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# Statistical outlier analysis in litigation support: the case of *Paul F. Engler and Cactus Feeders, Inc., v. Oprah Winfrey et al.*

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## Abstract

In the 1990s three decisions of the United States Supreme Court raised standards for admissibility of scientific and special knowledge testimony in Federal trials. Many states have adopted comparable standards. Expert economic testimony that seeks to prove facts from statistical generalizations has received considerable scrutiny in litigation. This article focuses on the nitty-gritty of performing regression studies that can meet the new standards for admissibility. The article redefines chance outliers in terms of tail probabilities of distributions. Tests for presence of outliers produced by anomalous factors are specified in terms of number of diagnosed outliers and waiting-times of their occurrence.

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“Our task, then, is to analyze not what the experts say, but what basis they have for saying it.” Judge Kozinski, 43 F.3d 1311, 1316 (Ninth Circuit, 1995)

“Any hypothesis must be tested on all points of observational fact.”

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<sup>2</sup> The confirmation of continental drift, *Scientific American*, April, 1968. Reprinted in *Continents Adrift*, 1972.

## 1. Introduction

“It has just stopped me cold from eating another burger”, so said Oprah Winfrey in her broadcast of April 16, 1996. She was responding to a guest’s disturbing account of cattle feeding practices in the United States. The topic of Ms Winfrey’s April 16, 1996 show was “Dangerous Foods”. The show included a discussion of bovine spongiform encephalopathy, or “Mad Cow Disease”. There had been increasing media coverage of “mad cow disease” for a considerable number of months.

In *Paul F. Engler and Cactus Feeders, Inc., v. Oprah Winfrey et al.* plaintiffs sought a substantial award of damages from defendants, alleging the total damages to be \$4,893,843. Plaintiffs claimed to have suffered economic harm because of a sudden and unusual decrease of the cattle prices in April 1996, which—they asserted—was caused by Oprah Winfrey’s actions. Plaintiffs contended that, but for actions of Oprah Winfrey *et al.*, such a decline would not have occurred under the market conditions which prevailed up to that time.

Plaintiffs were cattle producers who sold fed cattle to meat packers. Plaintiffs alleged that by broadcasting this segment of Ms Winfrey’s show defendants published or allowed to be published disparagements of the beef industry and of the safety of American beef. Plaintiffs alleged that defendants’ actions caused the price of fed cattle to decline, and that the price decrease in turn directly or proximately caused them to suffer economic damage: (1) Plaintiffs alleged that defendants’ actions forced them to sell cattle for less than they would have sold them had the market prices not declined significantly. Plaintiffs alleged that the damage from that cause was \$198,562. (2) Since—plaintiffs alleged—they experienced greater uncertainty as a result of Ms Winfrey’s broadcast, they increased their hedging activities, which—they argued—caused Cactus Feeders, Inc. to suffer economic harm, the total damage allegedly being \$4,695,281. The complaint and rebuttal are briefly summarized in Section 1.1.

Daniel Slotte of KPMG Peat Marwick (Dallas, TX) was a testifying expert for defendants. I served as a non-testifying statistical and econometrics consultant on the defense research team. My assigned task was to evaluate the plaintiffs’ statistical evidence and argumentation. Quite properly, neither defendants’ testifying experts nor their non-testifying consultants were apprised of the nature of defense counsel’s strategies of persuasion. The chief econometric task was to determine whether plaintiffs’ economics expert had established a *prima facie* statistical case for the occurrence of anomalous outliers in fed cattle prices during the weeks including and immediately following the Oprah Winfrey show on April 16, 1996.

With reference to any batch of data in which it appears, an *outlier* is an entry that differs markedly from most of the other entries in the batch. Barnett and Lewis (1994, pp. 7–8) “... describe an outlier in a set of data to be *an observation (or subset of observations) which appears to be inconsistent with the remainder of that set of data.*” Sprent (1998, p. 57) describes an outlier as “... an observation so remote from other observations as to cause surprise.” The immediate cause of surprise is the very low relative frequency with which such observations have occurred in the past. [Sections 3.1–3.2 will introduce a more precise definition of ‘outlier’ in terms of statistical probability.] Outliers can occur by pure chance; they can also be produced

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