

IMPERFECT INFORMATION, MONITORING COSTS, AND STATE DEBT RATINGS

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Abstract

An enacting government coalition issuing debt cannot make a credible commitment to maintain the existing debt repayment policy. Investors look to recent political turnover to estimate the possibility that some future government coalition will remain substantially similar to the enacting coalition. We test this in a model of state bond ratings from 1995 through 2000 for over 40 states and find that political turnover and divided government increase the default risk of state bonds.

Motivation

- Little on the politics of state bond ratings.
- Bond ratings change, costs of debt service, also.
- Solve the multiple raters problem.
- Estimate effects of turnover and divided govt.

Literature and Theory

- Elections first create then eliminate uncertainty.
- Investors must forecast default risk with the possibility of differing future coalitions.
- Government issued debt epitomizes the time-inconsistency problem, itself exacerbated by political uncertainty.
- Turnover need not lead to necessarily lead to change to increase the perceived risk to the investor.
- Institutions can mitigate these risks.

Variables of Interest

- Turnover:
 1. Cumulative number of changes from unified to divided government, or vice versa.
 2. Total number of changes during the sample period [fixed by i].
- Divided government:
Differing [unified] partisan control of the executive and legislative branches.

Measuring Risk: Bayesian IRT

INTUITION

y_{itb} all measure the inverse of risk, each with different scales. We can leverage multiple indicators to improve measures of risk. We do this in a standard ordered probit without a conditional mean function.

NOTATION

y_{itb} : bond rating for state i at time t by agency b .
Ordered rating with k_b categories.

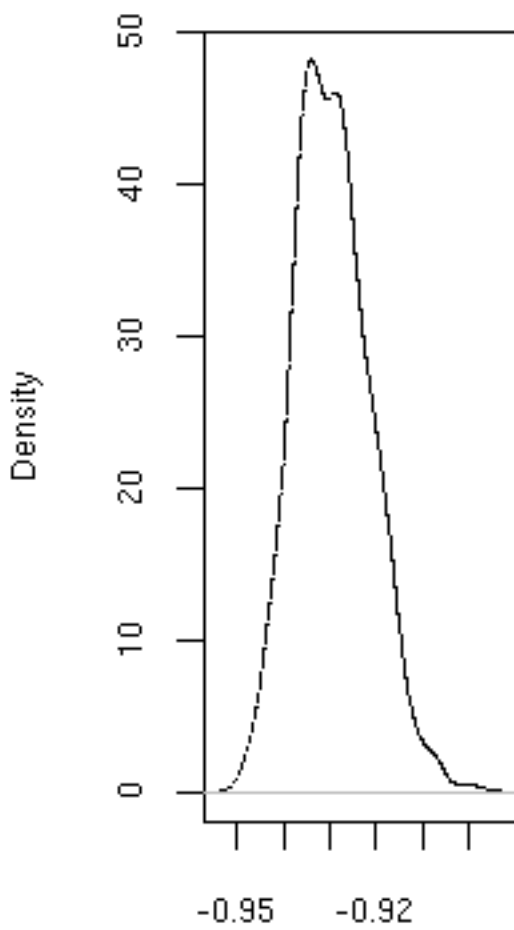
$$y_{itb} = F(\Lambda_b, \theta_{it}^*) \quad (1)$$

Λ_b : difficulty, discrimination, and cutpoint parameters.
 θ_{it}^* : “true” risk of state i at time t .

$$Pr(y_{itb} = k_b) = \Phi(\alpha_{b,k_b} - \theta_{it}^*) - \Phi(\alpha_{b,k_b-1} - \theta_{it}^*) \quad (2)$$

