DIVIDED GOVERNMENT, POLITICAL TURNOVER, AND STATE BOND RATINGS

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Abstract

Credit markets face an inherent risk that derives from future policy changes when considering the purchase of debt issued by state governments. An enacting government coalition issuing long-term debt cannot make a credible commitment to maintain the existing debt repayment policy into the future. In the face of this commitment problem, investors (and the rating agencies that serve those investors) look to recent political turnover and the existence of divided government to estimate the possibility that some future government coalition will remain substantially similar to the enacting coalition. Political turnover and divided government suggest to the credit markets that future coalitions may act opportunistically regarding debt repayment. This risk of opportunistic behavior, we argue, manifests in lower ratings of state debt. We empirically examine this claim in a model of state bond ratings from 1995 through 2000.

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1 Introduction

One of the fundamental concepts of democratic governance is the peaceful transition from one ruling coalition to another. Indeed, the oft cited democratic virtue of responsiveness requires a mechanism for implementing policy change. Though changes in policy and the composition of leadership are central to functional democratic systems, change can be costly and disruptive because many important microeconomic decisions must be made knowing that political change can influence the optimal allocation of resources. We evaluate one set of costs of political change by studying the impact that turnover of elected leaders and the presence of divided government have on the ratings of debt issued by states in the United States.

Government-issued debt provides a unique window into the interaction of public policy, uncertainty, and credit markets that lies at the heart of political economy. For this reason, economists and political scientists have paid considerable attention to state bonds. The economic literature on state bond ratings has focused on the impact that government finance policies and broader socio-economic trends have on the cost of government borrowing. On the other hand, the political science literature has focused on the impact that institutions and policies such as tax rate limits, debt issuance limits and balance budget requirements have on government borrowing. In general, scholars have found that institutions like these limit the ability of policymakers to act opportunistically and manipulate borrowing costs and the overall amount of debt issued. A few studies have focused on the impact that political market factors like divided government, party competition, and partisan identification have on borrowing patterns. While we believe these studies make important contributions to the understanding of the economic cost of democracy, there is room for deeper understanding.

In this study, we suggest that elections inherently create investor uncertainty about the future direction of policy (Hayek 1937, Hayek 1945, Stigler 1961). In the formal political economy literature, the model of Alesina, Roubini and Cohen (1997) stresses the centrality of elections as mechanisms for resolving uncertainty. Though an election need not necessarily lead to policy change, the chance that things can change creates uncertainty for the investor (Perry and Robertson 1998). This political risk is quantifiable for the investor in two ways. First, investors look at recent political turnover to estimate the risk of policy change in the future. Governments with fewer recent changes in party control of the executive or legislative branch are rewarded with higher bond ratings. Second, states with divided government operates as a signal to the investment community of the potential for coalitional turnover that may lead to future policy shifts.

We test these theoretical implications using data on state bond ratings from 1995 to 2000 for a sample of 44 U.S. states.[1] We model bond ratings are a function of variables representing the state of government finances, the social and economic milieu, and aspects of the political market. With this model, we can examine the effects of political turnover and divided government on ratings for state debt.

To preview, we find considerable evidence that turnover and divided government both increase the risk of bonds in the U. S. states. Though there is no clear way to determine the actual financial costs to taxpayers, we can deduce that responsiveness in the form of changes in partisan control is not without significant costs that arise from uncertainty about the future course of policy. The evidence is stronger for divided government than for turnover, but both impose costs on taxpayers. With this in mind, we develop a theory of political turnover, divided government and risk.

2 Theory of Political Uncertainty and Bond Risk

We argue that the issuance of debt by government and its purchase by an investor constitutes a transaction in the tradition of Williamson (1989). To the extent that government finances can be complex to evaluate for individual investors, rating agencies reduce this

[1] Aronson and Marsden (1980), Carleton and Lerner (1969), and Parry (1983) attempted to replicate Moody's credit ratings with modest success. The job of estimating the determinants of credit ratings is complicated by the fact that the agencies have a long history of maintaining secrecy regarding their rating algorithms.

information asymmetry and thus reduce the transaction costs associated with issuing public debt. For this reason, many of the studies in the economic literature on the net interest cost of new issues include variables for factors related to the issue itself (such as number of bids received, length of time to maturity, whether the bonds are callable, and issue size) while the rating of the issue is included to capture the variables not related to the specific issue, such as socio-economic forces and political market factors (e.g. Bierwag, Kaufman and Leonard (1984), Bland (1985), Kidwell, Koch and Stock (1984), and Kidwell, Sorensen and Wachowicz (1987)).

When investors consider the purchase of government debt, they are concerned with, among other things, the probability of full payments for the duration of the payment schedule. The future ability of a government to continue payments, then, is of critical importance. But so too, we suggest, is a government's willingness to continue to repay its debt in the future. While actual default may be an option only in the extreme, governments can and do change their taxing and spending priorities in ways that can threaten the long-term viability of repayment. The decision to issue debt to meet some policy choice is made in the short-term, but the commitment to repay the loan is long term. Elections and the concomitant possibility of political turnover necessitate the possibility that some future political coalition will not be as supportive as the enacting coalition of the original policy preference that resulted in the issuance of debt.

