The Design of Rent-Seeking Competitions: Committees, Preliminary, and Final Contests: Corrigendum

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My attention has been drawn to an error in Amegashie (1999). To save space, I will only reproduce the relevant equations and ask the reader to refer to the original article.

In Amegashie (1999), I studied a two-stage rent-seeking contest, where a subset of contestants is chosen in a preliminary contest to compete in a final contest. I claimed that aggregate rent-seeking expenditure, T, was *monotonically* decreasing in the returns parameter, b, of the Tullock probability function in the final stage. This is wrong.

The expression for the required derivative is

$$\frac{dT}{db} = \frac{f-1}{f}\left(1 - \frac{N-f}{N}a\right)V \qquad (1)$$

Recall that the returns parameter of the Tullock function in Amegashie (1999) was denoted by "a". For a non-negative payoff in stage 1, we require that $a \leq N/(N-f)$. When $a = N/(N-f)$, the derivative in (1) is zero, given $f \geq 2$. Since dT/db is decreasing in a, it follows that T is non-decreasing in b, given $N > f$ and $a \leq N/(N-f)$. Therefore, the claim that $dT/db < 0$ in Amegashie (1999) is wrong. Note, however, that the claim that $dT/da > 0$ is correct.

However, this error does not affect any results in Amegashie (1999). Based on $dT/da > 0$ and the erroneous claim that $dT/db < 0$, I argued that setting a higher quality standard (i.e., a higher returns parameter of the Tullock function) in the final stage than in the preliminary stage, *given* a two-stage contest, reduces rent-seeking waste. This conclusion is correct but a different argument is required to prove it. What is required is to show that $dT/da > dT/db \geq 0$. Notice that if $dT/db < 0$ and $dT/da > 0$, then $dT/da > dT/db$. Since the erroneous claim that $dT/db < 0$ is consistent with $dT/da > dT/db$, it turns out that the conclusion derived from this wrong claim (i.e., $dT/db < 0$) remains valid.

Suppose $dT/da > dT/db$. That is, a unit reduction in the returns parameter in the preliminary stage reduces aggregate expenditures more than the same reduction in the returns parameter in the final stage. Now $dT/da = (N - f)(f - b(f-1))V/Nf > 0$, where $b < f/(f-1)$. In what follows, fix b, N and f. If $a = N/(N-f)$, then $dT/db = 0$. Therefore, $dT/db < dT/da$, if $a = N/(N-f) \equiv \bar{a}$. If $a = 0$, then $dT/db = (f-1)V/f > dT/da$, if $N(f-1) > (N-f)(f - b(f-1))$. Assume that the latter condition holds. Then by continuity, there exists some $a = \hat{a} \in (0, \bar{a})$ at which $dT/da = dT/db > 0$. Therefore, $dT/da > dT/db$ for $a \in (\hat{a}, \bar{a}]$.

To illustrate the relevance of the preceding analysis, suppose we currently have a two stage rent-seeking contest as in Amegashie (1999). There are two administrators. One is allocated to stage 1 and the other is allocated to stage 2. These administrators determine the winners in each stage. Each administrator has a sensitivity parameter (i.e., a or b) equal to 1. Suppose there is a third administrator who has a *smaller* sensitivity parameter and we have the option of replacing one of the current two administrators with this third administrator. If we want to reduce aggregate rent-seeking expenditures, in which stage should we effect this replacement? The answer depends on the relative magnitudes of dT/da and dT/db. Given the *current* administrators, a = b = 1. Then dT/da = (N-f)V/Nf and dT/db = (f-1)V/N. So dT/da > dT/db, if $N > f^2$. Hence, if N is sufficiently large, the replacement should be made in stage 1. This result is very intuitive. Since N matters only in the preliminary stage, the gains to a reduction in rent-seeking expenditures are likely to be large, if N is sufficiently high and this reduction occurs in stage 1.

But if dT/da < dT/db, it does *not* mean that the replacement should be made in stage 2. If we were *restricted* to a two-stage design, then the replacement should be made in stage 2. But since the option of a one-stage design also exists, we should instead have a single-stage contest run by the third administrator since aggregate expenditures in the single-stage contest, S < T if a = 1 and b < 1 (see Amegashie, 1999). Indeed, given that S = b(N-1)V/N = T when a = b = 1 and dT/da > 0, dT/db > 0,[1] the rankings of the single-stage contest and the two-stage contest in cases (ii) and (vii) in Amegashie (1999) are obvious.

More importantly, notice from the rankings of the single-stage contest and the two-stage contest on page 71 of Amegashie (1999) that T > S whenever a > b. These correspond to cases (ii) and (iv). So in these cases, the one-stage contest dominates the two-stage contest. Hence, it is never optimal to have a > b, given that the option of a one-stage contest is available. When a ≠ b, it is only in cases (vi), (vii) and (viii) where a < b that T < S. Therefore, when the two-stage contest dominates the one-stage contest and a ≠ b, then the returns parameter (quality standard) in the preliminary stage must be lower than the returns parameter (quality standard) in the final stage. These arguments imply that Amegashie's (1999) point that a < b is optimal is correct and is not affected by the erroneous claim that dT/db < 0.

This error (i.e., dT/db < 0) does *not* affect any other arguments in Amegashie (1999). It also does not affect any results including all the rankings of the one-stage design and the two-stage design on page 71 of Amegashie (1999) and the result that the expenditure-minimizing number of finalists is $f^* = mN^{1/2} < N$, when b > 1 and a > 1.

References

Amegashie, J. A. (1999). The design of rent-seeking competitions: committees, preliminary and final contests. *Public Choice*, Vol. 99: 63-76.

[1] Of course, this holds if a < N/(N-f).