

TRANSPARENCY AND ACCOUNTABILITY: EMPIRICAL RESULTS FOR US STATES

James E. Alt and Robert C. Lowry

ABSTRACT

Recent formal models of accountability allow us to make different conditional predictions about how transparency affects voters' willingness to re-elect incumbents and acceptance of higher taxes. We review two models and investigate empirical implications derived from or related to them, using panel data from 1972–2000 for U.S. state budget process transparency, gubernatorial elections, and tax increases in a small structural model. We do not find that budget transparency has a direct effect on incumbent retention, but we do find clear evidence that increased transparency dampens the negative effect of tax increases on retention of incumbent governors. Independent of this, we also find that increased transparency leads to greater fiscal scale. We suggest some possible directions for future models based on our results.

KEY WORDS • accountability • fiscal policy • political economy • transparency

Introduction

Voters in representative democracies mainly hold politicians accountable through periodic elections. Elections and electoral accountability can constrain opportunistic behavior by incumbents. If incumbents value future terms in office enough, the threat of being replaced by a challenger reduces the chance that politicians will take actions which are not in the interests of the electorate. Moreover, elections also enable voters selectively to retain good incumbents. If politicians have heterogeneous preferences, for instance, then those with preferences closer to those of the electorate will have a higher probability of re-election, other things equal.

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The literature on political agency, the calculations voters and politicians make in a principal–agent framework, has produced important insights about the possibilities and limits of using elections to control the behavior of politicians and/or select ‘good’ types of politicians.¹ Within a larger agency literature, a small number of studies ask, ‘What is the effect of government transparency on accountability, that is, on voters’ ability to control politicians via the re-election mechanism?’² Transparency is often considered beneficial in information-scarce contexts because it ‘work[s] through increasing the amount of information available to voters’ (Besley, 2006: 196). Equally, however, as Przeworski (2003: 157) writes, ‘Information is not scarce: in fact, it is abundant. But extracting a signal – the true state of affairs – is difficult’. Consistent with a tradition of looking for ways in which institutions can promote ‘clarity of responsibility’ (Powell and Whitten, 1993), this article asks whether and how transparent budget institutions can help make voters less apt to punish ‘good’ politicians by kicking them out of office, thereby increasing accountability.³

We do so by examining the following set of relationships using data on gubernatorial elections, fiscal policy, and budget transparency in U.S. states. If voters dislike taxes, higher tax growth would reduce the retention of incumbent politicians. We ask empirically whether it does so. Next, suppose increased transparency enables voters to better observe the justification for tax increases, whether in comparison to situations where information is unavailable or where it is difficult to extract from a cacophony of claims and counter-claims. In that case transparency could reduce the retention costs to incumbents of raising taxes. A related question then is whether transparency increases tax growth, holding the current scale of taxation constant. We examine both those issues as well. Finally, we see whether these relationships hold up even if we treat transparency (and its interaction with tax growth) as endogenous.

A long empirical literature on accountability shows that incumbents (or candidates from the incumbent party) are rewarded or punished for good or bad economic and fiscal policy outcomes. With respect to state elections, several papers find evidence that incumbent candidates or candidates from the incumbent party do better in gubernatorial elections following a period of state economic prosperity (Chubb, 1988; Besley and Case, 1995; Niemi et al., 1995; Lowry et al., 1998). Conversely, voters tend to punish incumbent governors running for re-election following tax increases (Kone and Winters, 1993; Niemi et al., 1995), particularly if taxes increased more than in neighboring states (Besley and Case, 1995). Lowry et al. (1998) find that the candidate from the incumbent governor’s party may be

1. A sampling of the literature includes Barro (1973), Ferejohn (1986), Rogoff and Sibert (1988), Austen-Smith and Banks (1989), Rogoff (1990), Banks and Sundaram (1993, 1998), Harrington (1993), Fearon (1999), Smart and Sturm (2003, 2006), and Besley and Smart (2007).

2. This literature includes Canes-Wrone et al. (2001), Maskin and Tirole (2004), Stasavage (2007), Prat (2005), Hood and Heald (2006), and Besley (2006).

3. Lowry and Alt (2001) show how institutions like balanced budget laws help bond market participants coordinate on solutions to the sort of problem voters face.

punished at the ballot box for changes in fiscal scale relative to expectations. Apart from the cross-sectional results of Alt et al. (2002), however, no literature considers the effect of transparency on the relationship between taxes and re-election in U.S. states, though Ferraz and Finan (2008) show that public audits reduce corruption and increase the probability of incumbent retention in Brazilian municipalities.

The article proceeds as follows: we first briefly discuss formal models of transparency by Besley (2006) and Ferejohn (1999), which show how the effects in which we are interested can arise within a formal model. We describe conditions under which it is possible to extract some of our specific predictions about the relationships between incumbent retention, tax growth, and budget transparency from these models. Nevertheless, other predictions we test only follow from the models under unobservable conditions, so our empirical work should not really be regarded as a test of these models.

We then describe our data and empirical specifications. The bulk of the article contains empirical results from a small structural model that embodies the relationships among the probability an incumbent governor is re-elected, tax increases, and budget transparency. We first estimate a three-stage least squares model of the full system, then conduct sensitivity analysis of the full system as well as single-equation models. We use data on budget procedures in U.S. states to measure and endogenize transparency.⁴ Our estimation results show that incumbent governors are punished less for tax increases that occur under more transparent budget procedures. Furthermore, the estimates of the growth of real per capita income and sales taxes show that tax growth is higher where transparency is greater. Sensitivity analysis reveals that the effect of transparency on fiscal scale is mostly driven by cases with Republican governors, not Democrats; we speculate about why partisan effects like this could arise and suggest future directions for models of transparency.