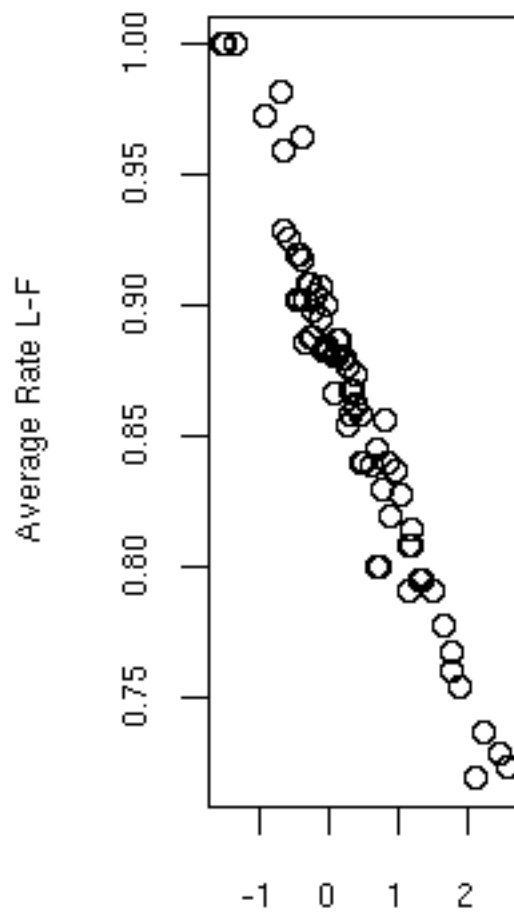
Assessing the Measurement Model

Density: Correlations



Pearson's r

Averages and Factors



Factor Scores

Factor score: Mean (1000 samples)

| | State | Year | $\hat{\theta}_{it}^*$ | D-L Value |
|------|----------------|-------------|-----------------------|------------------|
| | North Carolina | 1995 | -1.489 | 1 |
| | North Carolina | 1996 | -2.053 | 1 |
| LOW | North Carolina | 1997 | -1.609 | 1 |
| RISK | North Carolina | 1998 | -1.046 | 1 |
| | North Carolina | 1999 | -1.832 | 1 |
| | North Carolina | 2000 | -2.595 | 1 |
| | Louisiana | 1995 | 2.456 | .72 |
| | Louisiana | 1996 | 3.068 | .72 |
| HIGH | Louisiana | 1997 | 2.469 | .728 |
| RISK | Louisiana | 1998 | 2.586 | .724 |
| | Louisiana | 1999 | 2.586 | .724 |
| | Louisiana | 2000 | 3.053 | .737 |

Table 1: Comparing Measures of Risk

Methodology

Two obvious alternatives:

