

Inaccurate Priors and Quantized Types in Automatically Generated Mechanisms

Geoffrey Mainland

May 17, 2005

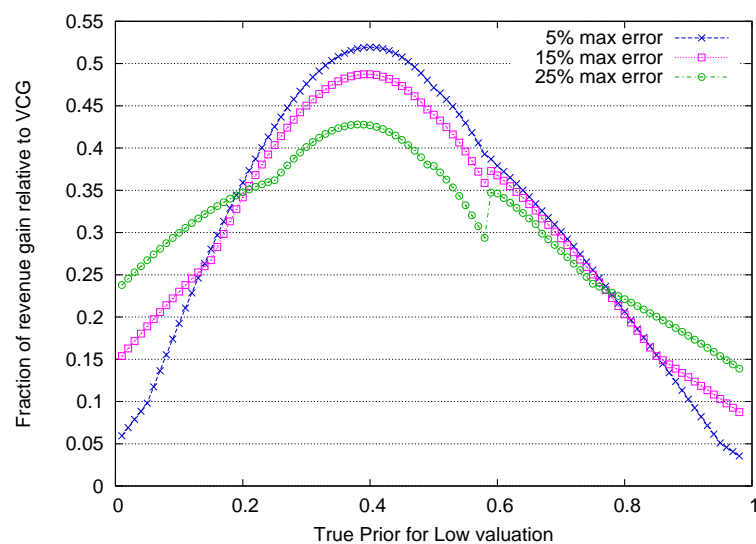
Applying AMD

- How dependent are mechanisms on priors?
- Can we use AMD when the space of types is not discrete?
- Look at a few CA problems, not because they're good candidates for AMD, but because they're familiar and give us a metric (revenue, social welfare).

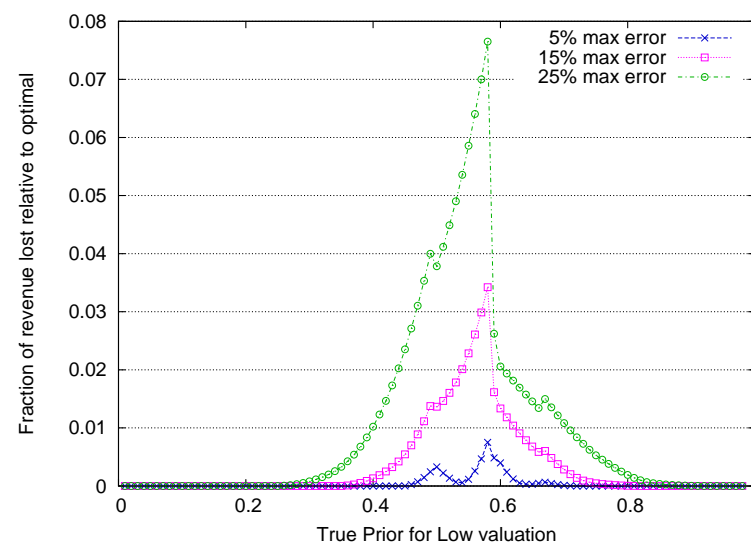
A Simple Auction

- Two agents have value L (1) or H (2) for each of two goods, A and B.
- Complementarity: if type is HH, value is 6 instead of 4.
- What happens when we generate a revenue maximizing mechanism using bad priors?