Thus, governments face a commitment problem. Governments wish to reduce their borrowing costs to the extent possible, but cannot commit to following the same policy for the duration of the bond repayment schedule. Further, this commitment problem creates a risk for the investor because there is always the chance in any government that policy will change and the risk profile of that government's debt will change. A naïve model of the risk between the policy of the enacting coalition and possible policy change by the future coalition might then price all risk equally based on election cycles.

Not all elections lead to turnover, of course, and competitive bidding of interest costs ensures that risk will not be overpriced. But if investors wish to improve their risk assessment over the naïve model (in which all elections matter), they must find a way to sort the risk across units of government. One way that investors and their bond rating agencies can do this is by evaluating factors that may lead to policy-relevant political change in the future. We suggest that rating agencies use two cues to identify when this may occur in the future.

First, they evaluate recent changes in control of state governments to assess the possibility of similar changes in the future. States that have recently experienced turnover of partisan control of the governorship or the legislature could be assumed to be at a greater risk for future political turnover. And if turnover in partisan control can be assumed to lead to policy changes, then recent political turnover is an important indicator of future policy risk. Recent political turnover need not actually lead to policy change in the future for investor transaction costs to increase. The impact is in increased monitoring costs. Recent turnover indicates a need on the part of investors and their rating agencies to watch those governments more carefully for possible policy changes that might impact debt repayment. A lower bond rating assigned to a high-turnover government, then, represents the net present value of those future monitoring costs.

Second, they identify governments in which the governorship and the state legislature are controlled by different parties as a cue to potential future coalitional change. Divided government need not lead inevitably to coalitional change, but they provide a clue to possible change because they indicate an electorate that has varied policy opinions that could lead to changes in partisan control in the future. More directly, Persson and Tabellini (1997) discuss divided government, in a static context, as a common pool resource problem that encourages over spending. In a dynamic context, the incentive to overspend is worsened by an incentive to spend quickly so as to avoid leaving any surplus for allocation by competitors. In effect, divided government has the same impact that recent partisan turnover has – it increases the monitoring requirements of the capital markets leading to higher monitoring costs and consequently lower debt ratings. With this in mind, we now examine how to construct an empirical model appropriately capturing these issues with particular attention to appropriately measuring risk.

3 Central Issues of Research Design

Combining debt ratings by Standard & Poor's, Moody's, and Fitch's provides a unique opportunity to test these claims. First, our theory is focused on the capital market in general and creditworthiness in particular and this requires something more than standard stocks or flows. Several studies have looked at the total amount of debt owed by a government, and we agree the subject is worthy of study. However, governments take on and retire debt in good markets and bad, and thus, we believe that many of the capital market reactions to political variables that are of particular interest in this study might be obscured in a model of total debt. In Clingermayer and Wood's (1995) study of state debt per capita, for example, only four of the nine variables that most closely match the political market variables of our study were statistically significant. For our purposes, stocks are distinct from, but almost certainly related to, the risk that we wish to study.

Risk derived from ratings is also a better measure for our particular purposes than actual interest rates. Many scholars, primarily in the economic literature, have studied the net interest cost (NIC) of new issues across governments and across time (Bierwag, Kaufman and Leonard 1984, Bland 1984, Bland 1985, Kidwell, Koch and Stock 1984, Kidwell, Sorensen and Wachowicz 1987). This approach is particularly useful for evaluating the impact of factors directly related to the particular debt issue. Such factors have typically included the number of bids received, total maturity of the issue, whether the issue has a call option, and whether the issuer bought bond insurance. New issuance can be a problematic measure, however, if governments opt not to issue new debt when interest rates are high generally or are high for that particular government. In other words, the choice to issue new debt, as the stocks studies indicate, is a function of many of the same factors that determine the rate. Thus, a selection bias almost surely exists in the new issue NIC studies.

Lowery and Alt (2001) avoid this selection bias by utilizing a survey of key capital market participants that asks these bond traders to estimate an interest rate for each state if it were to issue general obligation bonds at the time of the survey. This Relative Value Survey provides an opportunity to evaluate capital market reactions to all states, regardless of their actual participation in the capital market that year. While this approach to the flows literature is compelling, we believe that the study of ratings of state debt is particularly valuable because it eliminates much of the minor random interest rate fluctuation that makes interest rates models noisy.

Despite different measures of the dependent variable, most studies of government debt share a common set of explanatory variables. Scholars have studied the impact of government finances (Aronson and Marsden 1980, Bahl and Duncombe 1993, Clingermayer and Wood 1995, Lowery and Alt 2001, Parry 1983, Sharp 1986), socio-economic factors (Aronson and Marsden 1980, Bahl and Duncombe 1993, Bierwag, Kaufman and Leonard 1984, Clingermayer and Wood 1995, Kidwell, Sorensen and Wachowicz 1987, Lowery and Alt 2001, Parry 1983, Sharp 1986), political institutions (Bahl and Duncombe 1993, Clingermayer and Wood 1995, Lowery and Alt 2001, Sharp 1986, Wagner 2004), and political market indicators (Clingermayer and Wood 1995, Lowery and Alt 2001, Perry and Robertson 1998). Government finance indicators typically include the ratio of debt to revenue or population, the ratio of expenditures to the population, intergovernmental aid as a proportion of total revenue, and the existing (and persistence) of budget deficits. Typical socio-economic indicators studied in the past have included the percentage of minorities in the population, income per capita, population size, and population growth. Finally, the political market factors studied in the past include political corruption, the existence of divided government, the existence of a divided legislature, the party in control, and overall ideological measures of the state's residents.

