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Rethinking Government Supplier Decisions: The Economic Evaluation of Alternatives (EEoA)

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“If we do not have a good economic model for supplier decisions, we are not on a level playing field. And we already spend [too] much ... time on that uneven playing field.”

Colonel John T. Dillard, US Army (Retired)

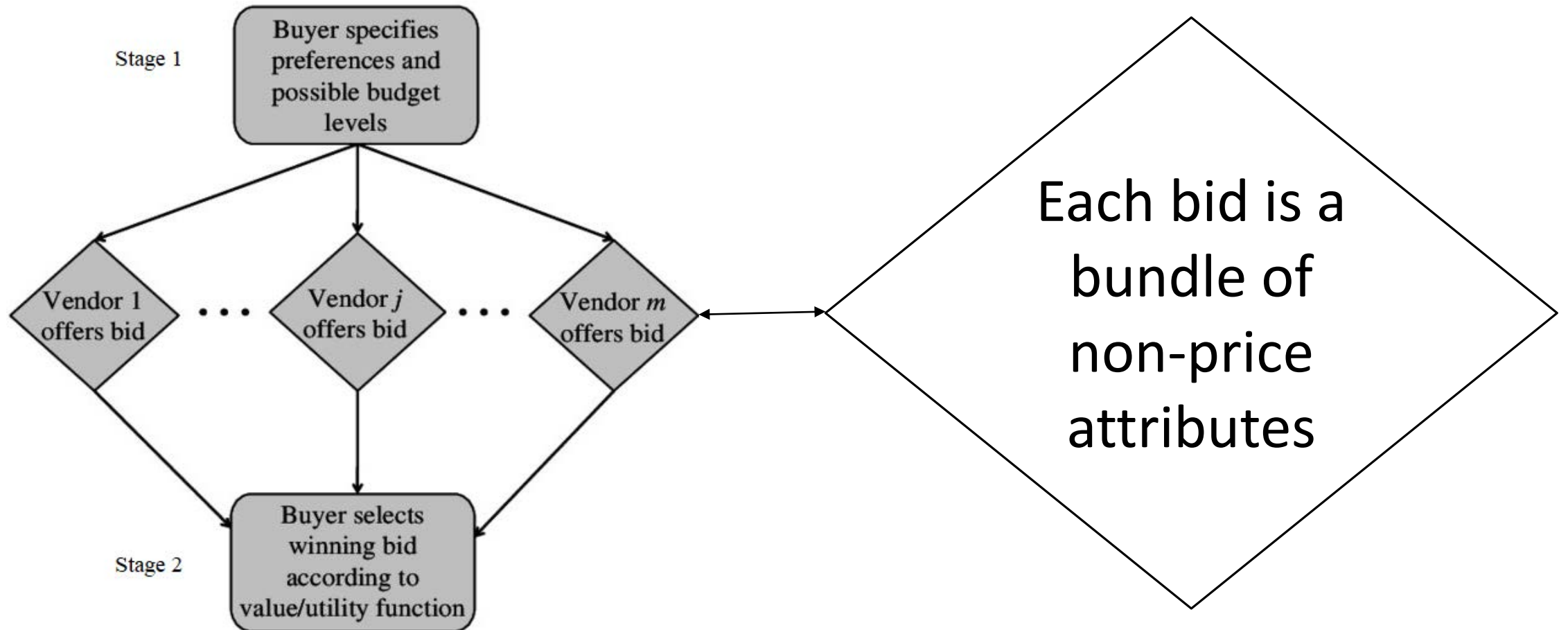
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Overview

- Propose an economic model to reframe the ranking of vendors when benefits cannot be monetized
- Consider supply side as well as demand side decision-making
- Implication: use EEOA as consistency check of final evaluations
 - Use in addition to traditional decision-making tools

Acquisition Framework



Buyer's Objective

- Maximize government utility
 - Mission specific, determined by policy
 - $E(U_j) = \sum_{i=1}^n w_i a_{ij}$
 - Procure most effective attribute bundle among j vendors

- Decision-maker makes explicit tradeoffs between all attributes
 - Ex: 20 miles of max range vs. 10 mph top speed

