

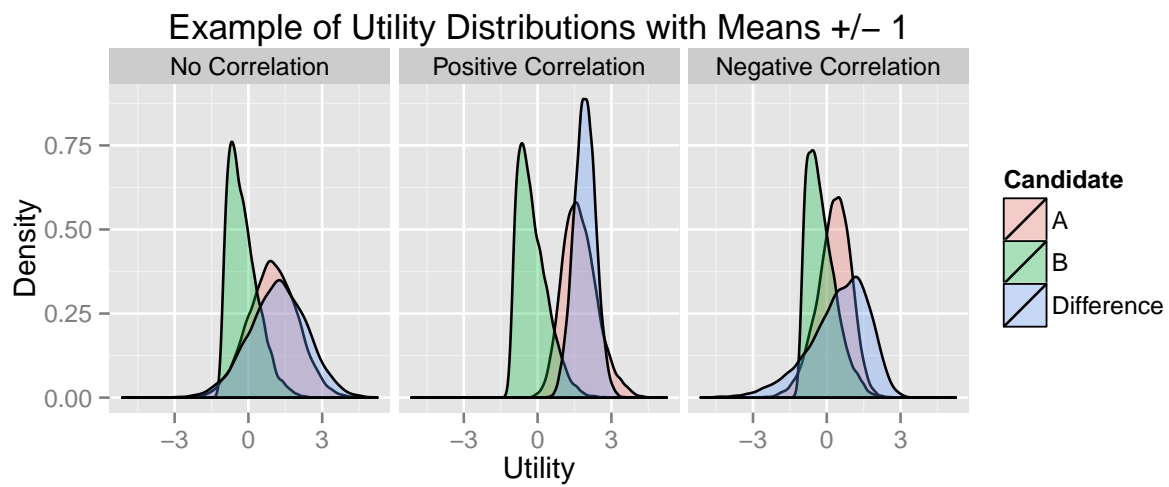
# Comparison of the Efficiency of Majority Election Results