Variables in each of these categories have been demonstrated to be important in previous studies, and we will thus utilize at least some variables from each category to control for these factors. Our focus, however, will be on those factors that link the uncertainty of future political policies to current debt ratings.

To remain comparable with previous literature, we utilize Depken and LaFountain's (2006) model of state bond ratings as our base model. That model includes six variables in three of the four factor areas. In the government finance factors area, we include variables measuring the average state tax burden as a percentage of personal income, debt as a percentage of total revenue, and real debt per capita. In the socio-economic factors area, we include variables for income per capita and unemployment.

In the political market factors area, we utilize Depken and LaFountain's (2006) measure of political corruption. In addition, we measure turnover in state governmental leadership by tabulating the number of times that a state goes from unified partisan control to shared partisan control, or vice versa. In addition, we measure a binary indicator capturing the presence or absence of divided government.

4 Measuring and Modelling Risk

Measuring bond ratings poses an interesting methodological problem. Because different combinations of rating agencies rate different bonds, there is no single accepted way to create measures that are consistent across space and time. To further complicate matters, the three major rating agencies utilize different grades and scales.[2] Our approach is based on the simple idea that all three rating agencies are providing different indices that reflect the same unobservable variable – risk. Our goal is to utilize the information contained in each bond rating to provide us with additional information about the unobservable true market risk which we will label θ^*_{it} for each state i in year t.

Though we are interested in θ^*_{it}, we cannot observe it, but must instead make of (as many as) three ordered ratings, $y_{itb}, b = \{Moody, Fitch, S\&P\}$. Intuitively, we have a single unidimensional latent construct – risk – and this latent variable manifests itself in up to three ordered indicators – bond ratings – that are related to each other and the inverse

[2]Moody's uses a scale containing 35 possible ranks; Standard & Poor's and Fitch's have 25 and 19 ratings, respectively.

of that risk. To measure risk, we simply formalize the idea that y_{itb} from one or more of b agencies for state i in year t is a function of parameters Λ_b and underlying risk θ^*_{it},

$$y_{itb} = F(\Lambda_b, \theta^*_{it}). \tag{1}$$

Λ_b has a regression interpretation that should be familiar. Each rating agency b has its own intercept, α_b, and a particular slope, β_b, relating changes in θ^*_{it} to the probabilities of various ordered categories. Indeed, if we define F to be a cumulative standard normal distribution Φ and $\Lambda_b = \{\alpha_b, \beta_b\}$, this is a conventional ordered probit model,

$$y_{itb} = \alpha_b + \theta^*_{it}\beta_b + \epsilon_{itb}. \tag{2}$$

with the requirement that

$$Pr(y_{itb} = k_b) = \Phi(\alpha_{b,k_b} - \theta^*_{it}) - \Phi(\alpha_{b,k_b-1} - \theta^*_{it}) \tag{3}$$

with $\alpha_{b,k_b} = \infty$ and $\alpha_{b,0} = -\infty$ to ensure proper probabilities for the discrete values k_b of y_{itb}. The substantive difference with the standard ordered probit model is that we are interested in θ^*_{it} and learn about it by employing multiple ordered scales that contain information about risk. Providing some intuition for the parameters, we actually observe eight discrete ratings of state bonds from Moody's in 238 overall scores, six of Fitch's ratings in 194 overall scores, and seven of S&P's ratings in 248 reported scores. As in the ordered probit model, we estimate cutpoints ($\alpha_{b,k}$) equal to the number of rating k_b minus one. Summing up, there are eighteen cutpoints to estimate.[3] Further, because each rating may react differently to variation in risk, there are a further three agency-specific parameters (β_b) linking risk to the ordered scales. In the end, there are twenty one parameters to estimate on 680 discrete ratings.

The problem arises because we wish to estimate $\hat{\theta}^*_{it}$ and there are 255 of these to es-

[3] To clarify, there are seven Moody's grades to differentiate, five Fitch's grades to distinguish, and six S&P ratings to recover. We cannot simultaneously identify a constant and $k_b - 1$ cutpoints, but each could be recovered from the other by simple algebra.

timate. To estimate the underlying risk, we employ a Markov Chain Monte Carlo framework for imputing the unobservable risk, estimating θ_{it}. Previous studies have employed single ratings, thus throwing away information concerning the true quantity of interest, or have somehow scaled these ordered but qualitative ratings into quantitative estimates, e.g. Depken and LaFountain (2006). Because we wish to avoid throwing away information and prefer a flexible scaling technique to measure the underlying risk, we argue that factor analytic techniques combine with imputation of latent quantities to provide the most appropriate testing grounds for our theoretical claims regarding political uncertainty and its pecuniary costs.

Mechanically, Markov Chain Monte Carlo techniques provide us with a simulation methodology for uncovering the latent scores. We drew 1,000 samples of $\hat{\theta}^*_{it}$ by allowing a 250,000 iteration burn-in of the Markov chain and a further ten million samples keeping every 10,000th draw of the parameters and factor scores. We now show the striking similarities with previous measures [D*L] obtained from the Bayesian factor analysis.[4] We first proceed by an examination of Table 1.

