S(p) = \beta [1 - (p/P_r)^x]$$

- With respect to the LF, the PF has a MVP which increases continuously as the price bid decreases.
- The parameter x , defines the curvature of the scoring formula .
- Both the LF with threshold, and the PF, tend to discourage very low price bids; however, the presence of a price threshold in the scoring formula, could give rise to unexpected behaviour.
- Indeed, in some auctions the price threshold has been interpreted as the “price firms were expected to bid by the buyer”, and so they all bid it!



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INTERDEPENDENT FORMULAE (Price Score)

- The following three seems to be the most commonly used in practice :
- Minimum Price
- Maximum-Minimum Price
- Average Price (*common in procurement of works to mitigate price competition*)



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- *Minimum Price Formula (MPF)*
- According to the MPF the price-component of the scoring rule is given by

$$S(p) = \beta P_{min}/p$$

- As well as LF, MPF has a slope which is linear in the price offered but the slope, and the MVP, is unknown at the time firms submit their bids (unless, of course, there is a cartel)
- For this reason, it is more difficult for bidders to optimally calculate their bids with such formula (no feedback on this from specialized literature)



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- *Maximum-Minimum Price Formula (MMPF)*
- Sometimes the following MMPF price score is used

$$S(p) = \beta (P_{Max} - p) / (P_{max} - P_{min})$$

- where P_{max} is the maximum price submitted and P_{min} the minimum price.
- Also MMPF is linear in p but its slope is not known when firms bid. As well as for MPF, $p = P_{min}$ entails the highest price score, equal to β .



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Final Remark (somewhat controversial)

To mitigate uncertainty and allow a better bid formulation by firms, in general it is preferable to use “independent” scoring rules.