May 1, 2014

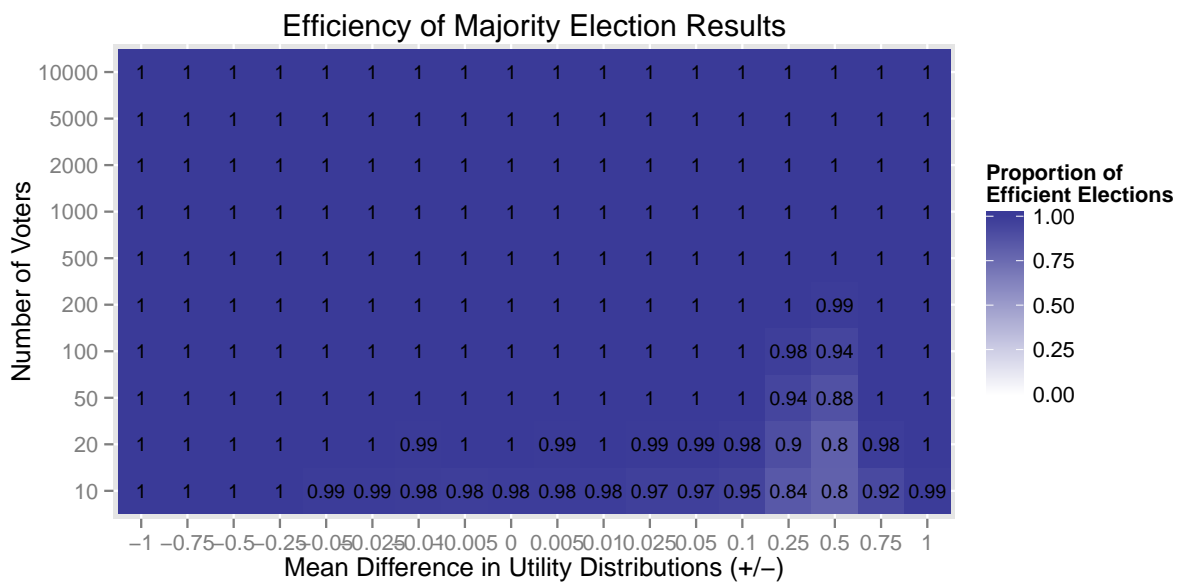
## Overview of Simulation Parameters

- Number of simulations for each scenario: 1000
- Numbers of voters: 10, 20, 50, 100, 200, 500, 1000, 2000, 5000, 10000
- Utility distributions for each voter (candidates  $A$  and  $B$ ):  
$$\begin{pmatrix} U_A \\ U_B \end{pmatrix} \sim \mathcal{N} \left( \boldsymbol{\mu} = \begin{pmatrix} 0 + \epsilon \\ 0 - \epsilon \end{pmatrix}, \boldsymbol{\Sigma} = \begin{pmatrix} 1 & \sigma^2 \\ \sigma^2 & 1 \end{pmatrix} \right)$$
- Differences in distribution means ( $\epsilon$ ): -1, -0.75, -0.5, -0.25, -0.05, -0.025, -0.01, -0.005, 0, 0.005, 0.01, 0.025, 0.05, 0.1, 0.25, 0.5, 0.75, 1
- Correlations between utilities ( $\sigma^2$ ): 0, 0.9, -0.9
- Skewness of distribution ( $\alpha$ ): 0, 10, -10

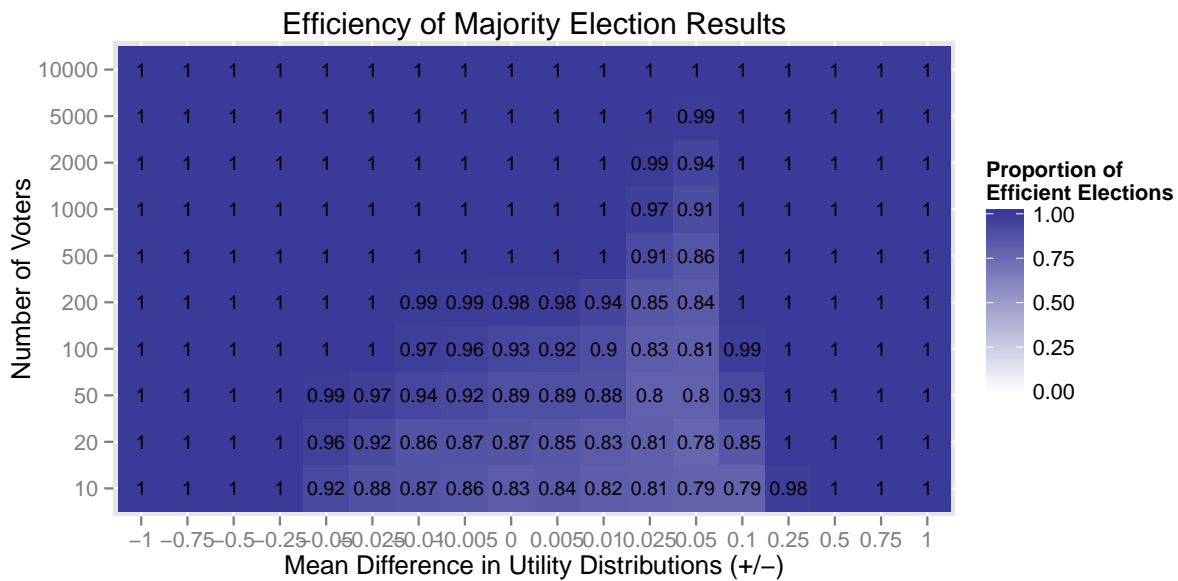
# 1 Normal + Positively Skewed Utilities