Table 1 provides some intuition for the measure of risk. In the first and second columns, we display the state and the year, respectively. In the third column, we display estimates from the 1000th posterior draw of $\hat{\theta}^*_{it}$and in the fourth column, we display the normalized bond rating used by Depken and LaFountain (2006). The top half of Table 1 compares estimates from our factor analysis with measures reported by Depken and LaFountain (2006) for the state of North Carolina – one of the states with consistently high bond ratings. The bottom half of Table 1 displays the factor analytic estimates and normalized bond ratings for Louisiana – the state consistently receiving the lowest ratings across bond rating agencies. Adding face validity to the measurement strategy, Louisiana's scores are the six highest estimates of $\hat{\theta}^*_{it}$ implying that Louisiana has the

[4]There is an implicit identification problem that arises from rotation. To avoid this problem, we constrain the factor loadings to be nonpositive to insure that we recover risk instead of inverse risk. To assess the robustness of the technique, we have utilized multiple chains and different starting values for the chain with a different seed for the random number generator and the estimated posterior distribution is virtually identical.

	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: Illustrating Latent and Averaged Measures of Risk

highest risk bonds.

Figure 1 consists of two descriptive comparisons. First, in the left panel, we show a density plot of the Pearson correlations between the average rate calculated by Depken and LaFountain (2006) and 1000 samples imputed from our MCMC factor analysis. As is clear from the plot, the mean correlation between the two measures is approximately .93; the two measures linearly share 86 percent of their variation. In the right panel of Figure 1, we show a simple scatterplot relating the mean imputed factor score from our Bayesian ordered factor analysis on the x-axis and the average ratings recorded by Depken and LaFountain (2006) on the y-axis. It is apparent that the two measures are capturing the same general phenomenon and that our factor analysis has performed as we desired.[5] Having rendered face validity for our measure of risk, we now motivate our models of the determinants of risk.

We have considered two approaches to hypothesis testing. The first is to specify the conditional expectation of θ^*_{it} as depending on regressors, stacked row vectors X_{it}, and a column vector of parameters, β , such as,

$$\theta^*_{it} = X_{it}\beta + \epsilon_{it} \tag{4}$$

[5]A host of diagnostics indicating posterior convergence are available upon request.

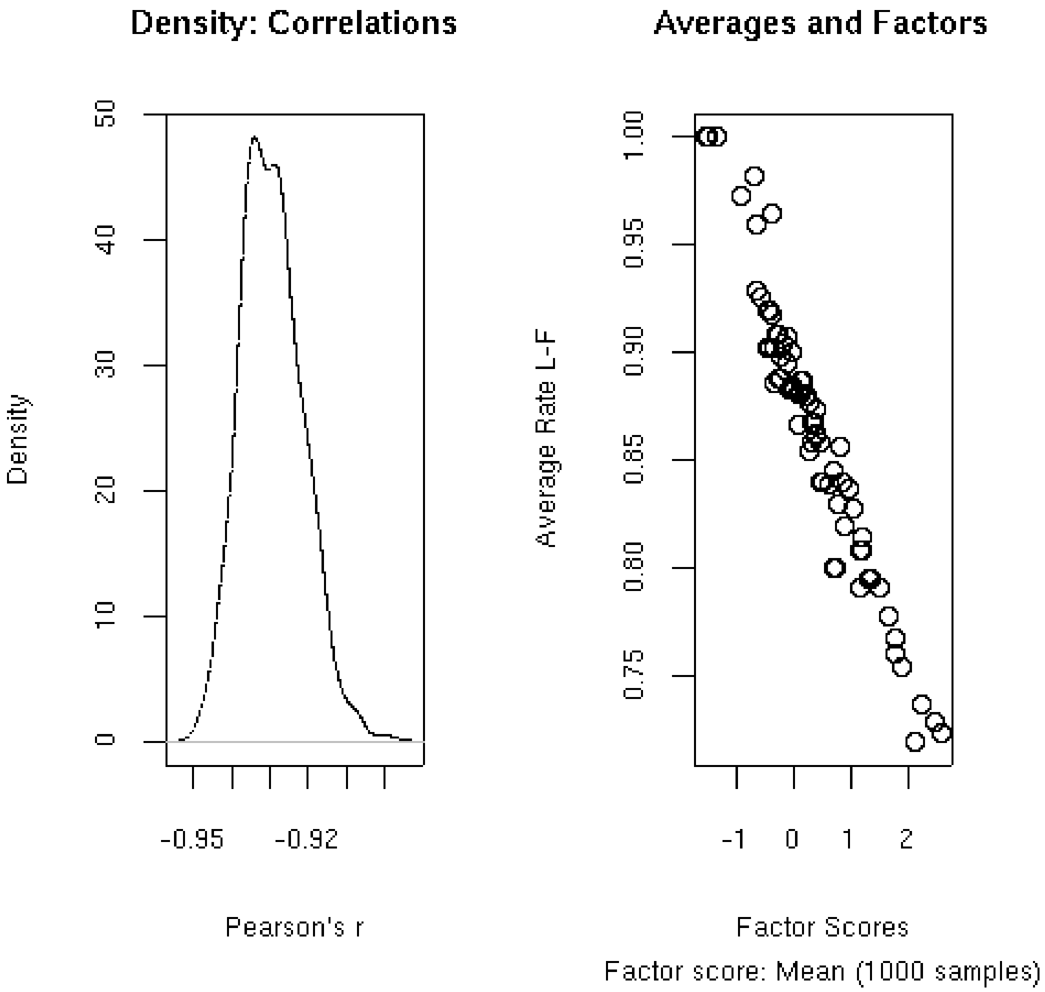

Figure 1: Comparing Measures of Risk Derived from Bond Ratings

Collecting everything we have presented, we can create a fully structural estimator of risk that models the explicit dependence between risk and exogenous covariates in the expected mean of θ^*_{it} as in (4) and the relationship between risk and observed ordinal ratings captured in Λ in (1).