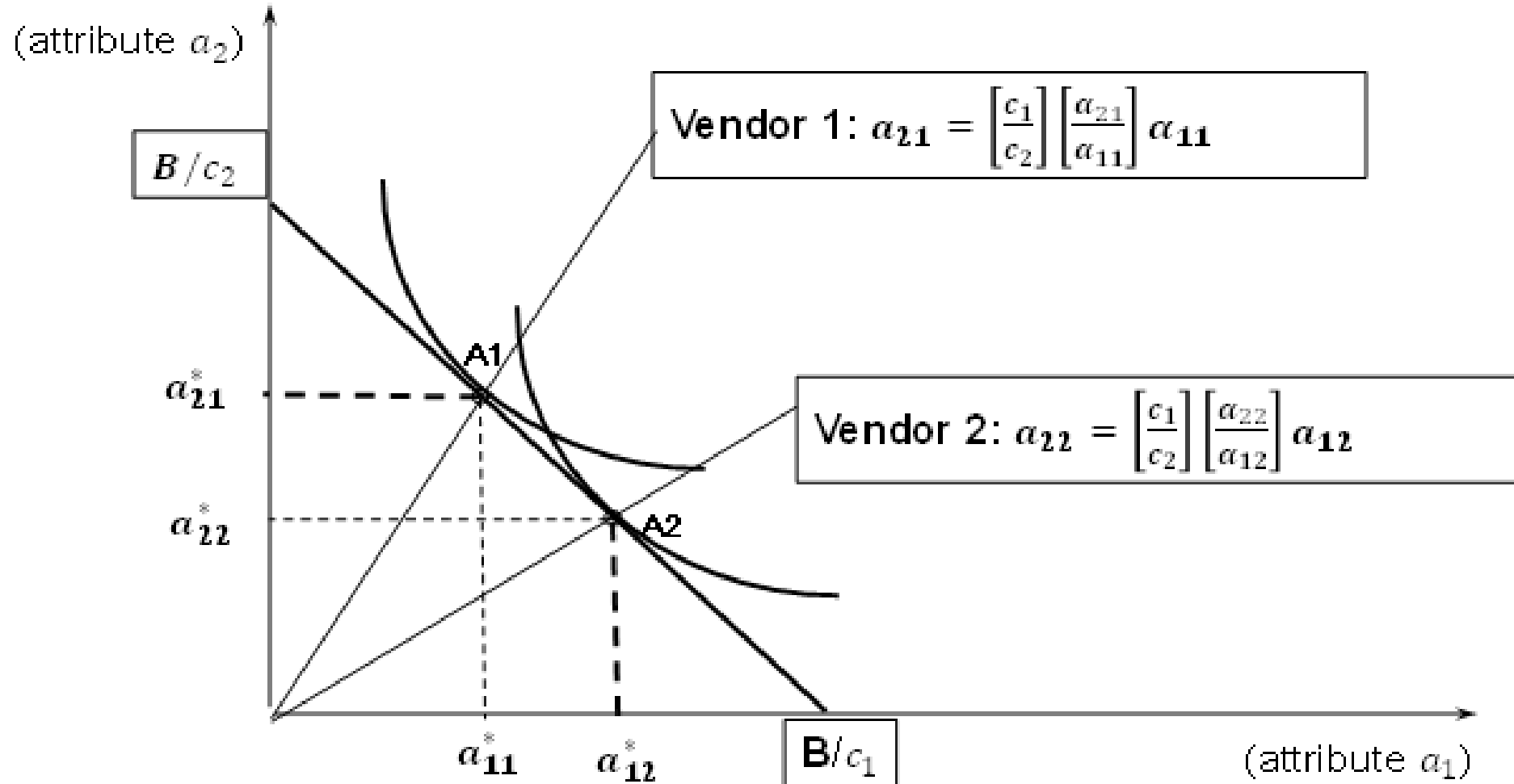
Vendors' Objective

- Maximize likelihood that bid is accepted
 - Given projected budget B , maximize production of attribute bundle
 - Deliver most attractive product