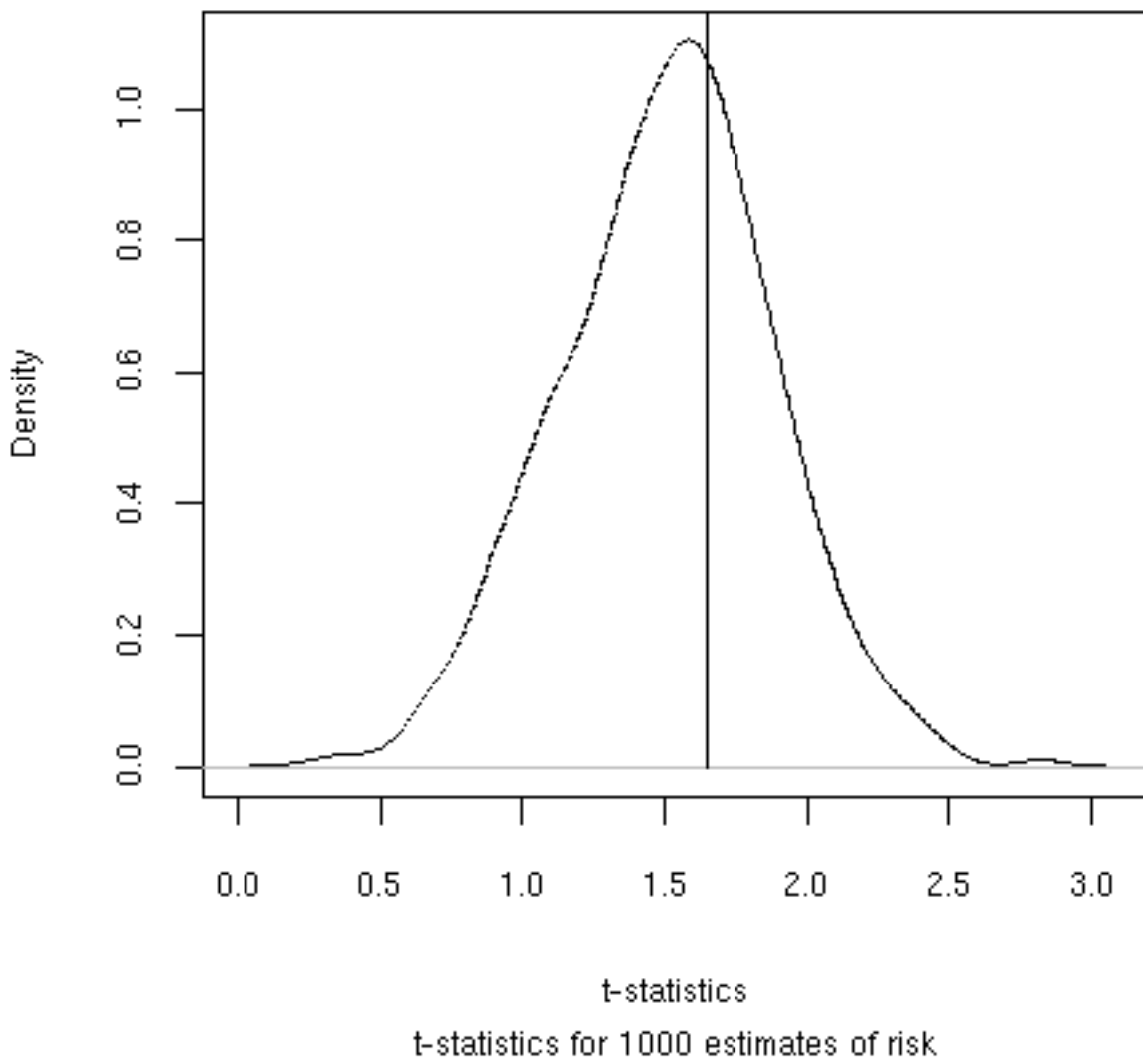
1. Full Bayesian structural estimation tying measurement of risk to covariates.
Disadvantage: Every model must be independently [repetitively] estimated.
2. Bayesian IRT for measures of risk. Regression over multiple posterior draws.

Results, Part I: Turnover

| | Estimate | Std. Error | t value | Pr(> t) |
|------------------------|----------|------------|---------|----------|
| (Intercept) | -3.4808 | 0.6658 | -5.23 | 0.0000 |
| Turnover | 0.1617 | 0.0977 | 1.66 | 0.0992 |
| Corruption | 0.6667 | 0.1634 | 4.08 | 0.0001 |
| State Tax Burden | 0.0960 | 0.0405 | 2.37 | 0.0185 |
| $\frac{Debt}{Revenue}$ | 0.0112 | 0.0036 | 3.10 | 0.0022 |
| per capita Income | -0.0200 | 0.0118 | -1.70 | 0.0906 |
| per capita Debt | 0.0385 | 0.0791 | 0.49 | 0.6271 |
| Unemployment | 0.4154 | 0.0510 | 8.14 | 0.0000 |
| 1996 | 0.1992 | 0.1770 | 1.13 | 0.2616 |
| 1997 | 0.2920 | 0.1699 | 1.72 | 0.0870 |
| 1998 | 0.4169 | 0.1765 | 2.36 | 0.0190 |
| 1999 | 0.4908 | 0.1871 | 2.62 | 0.0093 |
| 2000 | 0.4879 | 0.1973 | 2.47 | 0.0141 |

Table 2: Turnover and Mean Risk: Risk Measures are the average of 1000 draws from the posterior distribution of $\hat{\theta}_{it}^*$. Turnover is the current number of changes to and from unified government in the six year sample period.