A second related alternative is to split the measurement of $\hat{\theta}^*_{it}$ from the estimation of covariate effects. Because we measure a large number of draws from the posterior distribution of $\hat{\theta}^*_{it}$ and have evidence that we have converged on a posterior distribution, we can simply summarize the sampling distribution of $\hat{\beta}$ obtained from estimating the parametric model. In the end, there is little practical difference between the estimates, but estimation of the full structural models for each model of interest requires replicating the generation of $\hat{\theta}^*_{it}$ alongside the estimation of the vector $\hat{\beta}$. As a result, we have chosen the latter path.

5 Results

With a method and data in hand, we have the necessary groundwork to test the research hypotheses. Our first approach measures turnover as the cumulative number of changes to and from divided government during the sample period. For example, Michigan's Republican governor, John Engler, worked alongside a Republican legislature until 1998 when the Democrats took control of the lower house. Turnover becomes one, but does not stay this way for long as the Republicans returned to control of both Houses in 2000. Turnover takes the value of two in 2000. Though there are reasons to believe that this proxy only captures a part of our claims about coalition change, the results are encouraging.

5.1 Turnover

Table 2 displays a linear regression relating the mean [over 1000 posterior draws for each $\hat{\theta}^*_{it}$] to a series of explanatory variables.[6] In order, we find the the intercept is statistically

[6]To demonstrate that the effects do not depend critically on the measure of the dependent variable, we utilize the tobit specification in Depken and LaFountain (2006) and find a significant effect for this measure

significant and different from zero with high confidence. Because of the latent metric, the intercept has something close to a z-score interpretation implying that a extraordinarily low level of risk [over 3 standard deviations below the mean] would accompany a state with no turnover, no corruption, no state tax burden, no debt, zero per capita income, and no unemployment. While this scenario is completely unrealistic, the prediction is not surprising. Turning to our central interest, turnover has a statistically significant and positive impact on risk. Though the effects are not tremendous [in substantive terms] because a change from the minimum to the maximum on turnover only results in $\frac{1}{3}$ of a standard deviation increase in latent risk. That said, for the mean case, there is some statistical evidence in support of our claims.

The control variables take the expected signs and many are statistically relevant. As reported by Depken and LaFountain (2006), we find that corruption statistically and substantively important increases risk. Higher state tax burdens increase risk and decrease state bond rating; higher debt burdens [as a percentage of revenue] increase risk. Lower per capita incomes also increase risk and higher levels of unemployment increase risk. Finally, the coefficients on year effects show a secular increase in risk, that levels off in the year 2000. To provide a more detailed analysis of these results, we now focus our attention on the effects of turnover in greater detail.

Figure 2 displays the density of t-statistics on the effect of this measure of turnover on 1000 estimates of $\hat{\theta}^{*}_{it}$. Though the effect shown in Table 2 falls just to the right of the vertical line in Figure 2, we see that at least one-half of the t-statistics cannot be differentiated from zero. That said, it is important that no estimate fall to the negative side of zero. Though this evidence casts some doubt on our central claims, we believe that the central difficulty arises from measuring turnover. We now examine an alternative measure of turnover. Table 3 displays the same model as before substituting a measure of the total number of changes to and from unified government during the sample period. Returning to the previous discussion of turnover in Michigan, Michigan receives a fixed

of turnover. The results are reported in Table 6. We repeat this check for all of the models that we report in the columns of Table 6.

Variable	Estimate	Std. Err.	t-value	$Pr(>\|t\|)$
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
(Intercept)	-3.4808	0.6658	-5.23	0.0000

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.*

score of two through time because there were two changes in unified/divided government between 1995 and 2000. Of course, there are problems with this approach, chiefly that some information that is not available at the times the ratings are generated is available in the model. With this objection in mind, we still believe there is some merit to this measurement as a proxy for the general competitiveness and predictability of state level political outcomes. We now turn to an interpretation of the effects.

As before, the expected risk is extraordinarily low, over 3 standard deviations from the mean, when all variables take the value of zero. This is sensible given the lack of meaningful zero for most of the independent variables and the fact that almost all have positive signs. Turning to the central variable of interest, we see that this measure of turnover is statistically significant and positively related to risk. All other things equal, states with higher turnover and associated political uncertainty about future governing coalitions pay a premium. We will return to this finding in more detail shortly.

Turning to the control variables, we find that corruption increases risk and that higher state tax burdens imply lesser abilities to pay and thus, higher risks with state bonds. Furthermore, as debt increases, relative to revenue, we see state bonds becoming riskier.

