

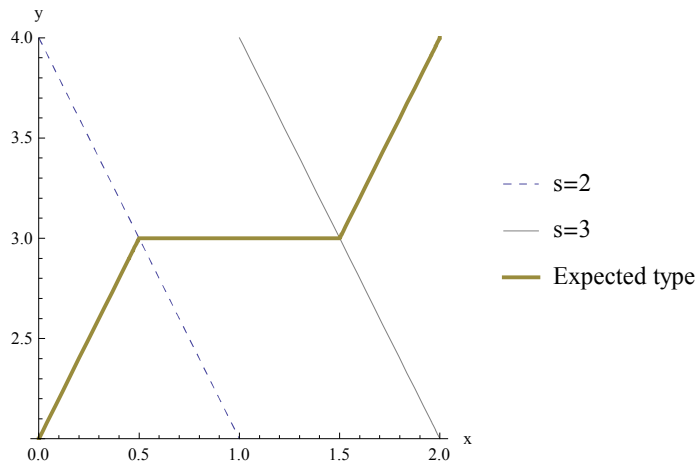
Auction Cartels and the Absence of Efficient Communication

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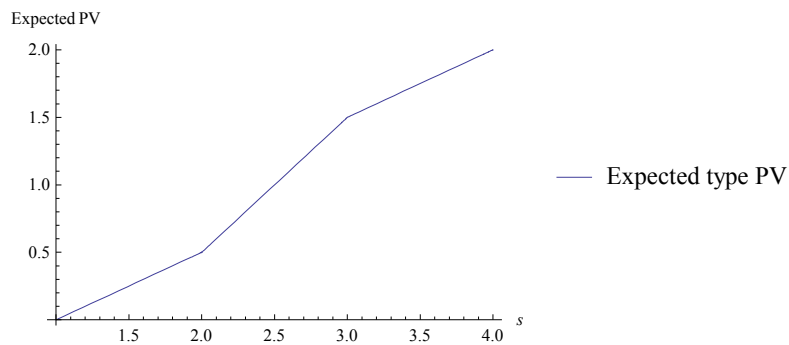
Web Appendix

(*Figure I, Example I. BBCM is feasible. Calculations can be found in the main text.*)

```
f[x_] := If[x < 1/2, 2 * x + 2, If[x < 3/2, 3, 2 * x]]
Plot[{4 - 2 * x, 6 - 2 * x, f[x]}, {x, 0, 2}, AspectRatio -> Automatic,
  PlotLegends -> {"s=2", "s=3", "Expected type"},
  AxesLabel -> {"x", "y"}, PlotRange -> {2, 4}, Frame -> False,
  FrameStyle -> Black, PlotStyle -> {Dashed, GrayLevel[0.5], Thick}]
```



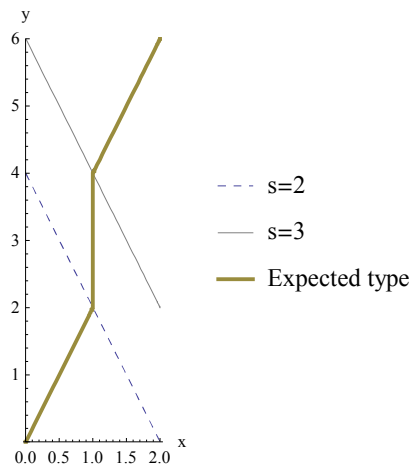
```
h[x_] := If[x < 2, x / 2 - 1 / 2, If[x < 3, x - 3 / 2, x / 2]]
Plot[h[x], {x, 1, 4},
  PlotLegends -> {"Expected type PV"}, AxesLabel -> {s, Expected PV}]
```



(*Figure 2, Example 2. BBCM is not feasible. Calculations can be found in the main text.*)

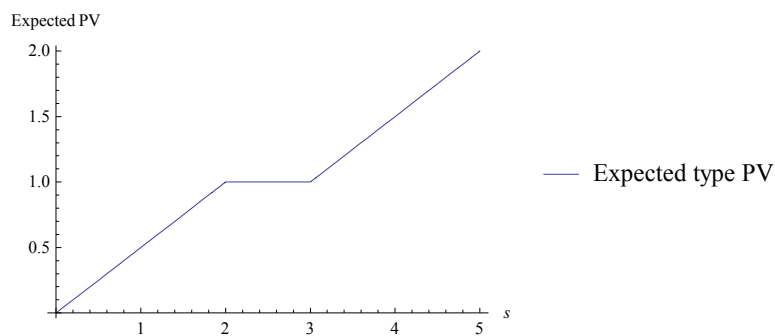
```
g[x_] := If[x < 1, 2 * x, 2 * x + 2]
```

```
Plot[{4 - 2 * x, 6 - 2 * x, g[x]}, {x, 0, 2}, AspectRatio -> Automatic,
  PlotLegends -> {"s=2", "s=3", "Expected type"},
  AxesLabel -> {"x", "y"}, PlotRange -> {0, 6}, Frame -> False,
  FrameStyle -> Black, PlotStyle -> {Dashed, GrayLevel[0.5], Thick}]
```



```
i[x_] := If[x < 2, x / 2, If[x < 3, 1, x / 2 - 1 / 2]]
```

```
Plot[i[x], {x, 0, 5},
  PlotLegends -> {"Expected type PV"}, AxesLabel -> {s, Expected PV}]
```