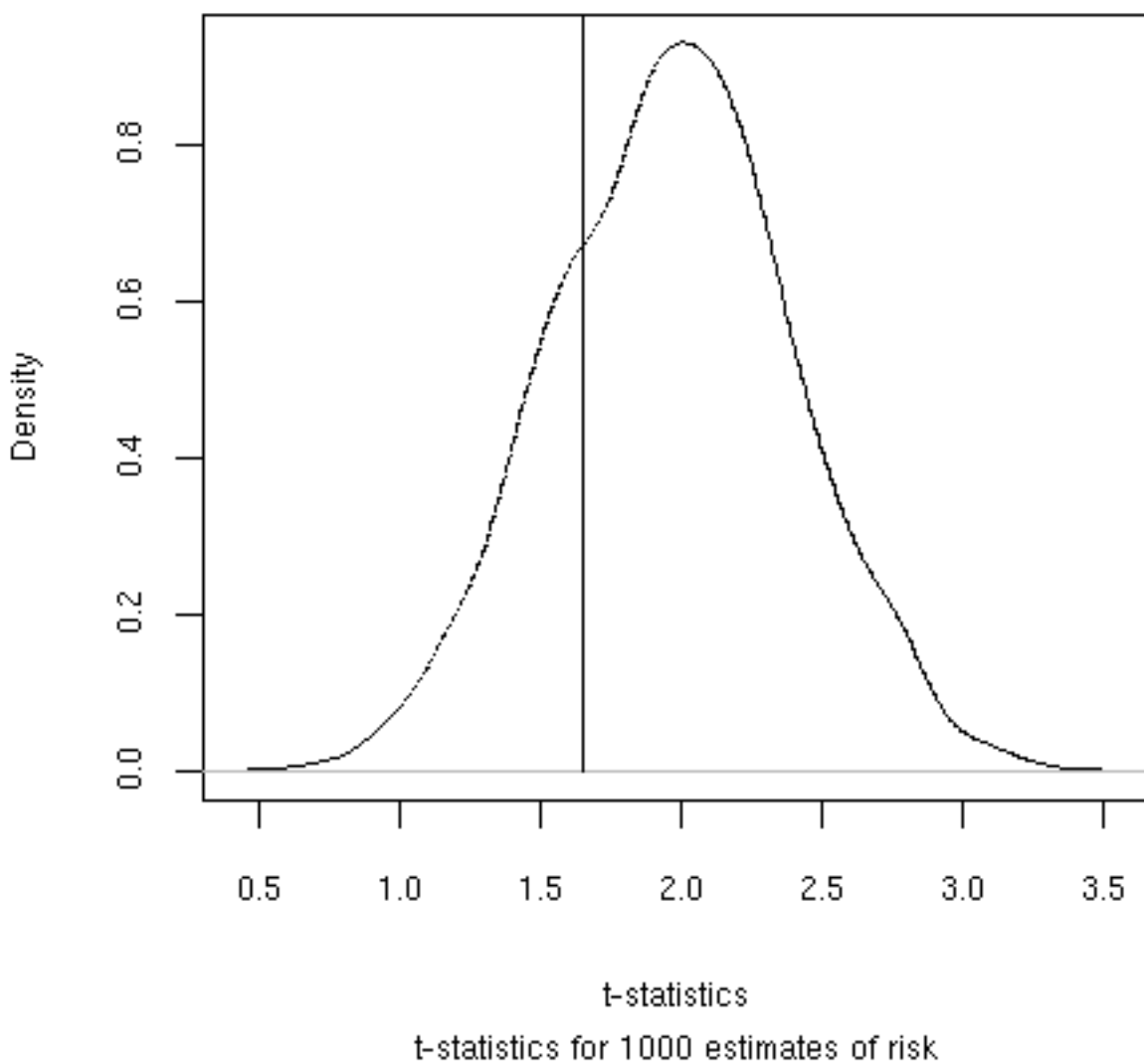
Density: Risk and Turnover



| | Estimate | Std. Error | t value | Pr(> t) |
|------------------------|----------|------------|---------|----------|
| (Intercept) | -3.6565 | 0.6703 | -5.45 | 0.0000 |
| Total Turnover | 0.1619 | 0.0749 | 2.16 | 0.0317 |
| Corruption | 0.6595 | 0.1628 | 4.05 | 0.0001 |
| State Tax Burden | 0.0950 | 0.0402 | 2.36 | 0.0191 |
| $\frac{Debt}{Revenue}$ | 0.0115 | 0.0036 | 3.20 | 0.0015 |
| per capita Income | -0.0196 | 0.0117 | -1.67 | 0.0958 |
| per capita Debt | 0.0431 | 0.0788 | 0.55 | 0.5852 |
| Unemployment | 0.4266 | 0.0514 | 8.30 | 0.0000 |
| 1996 | 0.2368 | 0.1754 | 1.35 | 0.1784 |
| 1997 | 0.3353 | 0.1671 | 2.01 | 0.0459 |
| 1998 | 0.4882 | 0.1723 | 2.83 | 0.0050 |
| 1999 | 0.5745 | 0.1811 | 3.17 | 0.0017 |
| 2000 | 0.5890 | 0.1894 | 3.11 | 0.0021 |

Table 3: Turnover and Mean Risk, Part II: Risk Measures are the average of 1000 draws from the posterior distribution of $\hat{\theta}_{it}^*$. Turnover is the total number of changes to and from unified government in the six year sample period. The vertical line represents one-tailed significance at the .05 level of probability.

Density: Risk and Total Turnover

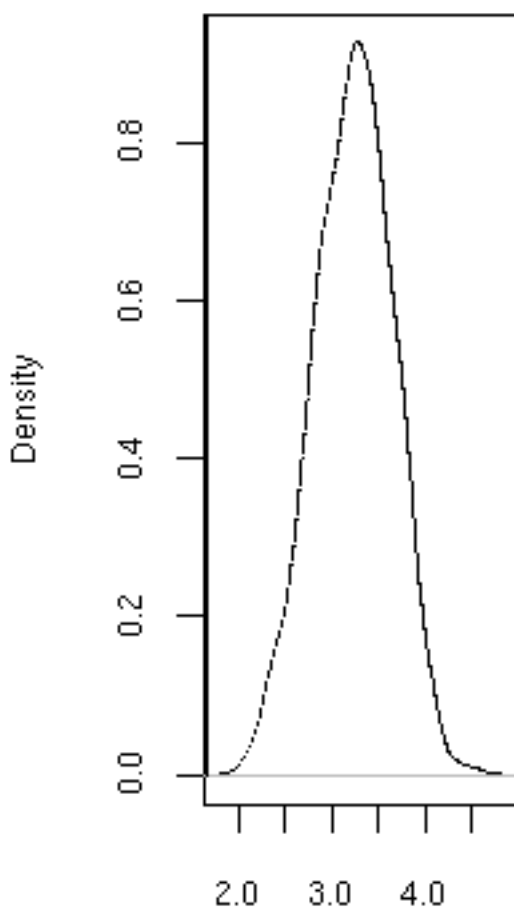


Results, Part II: Divided Government