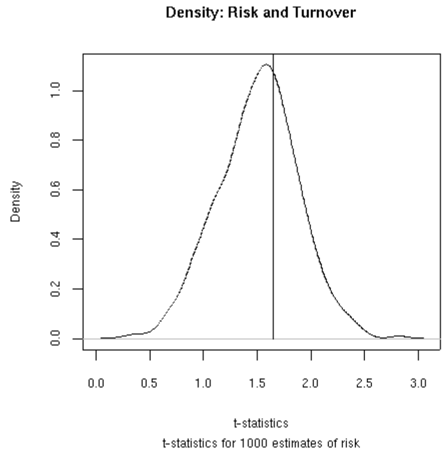

Figure 2: The Effect of Turnover on Risk: *Risk is measured as 1000 imputations from the estimated posterior distribution of* $\hat{\theta}^*_{it}$ *. Turnover is the current number of changes to and from unified partisan government in the six year sample period. The density is of t-statistics over the 1000 estimates of risk for state i in year t. The vertical line represents one-tailed significance at the .05 level of probability.*

Variable	Estimate	Std. Err.	t-value	$Pr(>\|t\|)$
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
(Intercept)	-3.6565	0.6703	-5.45	0.0000

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.*

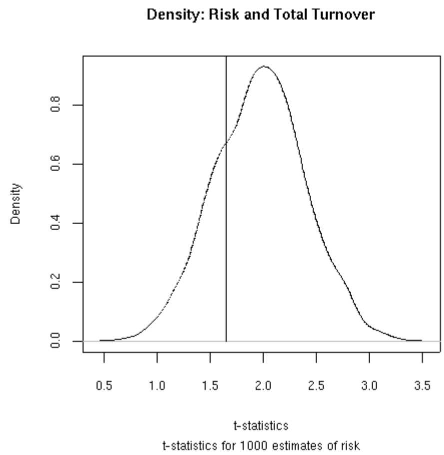

Figure 3: The Effect of Total Turnover on Risk: *Risk is measured as 1000 imputations from the estimated posterior distribution of* $\hat{\theta}^{*}_{it}$ *. Turnover is the total number of changes to and from unified partisan government in the six year sample period. The density is of t-statistics over the 1000 estimates of risk for state i in year t. The vertical line represents one-tailed significance at the .05 level of probability.*

States with higher per capita incomes, all other things equal, issue less risky bonds. While per capita debt cannot be differentiated from zero, higher unemployment again increases risk.[7]

To more deeply explore the relationship between this measure of turnover and risk, we generate a density of t-statistics for the 1000 estimates of risk from the measurement model and display it in Figure 3. First, every estimated effect is positively signed, as we would expect. Furthermore, we see that considerable mass lies to the right of the critical value. In fact, 76.1% lie to the right of the vertical line. Added to a baseline model, we find sufficient evidence to justify further inquiry on the effects of uncertainty and turnover on state bond risk. We further explore these findings alongside the implications of divided government for state bond ratings.

[7]To demonstrate some robustness to these findings, we replicate this finding using the tobit model of Depken and LaFountain (2006) in Table 6.

Variable	Estimate	Std. Err.	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, Part I: *Risk Measures are the average of 1000 draws from the posterior distribution of* $\hat{\theta}^*_{it}$. *Divided Government 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.*

5.2 Divided Govenment

We now include both turnover and divided government in a baseline model of bond ratings determination. Following the earlier presentation, we utilize both measures of turnover and combine this effect with an estimate of the effect of divided government.[8] With the specifications defined, we now turn to the estimated reported in Table 4.

The top row of Table 4 shows that divided government clearly increases the risk of a state's bonds. Indeed, the reported t-value suggests an extraordinarily low likelihood that the result arises from chance alone. Furthermore, the effect of divided government is consistent with our claims regarding uncertainty about future governing coalitions and increased risk. To further emphasize the robustness of the finding, we turn to the left panel of Figure 4.

The left panel of Figure 4 displays the density of t-statistics for the effect of divided

[8] Divided government is measured as unified party control of both houses of a legislature with an executive of the opposing party.

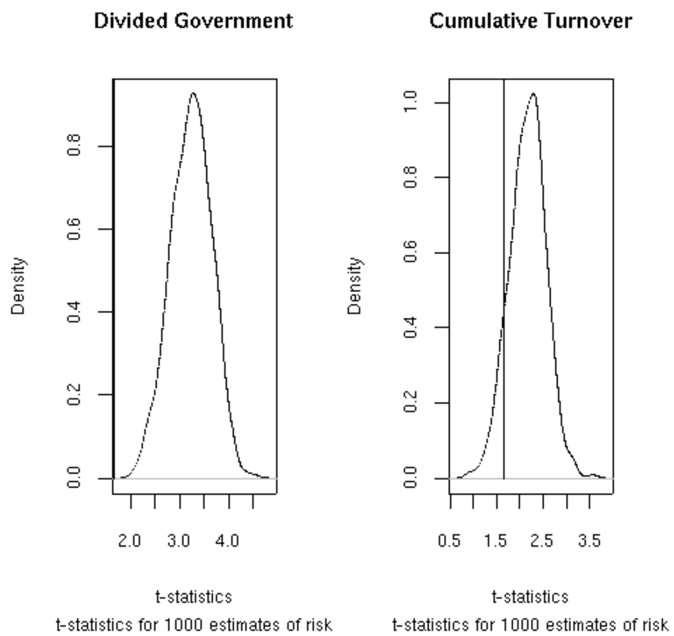

Figure 4: The Effect of Divided Government and Turnover on Risk: *Risk is measured as 1000 imputations from the estimated posterior distribution of* $\hat{\theta}^*_{it}$. *Turnover is the cumulative number of changes to and from unified partisan government in the six year sample period. Divided government captures a unified legislature of one party operating with a governor of the other. The density is of t-statistics over the 1000 estimates of risk for state i in year t. The vertical line represents one-tailed significance at the .05 level of probability.*

government for each of the 1000 measures of risk. The most striking finding is that no sample of risk measures from the measurement model yields a t-statistic less than positive two. Thus, it is clear that divided government has a remarkably consistent effect; divided government increases the risk of state bonds where it exists.