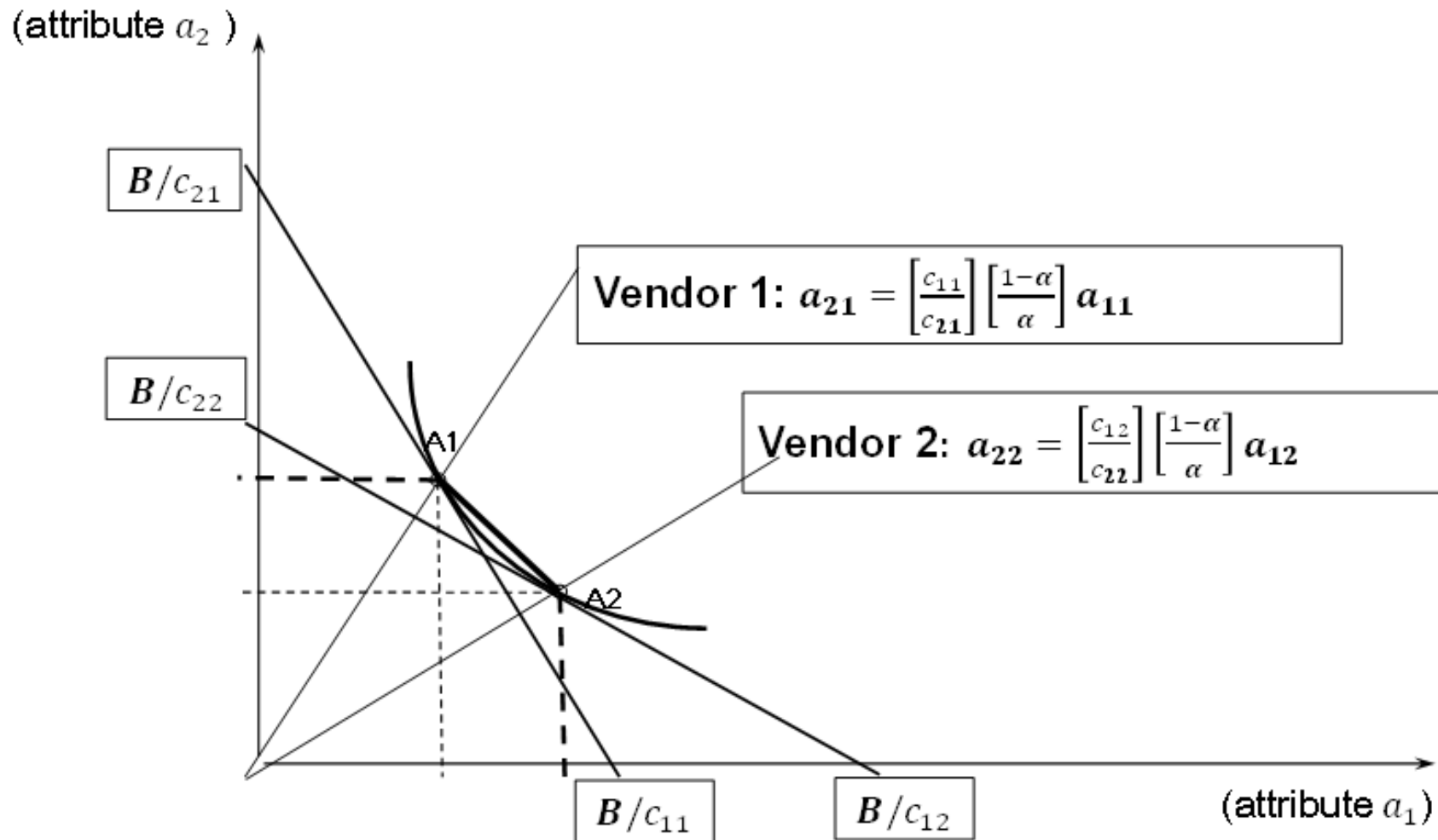
Model Assumptions for Vendors

- Vendor's objective function is constrained maximization of output (in attribute space)
- Each vendor may have idiosyncratic production technology and attribute costs
 - Cobb-Douglas production functions
 - $Q_j(a_{1j}, a_{2j}) = a_{1j}^{\alpha_{1j}} a_{2j}^{\alpha_{2j}}$
 - Total cost = $\sum_{i=1} c_{ij} a_{ij}$
- Vendors do not know buyer's exact weighting of each attribute