| | Estimate | Std. Error | t value | Pr(> t) |
|------------------------|----------|------------|---------|----------|
| Divided Government | 0.3699 | 0.1039 | 3.56 | 0.0004 |
| Turnover | 0.2329 | 0.0975 | 2.39 | 0.0177 |
| Corruption | 0.6960 | 0.1598 | 4.36 | 0.0000 |
| State Tax Burden | 0.1298 | 0.0407 | 3.19 | 0.0016 |
| $\frac{Debt}{Revenue}$ | 0.0115 | 0.0035 | 3.26 | 0.0013 |
| per capita Income | -0.0122 | 0.0117 | -1.05 | 0.2969 |
| per capita Debt | 0.0020 | 0.0779 | 0.03 | 0.9798 |
| Unemployment | 0.3915 | 0.0503 | 7.78 | 0.0000 |
| 1996 | 0.1950 | 0.1729 | 1.13 | 0.2604 |
| 1997 | 0.2388 | 0.1666 | 1.43 | 0.1530 |
| 1998 | 0.3429 | 0.1736 | 1.98 | 0.0494 |
| 1999 | 0.4124 | 0.1841 | 2.24 | 0.0260 |
| 2000 | 0.3895 | 0.1947 | 2.00 | 0.0465 |
| (Intercept) | -3.9803 | 0.6651 | -5.98 | 0.0000 |

Table 4: Divided Government, Turnover, and Mean Risk: Risk Measures are the average of 1000 draws from the posterior distribution of $\hat{\theta}_{it}^*$. Divided measures unified partisan control of the legislature with a governor of the opposing party. Turnover is the cumulative number of changes to and from unified government in the six year sample period. The vertical line represents one-tailed significance at the .05 level of probability.