Returning to Table 4, we also see that turnover has a statistically significant and positive effect on risk. While the magnitude of the effect is slightly over half the effect of divided government, it is statistically different from zero and of reasonable substantive import. Because the maximum number of observed turnovers is two, a change from the minimum to the maximum yields a .5 standard deviation increase in risk [about $\frac{1}{8}$ of the total metric]. This effect is not substantively insignificant. Turning to the right panel of Figure 4 and comparing it to Figure 2, we see that the density has shifted to the right with considerably less mass to the right of the 5% critical value. However, unlike divided government, there are some samples of risk from the measurement model that fail to yield statistically significant increases on risk emanating from political turnover and concomitant uncertainty. Summing the results for the two primary variables of interest, we find that both divided government and turnover in partisan control have the theorized impact on risk. As the adage suggests, markets abhor uncertainty and charge the citizens of governments that generate it a significant premium, given the well known relationship between bond ratings and interest rates (Ingram, Brooks and Copeland 1983). We now briefly conclude this discussion with mention of the control variables in Table 4.

As before, corruption is both statistically and substantively significant in increasing risk. More corruption forces the taxpayers who tolerate it to pay a significant premium on state bonds. In addition, higher tax burdens and higher debt to revenue ratios increase risk. Income (per capita) has no statistically significant impact though it is intuitively signed; the same is true of per capita debt. Finally, unemployment increases risk by reducing the ability to repay by the state's population and we see the general increase in risk through time isolated by the annual fixed effects. In sum, there is evidence of the importance of turnover and divided government in increasing the risk of state bonds. We now turn to our alternative measure of political turnover, total turnover during the six year period of study.

Table 5 reports an identical model to Table 4 except for the measure of political turnover; we now employ the time-invariant measure. The pattern of effects is similar. For example, divided government is statistically significant and correctly signed and the effect of divided government is of virtually identical magnitude to the previous estimates. In addition, a glance at the left panel of Figure 5 reveals, once again, that the minimum t-statistic for the effect of divided government is just under 2.5. In short, the density of the t-statistic reported in the left panel of Figure 5 makes it clear that divided government increases risk and reduces bond ratings, as we have earlier suggested. With this in mind, we turn to the effect of total turnover.

Variable	Estimate	Std. Err.	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 Government measures unified partisan control of the legislature with a governor of the opposing party. Total Turnover is the total number of changes to and from unified government in the six year sample period.*

This measure of turnover has a larger effect on risk than does the previous measure, though both are statistically differentiable from zero using mean levels of risk across all 1000 measures from the ordered factor analysis. The key difference between the two measures comes down to robustness. Comparing the right panel of Figure 5 and the right panel of Figure 4, we see that the density has shifted to the left in the former case. Put simply, this measure provides more robust and more substantively important evidence in support of our claims regarding turnover and risk. Indeed, all 1000 estimates are greater than the critical value at the .05 level in a one-tailed test [the minimum estimate is 1.74]. In short, this measure provides robust support for our theoretical assertions.

As before, corruption, higher state tax burdens, higher ratios of debt to revenues, and unemployment increase risk. The consistency of these findings, the strength of the relationship between divided government and increased risk [and decreased bond ratings], and the considerable robustness of the effect of turnover on risk despite the measurement difficulties give us considerable confidence with which to expand this study. In short, the

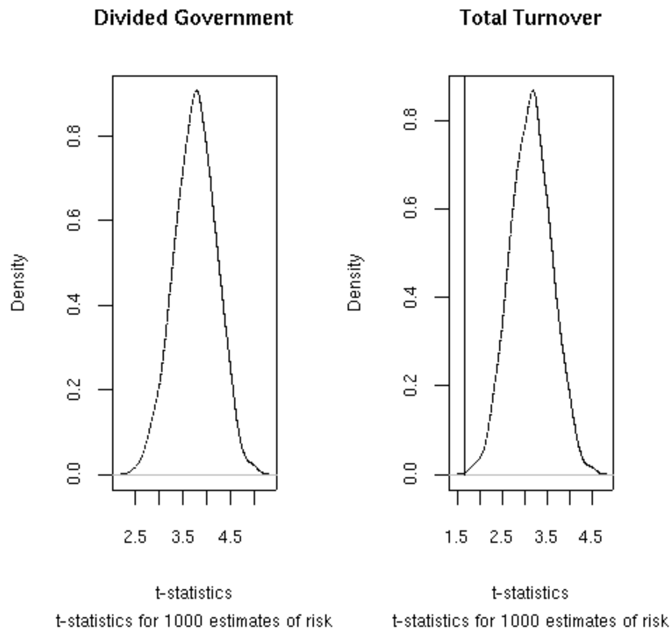

Figure 5: The Effect of Divided Government and Turnover on Risk: *Risk is measured as 1000 imputations from the estimated posterior distribution of* $\hat{\theta}^{*}_{it}$. *it Turnover is the cumulative number of changes to and from unified partisan government in the six year sample period. Divided government captures a unified legislature of one party operating with a governor of the other. The density is of t-statistics over the 1000 estimates of risk for state i in year t. The vertical line represents one-tailed significance at the .05 level of probability.*

data limitations make the robustness and strength of these findings surprising and encouraging of further research.