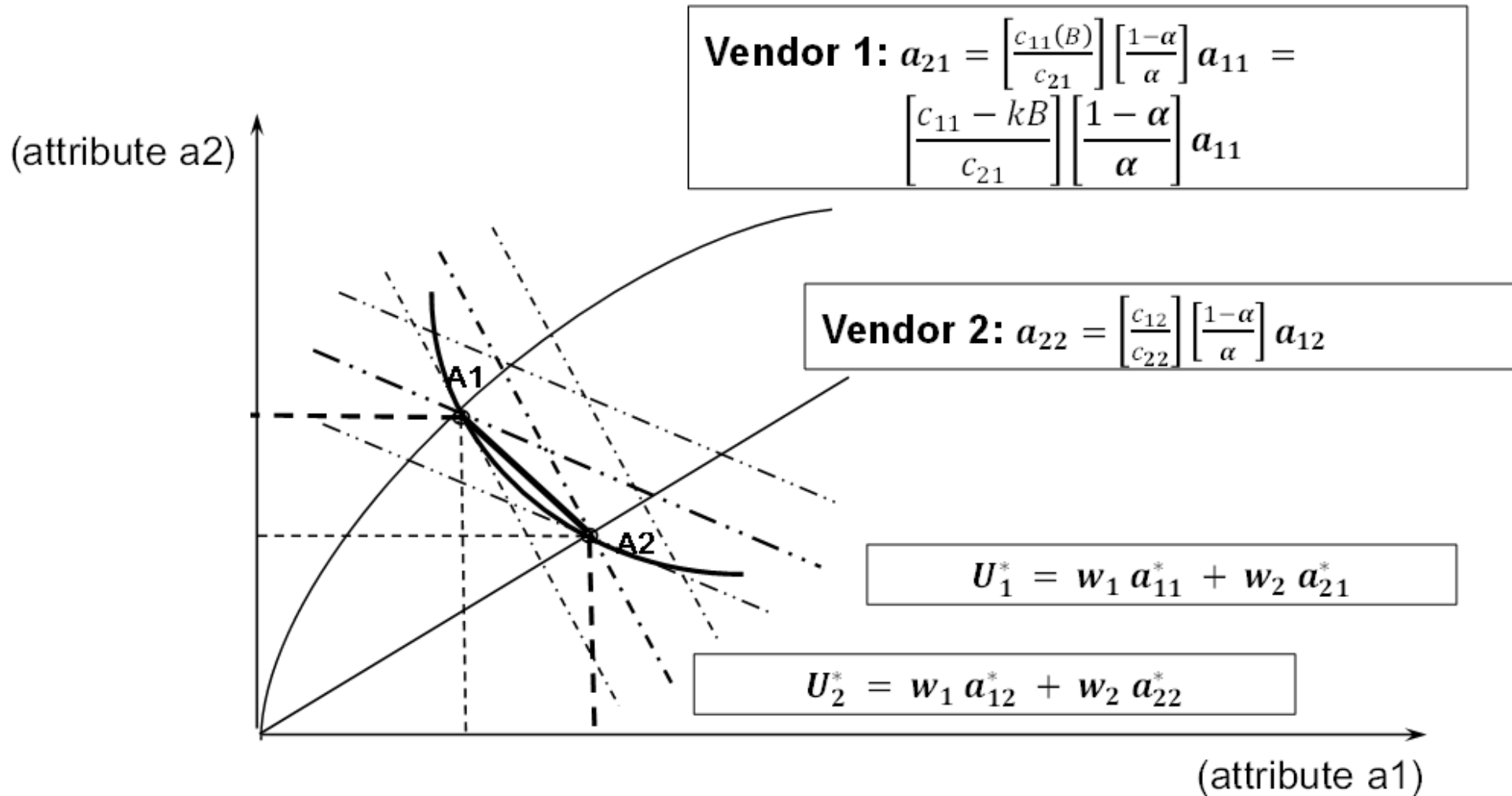
Vendors with Different Attribute Costs, Same Production Technologies