Expected Revenue Loss with Inaccurate Priors



Gain in Expected Revenue Relative to VCG

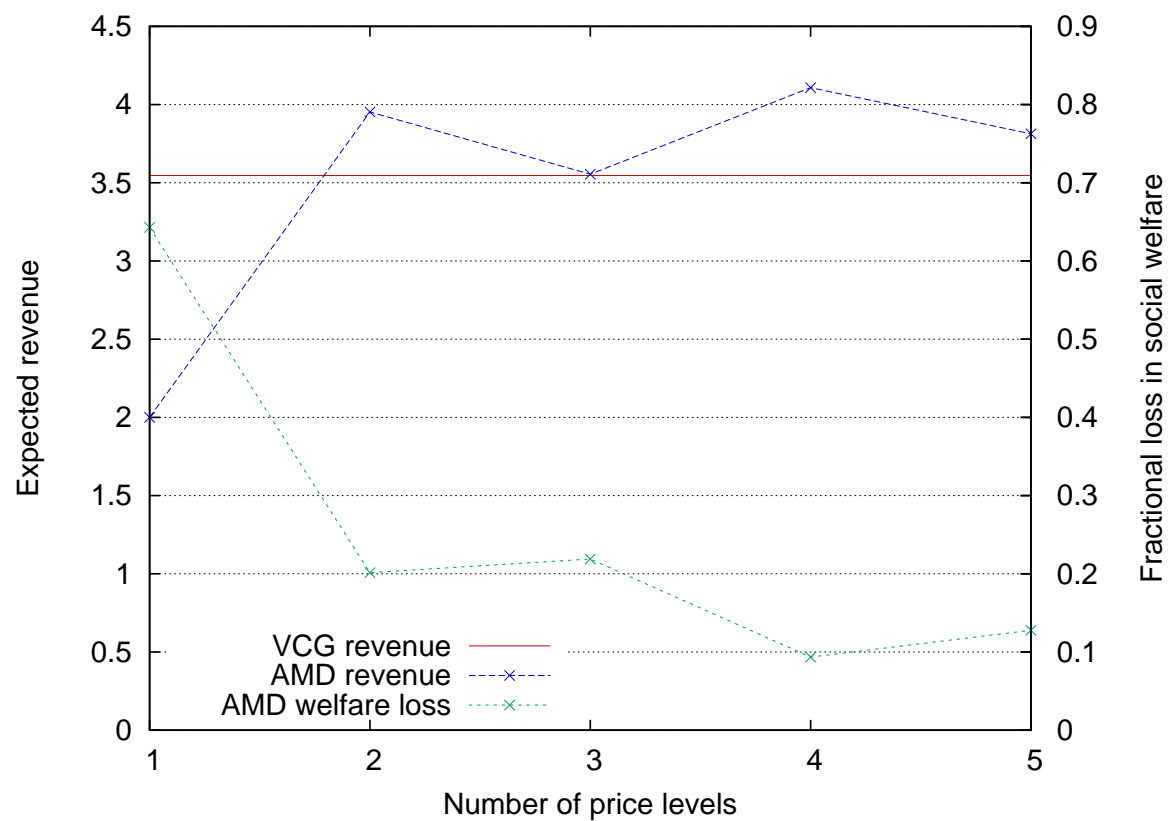


Loss in Expected Revenue Relative to Optimal Mechanism

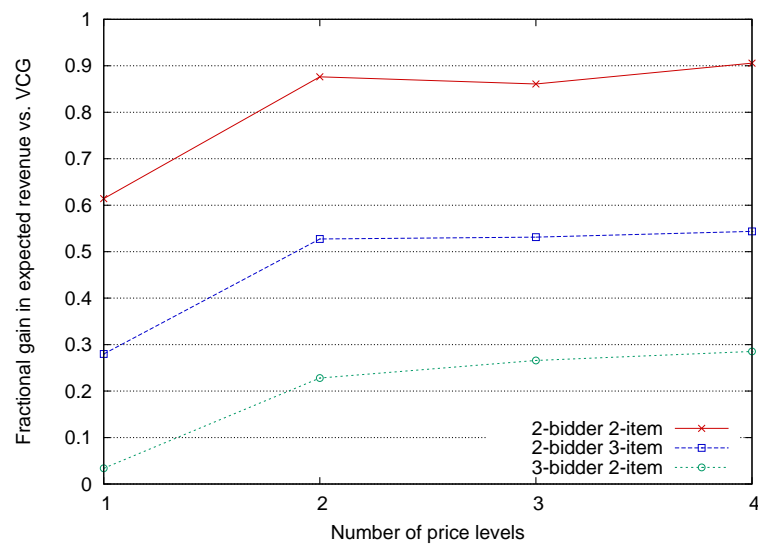
A Simple Auction with Continuous Types

- Two agents have values ranging uniformly from 1 to 3 for each of two goods, A and B.
- Complementarity: if the value for both goods is more than 2, add a complementarity “bonus” of 2.
- Now we must quantize the type space if we want to use AMD. What happens?

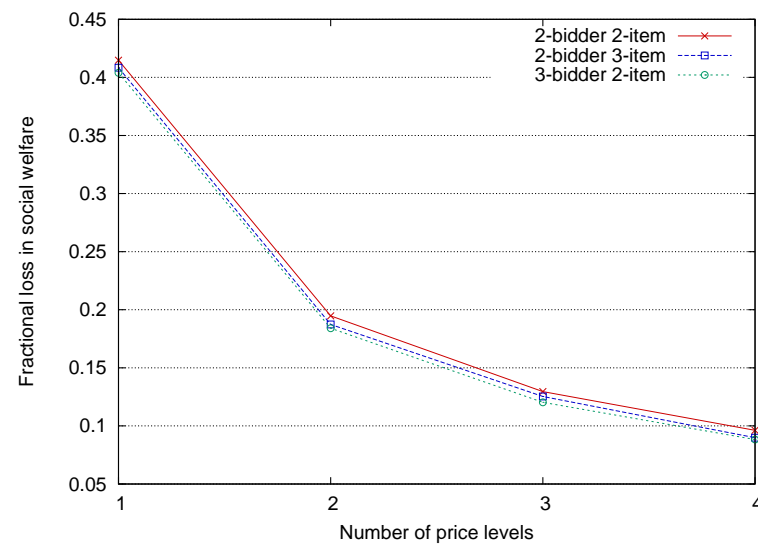
Expected Revenue and Welfare Loss for Quantized Auction



More Auctions: Revenue and Social Welfare



Fractional Gain in Revenue Relative to VCG



Fractional Loss in Welfare Relative to VCG

Conclusions

- We can still get good mechanisms with fuzzy priors and quantization.
- AMD and CA's don't go well together, but we knew that.
- Generating a mechanism is hard, but once we have it using it is fast (in contrast to, say, VCG)!
- Good technique for public goods problems?