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Replication/Reappraisal

Correction to Feddersen and Pesendorfer (1998)

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The proof of Proposition 2 in Feddersen and Pesendorfer (1998, American Political Science Review *92(1): 23–35) is flawed. This note presents an elementary direct proof of the result.*

In their seminal paper, Feddersen and Pesendorfer (1998, 32) make a squeeze argument to establish a limit (Proposition 2) using the inequalities

$$1+\frac{-1}{n}\ln f \geq f^{\frac{-1}{n-1}} \geq 1+\frac{-1}{n-1}\ln f, \tag{6}$$

where $f \in (0,1)$ and $n \geq 2$.[1] However, only the second inequality holds.[2] The argument, therefore, establishes just one bound on the quantity of interest.

This bound only serves to demonstrate that, as the jury size grows, the equilibrium probability of convicting an innocent defendant stays bounded away from one; not zero. Still, Proposition 2 is true. I provide a short proof below.

Claim. Let $p \in (1/2,1)$, $q \in (1-p,1)$, and $f := \frac{(1-q)(1-p)}{qp}$. Then

$$\lim_{n\uparrow\infty}\left(\frac{p}{2p-1}f^{-\frac{1}{n-1}}-\frac{1-p}{2p-1}\right)^{-n} = f^{\frac{p}{2p-1}}.$$

Proof. Let $a := \frac{p}{2p-1}$. For $n \geq 2$, write $x_n := a\left(f^{-\frac{1}{n-1}}-1\right)$ and

$$\begin{aligned} h_n &:= \frac{p}{2p-1}f^{-\frac{1}{n-1}}-\frac{1-p}{2p-1} \\ &= 1+a\left(f^{-\frac{1}{n-1}}-1\right) = 1+x_n. \end{aligned}$$

Note that $x_n > 0$ (when $n \geq 2$) since $a > 0$ and $f \in (0,1)$. So,

$$\begin{aligned} \ln((h_n)^{-n}) &= -n\ln(1+x_n) \\ &= -n\left[\frac{-\ln f}{n-1}\right]\frac{x_n}{\left[\frac{-\ln f}{n-1}\right]}\frac{\ln(1+x_n)}{x_n} \end{aligned}$$

is well-defined. Using $f^{-\frac{1}{n-1}} = e^{\frac{-\ln f}{n-1}}$,

$$\ln((h_n)^{-n}) = \underbrace{-n\left[\frac{-\ln f}{n-1}\right]}_{\to \ln f} \times \underbrace{\frac{a\left(e^{\left[\frac{-\ln f}{n-1}\right]}-1\right)}{\left[\frac{-\ln f}{n-1}\right]}}_{\to a} \times \underbrace{\frac{\ln(1+x_n)}{x_n}}_{\to 1} \xrightarrow{n\uparrow\infty} a\ln f$$

since $\lim_{n\uparrow\infty}x_n = 0$ while $\lim_{y\to 0}\frac{\ln(1+y)}{y} = 1$ and $\lim_{y\to 0}\frac{e^y-1}{y} = 1$. Therefore,

$$\lim_{n\uparrow\infty}(h_n)^{-n} = f^a \equiv f^{\frac{p}{2p-1}}.$$

□

CONFLICT OF INTEREST

The author declares no ethical issues or conflicts of interest in this research.

ETHICAL STANDARDS

The author affirms this research did not involve human participants.

REFERENCE

Feddersen, Timothy, and Wolfgang Pesendorfer. 1998. “Convicting the Innocent: The Inferiority of Unanimous Jury Verdicts under Strategic Voting.” *American Political Science Review* 92 (1): 23–35.

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[1] The middle term in (6) is printed slightly differently here to avoid ambiguity.

[2] In fact, $f^{\frac{-1}{n-1}} = e^{\frac{-\ln f}{n-1}} > 1+\frac{-\ln f}{n-1} > 1+\frac{-\ln f}{n}$.