(*Figure 3, Example 3. Expected revenue is not monotonically increasing function of public disclosure. An example violating the Linkage Principle. *)

```
bida2[x, y] := If[x + y / 2 < (3 - 2.9999), 0, If[x + y / 2 < 2 + (3 - 2.9999) / 2,
  3 / 2 * (x + y / 2) + (3 - 2.9999) / 4, If[x + y / 2 < (3 + 2.9999) / 2, 2 * (x + y / 2) - 1,
  If[x + y / 2 < (3 + 2.9999) / 2 + 2, 3 / 2 * (x + y / 2) + (2.9999 - 1) / 4]]]
```

```
bidb2[w, z] := If[w + z / 2 < (3 - 2.9999), 0, If[w + z / 2 < 2 + (3 - 2.9999) / 2,
  3 / 2 * (w + z / 2) + (3 - 2.9999) / 4, If[w + z / 2 < (3 + 2.9999) / 2, 2 * (w + z / 2) - 1,
  If[w + z / 2 < (3 + 2.9999) / 2 + 2, 3 / 2 * (w + z / 2) + (2.9999 - 1) / 4]]]
```

```
Refine[Expectation[Min[bida[x, y], bidb[w, z]], {x, y, w, z} ≈
  UniformDistribution[{{0, 2}, {0.0001, 5.9999}, {0, 2}, {0.0001, 5.9999}}]]]
0.658343
```

```
bida2[x, y] := If[x + y / 2 < (3 - 2.0001), 0, If[x + y / 2 < 2 + (3 - 2.0001) / 2,
  3 / 2 * (x + y / 2) + (3 - 2.0001) / 4, If[x + y / 2 < (3 + 2.0001) / 2, 2 * (x + y / 2) - 1,
  If[x + y / 2 < (3 + 2.0001) / 2 + 2, 3 / 2 * (x + y / 2) + (2.0001 - 1) / 4]]]
```

```
bidb2[w, z] := If[w + z / 2 < (3 - 2.0001), 0, If[w + z / 2 < 2 + (3 - 2.0001) / 2,
  3 / 2 * (w + z / 2) + (3 - 2.0001) / 4, If[w + z / 2 < (3 + 2.0001) / 2, 2 * (w + z / 2) - 1,
  If[w + z / 2 < (3 + 2.0001) / 2 + 2, 3 / 2 * (w + z / 2) + (2.0001 - 1) / 4]]]
```

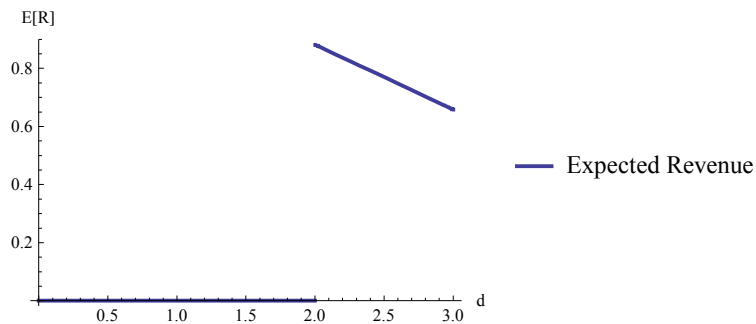
```
Refine[Expectation[Min[bida[x, y], bidb[w, z]], {x, y, w, z} ≈
  UniformDistribution[{{0, 2}, {0.9999, 5.0001}, {0, 2}, {0.9999, 5.0001}}]]]
0.881518
```

```
(0.881517813733899 - 0.6583429530443308) / 0.9998
0.22322
```

```
0.881517813733899 + 0.22321950459048637 * 2.0001
```

```
1.32798
```

```
Plot[If[d <= 2, 0, 1.3279791448653309 - 0.22321950459048637 * d],
  {d, 0, 3}, Exclusions -> {d == 2}, PlotLegends -> {"Expected Revenue"},
  AxesLabel -> {"d", "E[R]"}, PlotStyle -> {Thick}]
```



```
Plot[{2 - 2 * x, 4 - 2 * x, f[x]}, {x, 0, 2}, AspectRatio -> Automatic,
  PlotLegends -> {"s=1", "s=2", "Expected type"},
  AxesLabel -> {"x", "y"}, PlotRange -> {0, 2}, Frame -> False,
  FrameStyle -> Black, PlotStyle -> {Dashed, GrayLevel[0.5], Thick}]
```