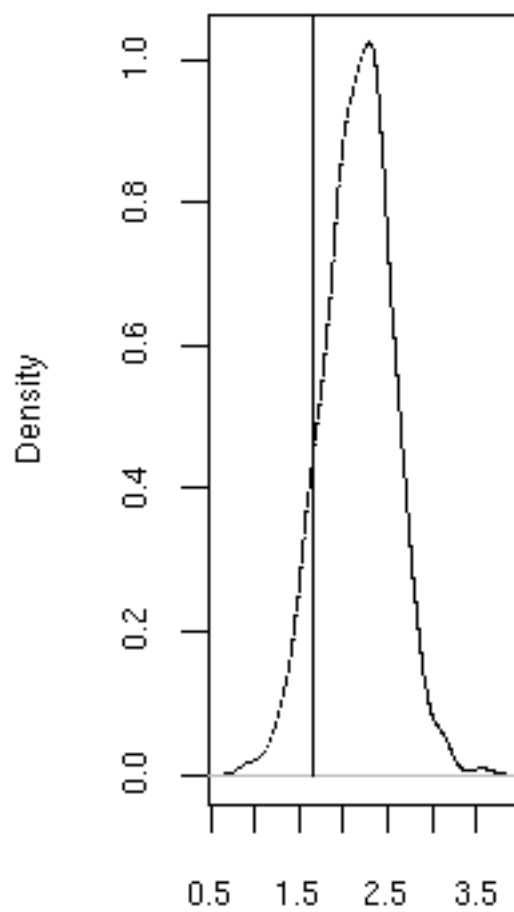
Divided Government



t-statistics

t-statistics for 1000 estimates of risk

Cumulative Turnover



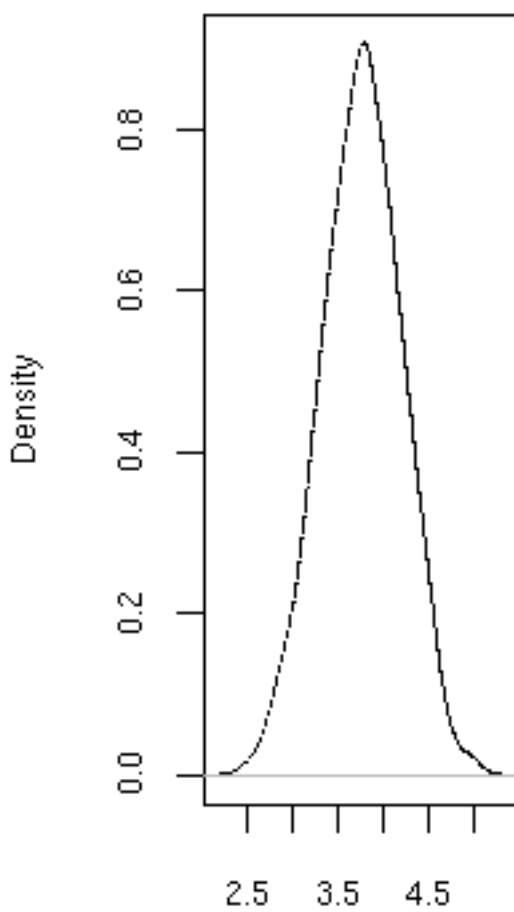
t-statistics

t-statistics for 1000 estimates of risk

| | Estimate | Std. Error | t value | Pr(> t) |
|------------------------|----------|------------|---------|----------|
| Divided Government | 0.4410 | 0.1063 | 4.15 | 0.0000 |
| Total Turnover | 0.2670 | 0.0768 | 3.48 | 0.0006 |
| Corruption | 0.6882 | 0.1577 | 4.36 | 0.0000 |
| State Tax Burden | 0.1337 | 0.0401 | 3.34 | 0.0010 |
| $\frac{Debt}{Revenue}$ | 0.0122 | 0.0035 | 3.49 | 0.0006 |
| per capita Income | -0.0097 | 0.0116 | -0.84 | 0.4029 |
| per capita Debt | 0.0026 | 0.0769 | 0.03 | 0.9730 |
| Unemployment | 0.4063 | 0.0500 | 8.13 | 0.0000 |
| 1996 | 0.2523 | 0.1698 | 1.49 | 0.1387 |
| 1997 | 0.2946 | 0.1620 | 1.82 | 0.0703 |
| 1998 | 0.4390 | 0.1672 | 2.63 | 0.0092 |
| 1999 | 0.5263 | 0.1757 | 3.00 | 0.0030 |
| 2000 | 0.5264 | 0.1839 | 2.86 | 0.0046 |
| (Intercept) | -4.3714 | 0.6713 | -6.51 | 0.0000 |

Table 5: Divided Government, Turnover, and Mean Risk, Part II: Risk Measures are the average of 1000 draws from the posterior distribution of $\hat{\theta}_{it}^*$. Divided measures unified partisan control of the legislature with a governor of the opposing party. Turnover is the total number of changes to and from unified government in the six year sample period. The vertical line represents one-tailed significance at the .05 level of probability.