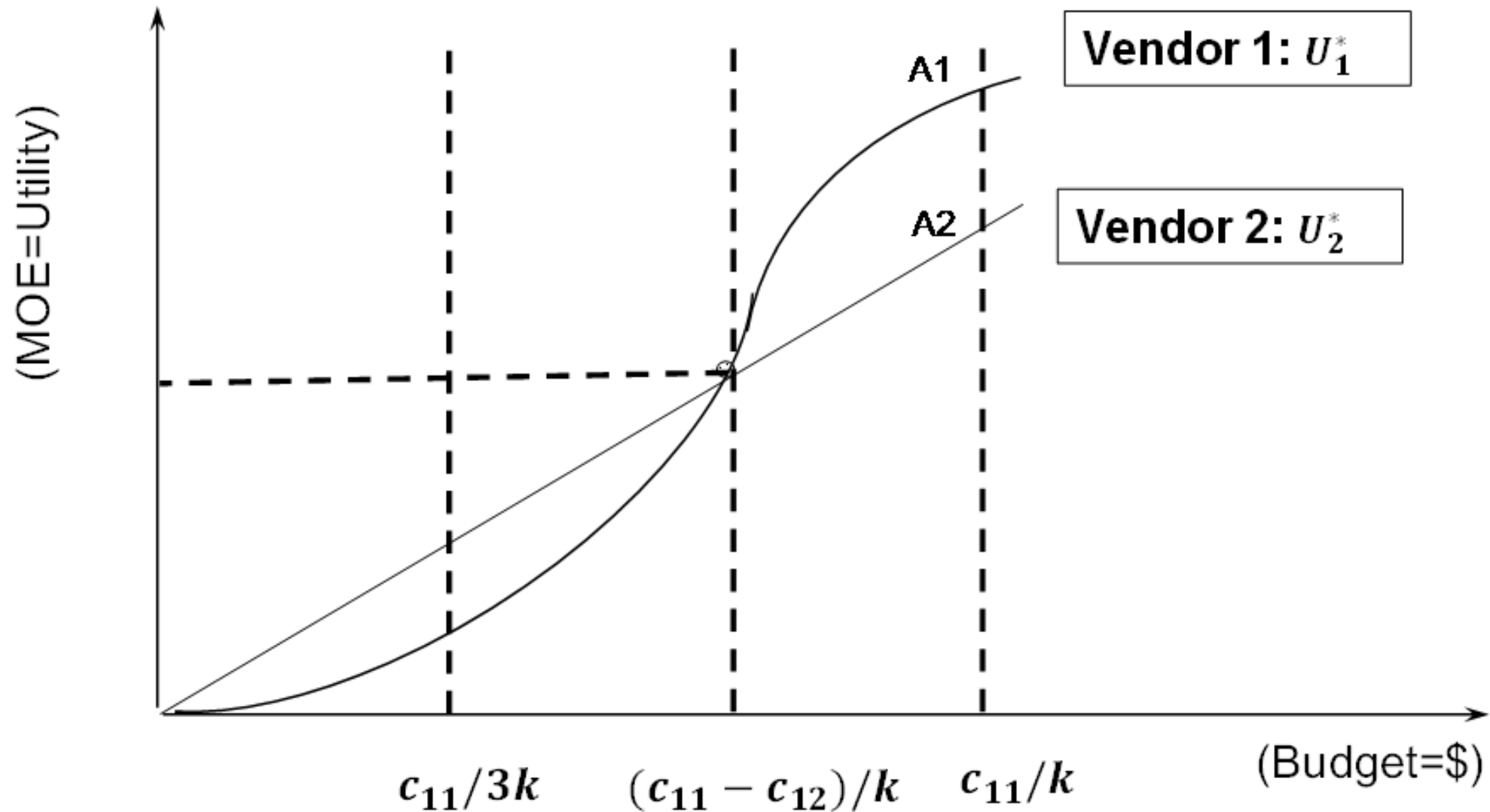
Vendors with Same Attribute Costs, Different Production Technologies



Vendor 1's attribute cost dependent on projected budget



Vendor Selection in Cost-Effectiveness Space



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Comparison of EEoA & MCDM

- MCDM adds a degree of freedom for procurement officials
 - Expands decision space (assign value functions & attribute weights)
 - In theory, isomorphism between EEoA & MCDM utility functions
- Both approaches generate tradeoff functions between attributes (partial derivatives)
 - EEoA generates explicit tradeoff functions
 - MCDM generates implicit tradeoff functions

Comparison of EEoA & MCDM

- Likely to recommend differing alternatives for complex decisions
 - EEoA considers effect of budget constraint on possible attribute bundles
- Important open empirical question which is better under what scenario
 - Warrants future research with other methodologies

Conclusion

- Propose an economic model to assist government procurement
- Consider impact of projected budget on alternatives in cost-effectiveness space
- Raise important empirical questions for decision-support models