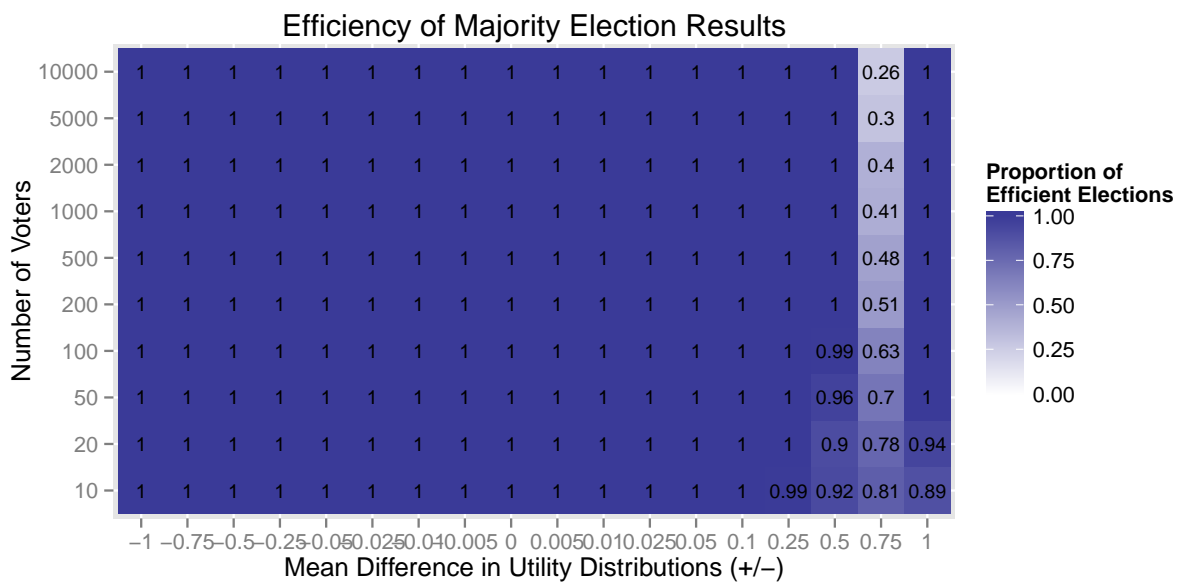
## 1.1 No Correlation Between Utilities



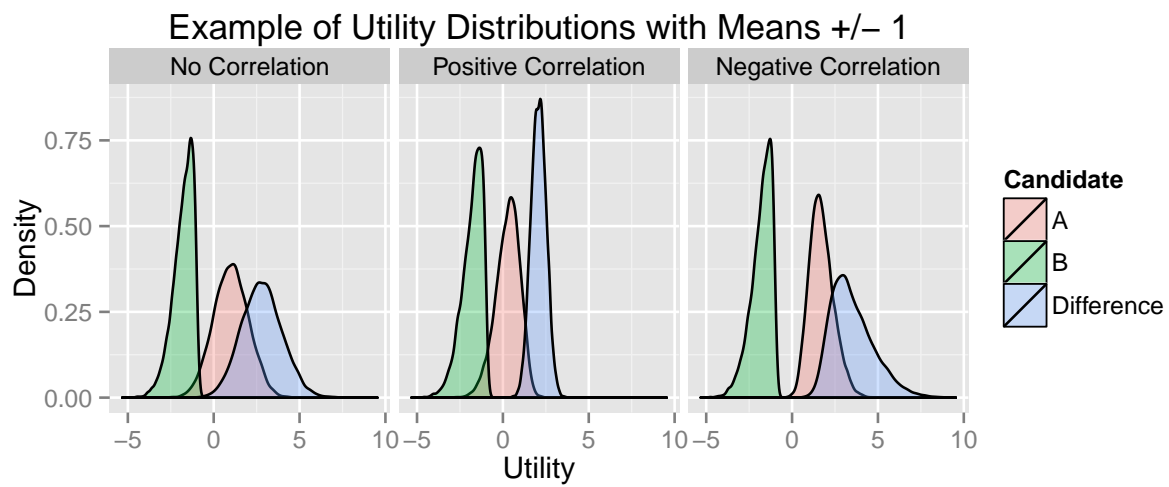
## 1.2 Positive Correlation Between Utilities