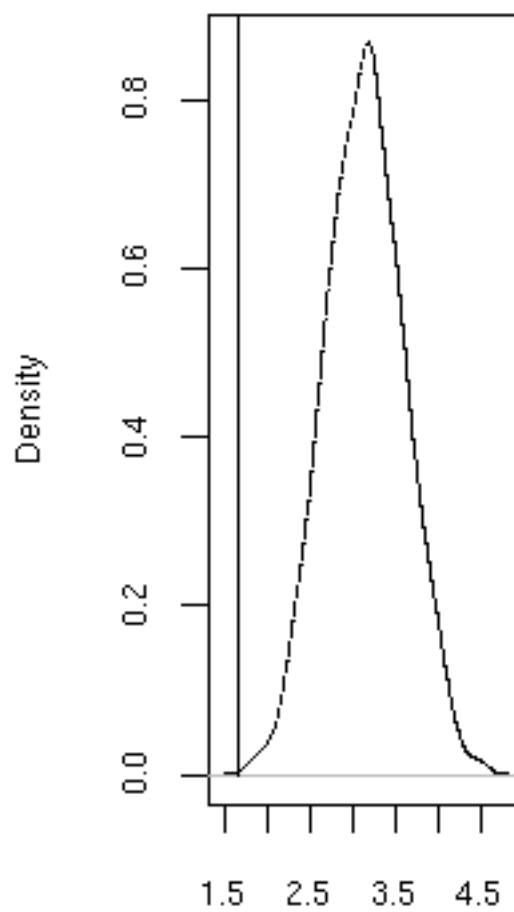
Divided Government



t-statistics

t-statistics for 1000 estimates of risk

Total Turnover



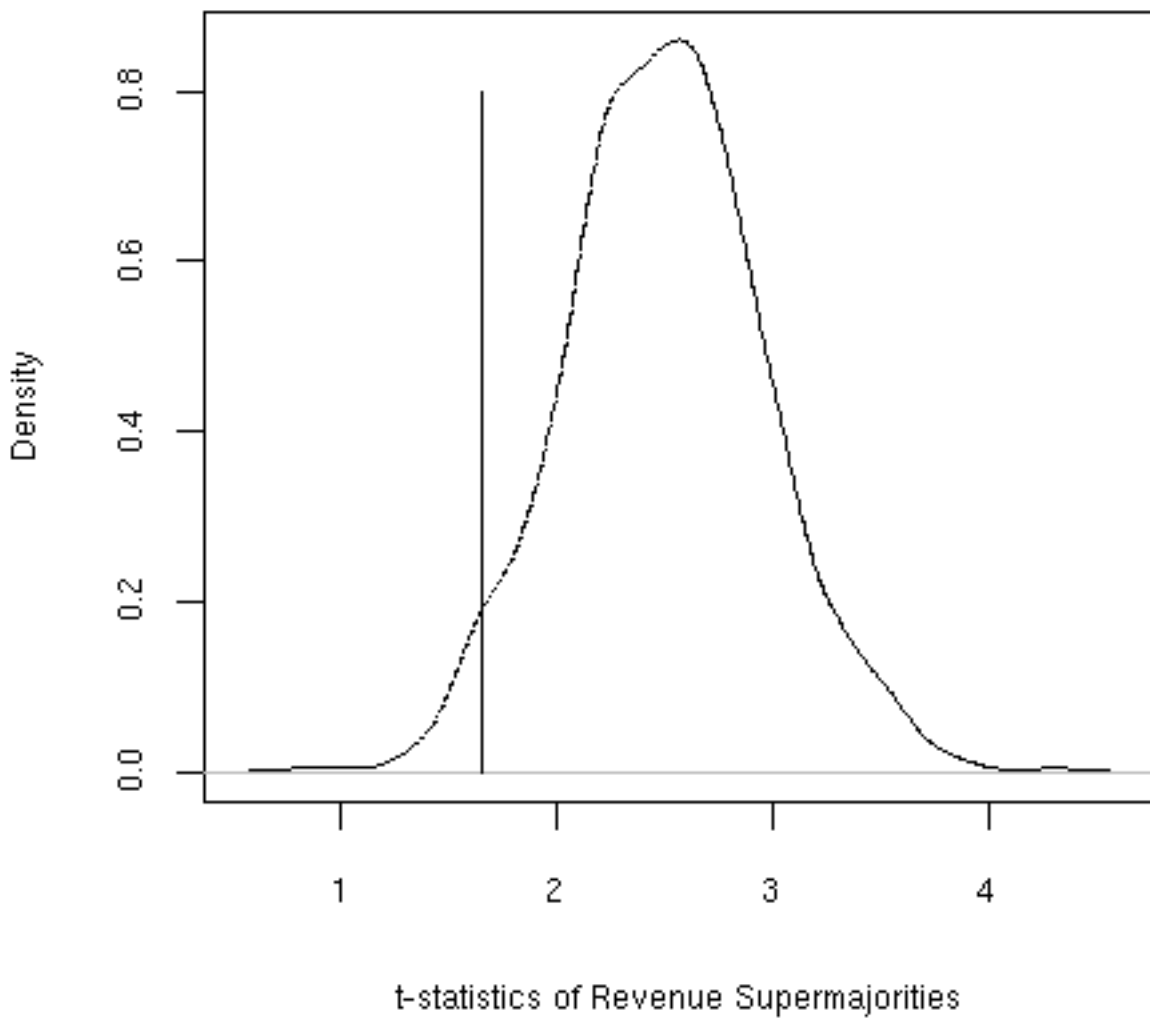
t-statistics

t-statistics for 1000 estimates of risk

| | Estimate | Std. Error | t value | Pr(> t) |
|-------------------------|----------|------------|---------|----------|
| (Intercept) | -4.9865 | 0.7523 | -6.63 | 0.0000 |
| Revenue Supermajorities | 0.4110 | 0.1277 | 3.22 | 0.0015 |
| Divided Government | 0.4541 | 0.1192 | 3.81 | 0.0002 |
| Turnover | 0.2635 | 0.0856 | 3.08 | 0.0023 |
| Corruption | 0.7619 | 0.1762 | 4.32 | 0.0000 |
| Tax Burden | 0.1656 | 0.0453 | 3.65 | 0.0003 |
| Debt Ratio | 0.0144 | 0.0039 | 3.69 | 0.0003 |
| Income | -0.0026 | 0.0129 | -0.20 | 0.8428 |
| Debt | -0.0211 | 0.0862 | -0.24 | 0.8072 |
| Unemployment | 0.4098 | 0.0559 | 7.33 | 0.0000 |
| 1996 | 0.1913 | 0.1893 | 1.01 | 0.3133 |
| 1997 | 0.2026 | 0.1806 | 1.12 | 0.2629 |
| 1998 | 0.4134 | 0.1863 | 2.22 | 0.0274 |
| 1999 | 0.5465 | 0.1958 | 2.79 | 0.0057 |
| 2000 | 0.4607 | 0.2051 | 2.25 | 0.0256 |

Table 6: The Effect of Revenue Supermajority Requirements

Revenue Supermajorities and Risk



Thank you!