

**Applied Probabilistic Reasoning: A  
*Vade Mecum* to Accompany a First  
Course in Statistics**

Ehsan Bokhari and Lawrence Hubert  
The University of Illinois  
November 2, 2014

# A Populist Prologue

Last week, the Supreme Court reversed a century of law to open the floodgates for special interests—including foreign corporations—to spend without limit in our elections. Well I don't think American elections should be bankrolled by America's most powerful interests, or worse, by foreign entities.

— President Barack Obama (State of the Union Address, January 27, 2010)

The quotation just given was made by President Obama in response to the landmark Supreme Court case of *Citizens United v. Federal Election Commission* (2010) in which the Court held that the First Amendment prohibited the government from restricting independent political expenditures by corporations and unions. Or, as one might say facetiously: “money is speech and corporations are people.” For those interested in political theater, the picture of the black-robed Supreme Court justices arrayed stone-faced in front of the President was priceless, including Justice Alito shaking his head back-and-forth and mouthing the words “not true.”

The main concern with the *Citizen's United* ruling seems to be the unproven belief that no matter the political topic or candidate, if enough money is available, the American people can be persuaded to believe and vote the way that those with the most money wants the electorate to vote. If true, this is a bad omen for the future of the United States. It suggests that no matter what data are available and how the evidence is presented, if enough negative information is provided, however unjustified or untrue, people can be made to believe just about anything. Our view is somewhat more optimistic than this; it is our fervent hope that data and associated argumenta-

tion presented honestly and accurately can persuade in appropriate directions and lead to actions that are ethically defensible. The issues that face the United States, or for that matter, the World (such as climate change, resource and wealth inequality, religious intolerance, human rights, and so on), are just too important to be resolved by money that is used solely to counter credible data-based arguments because they are potentially detrimental to someone's personal (business) concerns.

In the various modules that follow, our interests will center on data given mostly in the form of simple 2 by 2 ( $2 \times 2$ ) tables that serve to cross-classify individuals or other entities according to two different attributes they may display (e.g., male/female versus tall/short). This may seem a bit simplistic at first, but as will be seen in the presentations to come, it definitely is not. There are some deep issues involved when probabilistic reasoning is approached through such simple tables and related graphical devices, and informed by an understanding of the basic sampling model(s) that underlie much of modern statistics.