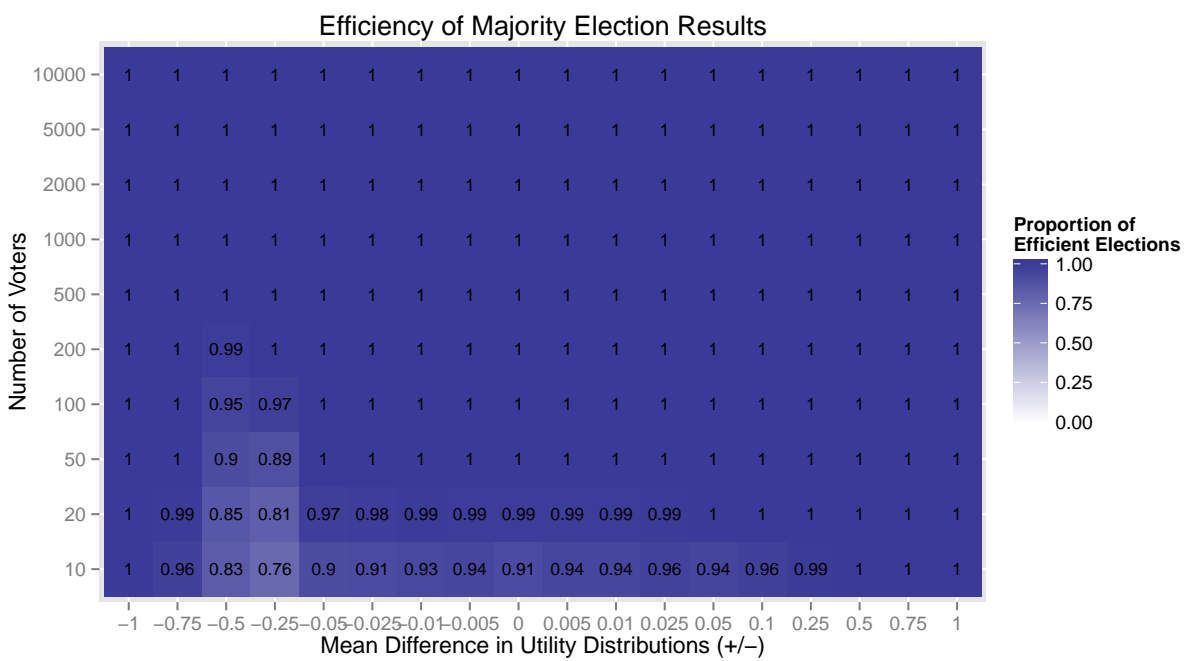
## 1.3 Negative Correlation Between Utilities



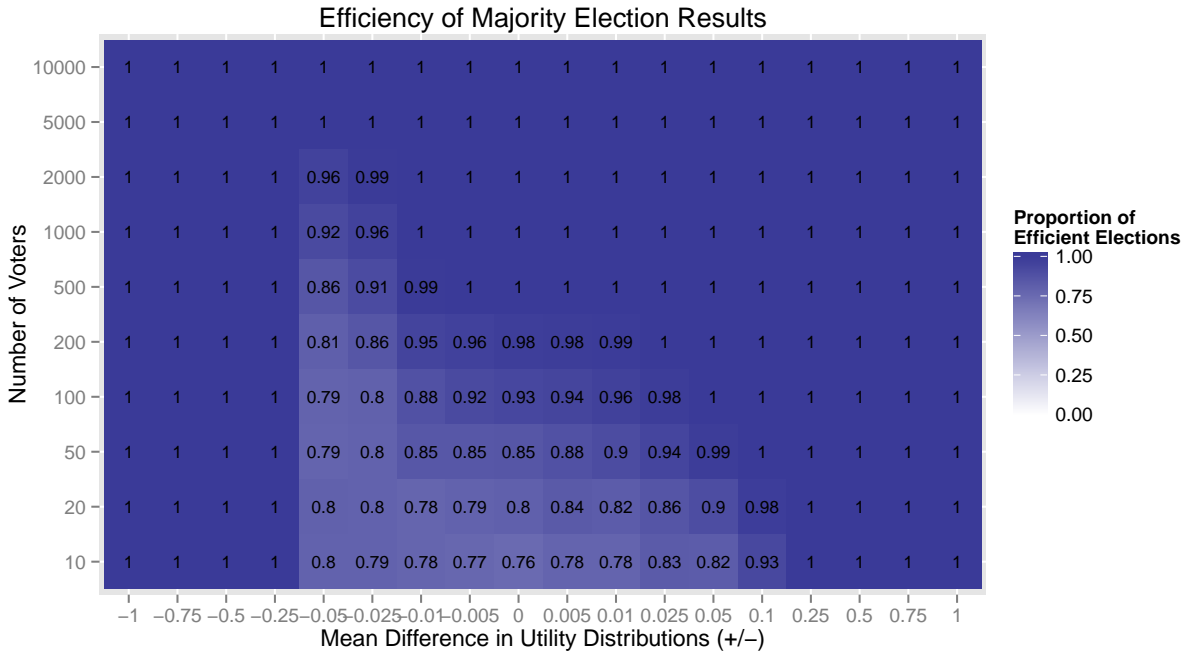
## 2 Normal + Negatively Skewed Utilities