6 Conclusions and Future Directions

We have argued that the uncertainty of future fiscal priorities imposes a pecuniary cost on citizens in states with considerable partisan turnover and with divided government. We have related these arguments to broader literatures in political economy and demonstrated the underlying logic to tie them to broader themes. We have improved the measurement of risk using bond ratings by employing a Bayesian measurement model for multiple ordinal indicators and have provided evidence relating our measures to previous efforts. Employing two facets of uncertainty regarding future policies, we have measured turnover and divided government and shown that both have important statistical and substantive impacts increasing the risk [and thus the interest rate] that U.S. states pay on their bonds. Though we quibbled with previous efforts, we have also shown that our findings can generalize to other models [the Tobit models reported in Table 6].

Despite the contributes we have made in this study, more work remains to be done. Perhaps most important, we believe that a longer study of bond rating would allow for the incorporation of fiscal institutions. We believe that governmental actors are not totally powerless in the face of the commitment problem they face with credit markets. In fact, we believe that governments can signal their commitment to bond repayments by tying the hands of future coalitions with constitutional and statutory rules. Analysis of such phenomena, however, require many more data points than are currently available. Future work on this issue will require laborious and time-consuming data collection.

Second, there is a fundamental question about the need for three rating agencies. From the standpoint of industrial organization and the information economies of scale that are likely in rating complicated state finances, it would seem that two rating agencies would exist for the necessary competition to insure quality information. The third agency is something of a puzzle. However, we contend that different agencies that specialize in lower, medium, and higher risk bonds is both plausible and borne out by initial diagnostics on the separation of the cutpoints from the ordered factor analysis. Further analysis would provide insights not only into issues of public finance, but of information economies generally.

Finally, we believe it would be fruitful to expand this study to municipal bonds to extend our understanding of the political determinants of bond ratings and risks in government bonds. The sheer number of municipalities facilitates much more fine-grained testing of political economy hypotheses regarding the pricing of governmental debt.

In sum, we have shown that uncertainty over the future composition of taxing and spending coalitions leads to risk premia on state government bonds. We have demonstrated important effects, both statistical and substantive, that support the view that political dynamics in the states have important effects on the real costs of government debt to citizens. Lying as it does at the heart of political economy, the political economy of state bonds merits considerable further understanding.

Table 6: Maximum Likelihood Tobit Estimates – Censored at Upper Limit Equal to One

Variable	**Maximum Likelihood Estimate** Asymptotic Standard Error				
Divided Government				-0.027**	-0.032**
				0.009	0.009
Total Turnover			-0.015*		-0.022**
			0.006		0.006
Turnover		-0.017*		-0.022**	
		0.006		0.008	
Corruption Convictions	-0.055**	-0.054**	-0.053**	-0.056**	-0.055**
(per capita)	0.013	0.013	0.013	0.013	0.013
Tax Burden	-0.008*	-0.007*	-0.007*	-0.010**	-0.010**
	0.003	0.003	0.003	0.003	0.003
Debt to Revenue	-0.001**	-0.001**	-0.001**	-0.001**	-0.001**
	0.0003	0.0003	0.0003	0.0003	0.0003
Real Income	0.002*	0.002†	0.002†	0.001	0.001
(per capita)	0.001	0.001	0.001	0.001	0.001
Real State Debt	-0.004	-0.004	-0.005	-0.002	-0.002
(per capita)	0.007	0.006	0.006	0.006	0.006
Unemployment Rate	-0.033**	-0.034**	-0.034**	-0.032**	-0.033**
	0.004	0.004	0.004	0.004	0.004
1996	-0.019	-0.015	-0.019	-0.015	-0.019
	0.015	0.015	0.014	0.014	0.014
1997	-0.024†	-0.019	-0.023†	-0.015	-0.020
	0.014	0.014	0.014	0.014	0.013
1998	-0.040**	-0.034*	-0.041**	-0.029*	-0.037**
	0.014	0.015	0.014	0.014	0.014
1999	-0.045**	-0.037*	-0.045**	-0.031*	-0.042**
	0.015	0.015	0.015	0.015	0.015
2000	-0.046**	-0.036*	-0.046**	-0.029†	-0.041**
	0.016	0.016	0.016	0.015	0.015
Intercept	1.166**	1.170**	1.184**	1.207**	1.237**
	0.055	0.055	0.055	0.055	0.055
Standard Error of the Regression					
Intercept	0.059	0.059	0.059	0.058	0.057
	0.003	0.003	0.003	0.003	0.003
N	253	253	253	253	253
Log-likelihood	250.293	252.6	252.99	257.4	259.5
LR χ^2	128.5	133.03	133.9	142.74	146.99

211 observations are uncensored; 42 observations are right-censored.

Two-tailed significance levels : † : 10% ∗ : 5% ∗∗ : 1%

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