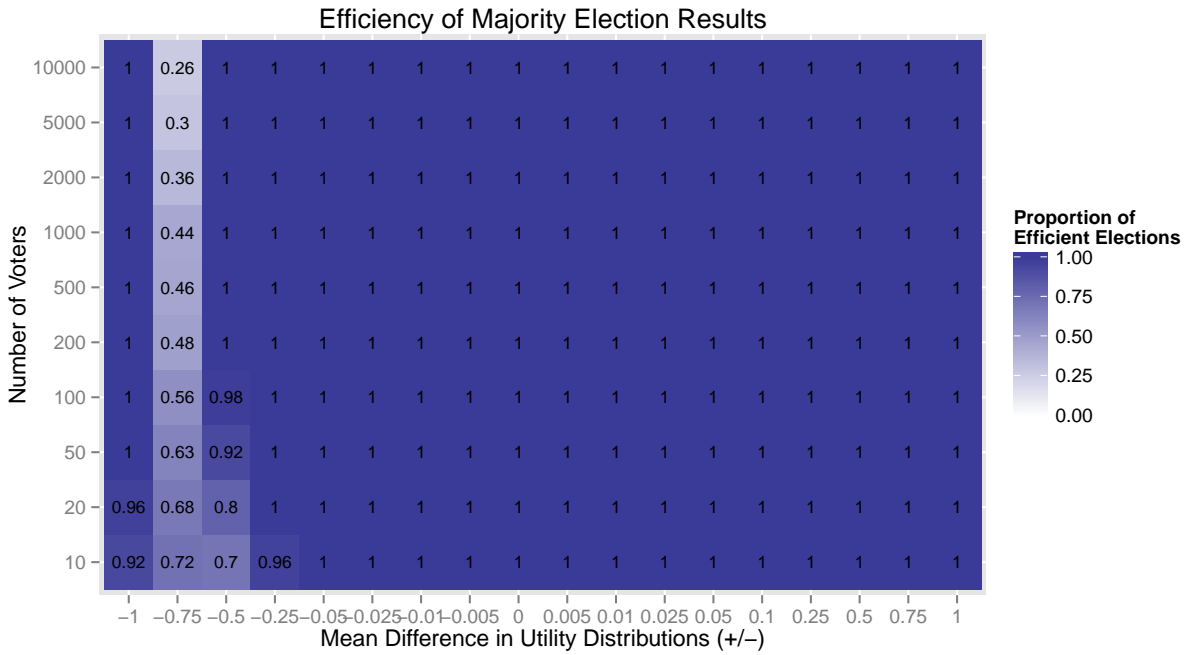
### 2.1 No Correlation Between Utilities



## 2.2 Positive Correlation Between Utilities



## 2.3 Negative Correlation Between Utilities



### 3 Closer Look at Inefficient Distributions

- No correlation b/w utilities
- Opposing skewness, negative Skew for favored candidate