Formal Models of Transparency

The literature on transparency is growing. The concept of transparency is often ‘used imprecisely to refer to a number of characteristics of an open system’ (Garrett and Vermeule, 2008: 68). We use the term to refer to rules for the construction and reporting of budgets that make what Besley (2006) refers to as ‘policy relevant’ information more accessible or credible. One should not assume that transparency is always beneficial: it need not be.⁵ In the case of pure moral

4. We also consider media penetration rates as an alternative information source.

5. In Prat (2005), if outcomes are observed, transparency is good. In Gavazza and Lizzeri (2009), transparent revenues are larger (because of efficiency) and thus it is easier to fund wasteful transfers, but of course voters have to like wasteful transfers. In Dal Bo (2007) secrecy is better when individual accountability is weak, and there is a part-whole problem: if voters are too likely to vote against incumbents who vote against bad projects, it is better to have secret voting. See also Levy (2007) and Gavazza and Lizzeri (2009).

hazard, increasing observability can be counter-productive if it leads to ‘pandering’ (Canes-Wrone et al., 2001). If an agent does better by acting according to preconceived expectations, she might also ignore potentially valuable private signals, to the detriment of the principal (Prat, 2005; Stasavage, 2007). However, if the choice of transparency is endogenous, in equilibrium no agent who chooses more transparency then takes a ‘bad’ action (Ferejohn, 1999).

Further complications arise if elections are a mechanism for selecting incumbents of different ‘types’⁶ as well as a means of disciplining incumbents. Transparency can help screen out bad types, yet this may also have some undesirable consequences. Suppose increasing transparency increases the probability of a bad type actually being exposed, the ‘screening’ effect, and decreases equilibrium rents extracted, the ‘discipline’ effect (Besley and Prat, 2006). Then there is a fundamental trade-off: greater discipline can make screening harder.

Formal models that address the relationship between transparency, policy choices, and incumbent accountability are less common. We look at two models in which the effects in which we are interested can exist. First, in the strategic situation Ferejohn (1999) studies, an incumbent politician first commits to a level of transparency. Thus transparency is endogenous: the agent chooses how observable to make her actions. Voters next decide how much to invest in the government; Ferejohn assumes that rents (incumbent compensation) are proportional to the scale of government. Then, the politician takes some action that produces an outcome, an amount of public goods, subject to a cost shock. Voters observe the outcome and, if they so chose when deciding about investment, a noisy signal of the action taken, where noise is inversely related to transparency.⁷ Finally, voters decide whether to retain the politician or replace her with another from the same pool.

Ferejohn shows that politicians have incentives to choose non-zero levels of transparency which lead to ‘greater investment’ (larger fiscal scale or higher taxes) and thus more compensation than if the politician’s action remained completely hidden. Agent discipline also increases as transparency increases. Conditional on the choice to monitor actions, i.e. when voters evaluate incumbents based on their policy choices rather than eventual outcomes, the probability of re-election also increases with transparency, as we show in Appendix 1. Moreover, when transparency is endogenous and voters conditionally commit to use action monitoring, Ferejohn’s model predicts that increased transparency diminishes the negative impact of taxes on retention, since in equilibrium at the margin transparency increases fiscal scale and incumbents get re-elected. In addition to showing how the direct and indirect effects of transparency on incumbent retention could exist in equilibrium (conditional on the choice of action monitoring). Ferejohn’s model provides a rationale for treating transparency as endogenous. However, since choosing action monitoring is unobservable, our estimates are not strictly a test of this model.

6. See Fearon (1999), Persson and Tabellini (2000) and Ashworth (2005).

7. The signal voters receive is essentially a noisy signal of the cost shock.

Besley (2006) develops a two-period model of screening and discipline in which politicians make tax policy choices in situations of more and less transparency. Elected politicians raise taxes and spend on public goods, which voters observe when deciding about re-election. Bad incumbents maximize the diversion of rents to themselves while good types maximize social welfare. Incumbents have private information about personal rent diversion and cost shocks (a 'high' cost shock makes public goods relatively expensive). Voters have beliefs about how likely are high or low cost shocks in any period, and have to infer whether the tax rate indicates rent diversion, given the proportion of politicians who are 'good'. In general, equilibrium depends on the extent to which bad types show discipline by mimicking good types and the voters' cost beliefs and re-election rule. If the *ex post* probability that the incumbent is a 'good' type conditional on observed taxes and public spending exceeds the proportion of all politicians who are 'good,' then voters re-elect (Besley, 2006).⁸

There are three equilibria: pooling, separating, and 'hybrid'. In the pooling equilibrium, bad types mimic good types given a low-cost shock: incumbents set taxes as if costs were low (a bigger tax bill or public sector) but provide less public goods (as if costs were high) and divert the difference to themselves. In the separating equilibrium, good incumbents supply public goods and are re-elected, while bad incumbents set maximal taxes and grab rents before being replaced with certainty.⁹ The tax rate pooling incumbents set is lower than what bad types choose when forgoing re-election entirely in the separating equilibrium. The magnitude of the effect of the tax rate on voter support for incumbents thus depends on which equilibrium arises. Nevertheless, Besley (2006) shows that across all of the model's equilibria higher taxes increase turnover, that is, they reduce the retention rate or incline voters to be less supportive of incumbents.¹⁰ Besley claims empirical support for this result, and we re-examine that empirical work in our own estimates later.

How does transparency affect the relationship between retention and the scale of taxation in this model? With regard to retention itself, more transparency in the form of a probabilistic signal of the true cost state can in equilibrium help voters choose good types for re-election. However, this also reduces the incentive for bad types to mimic good types, so the effect of this sort of *ex post* informative transparency on retention depends on how these selection and discipline effects balance,

8. Note that the two models we review are not consistent with each other. In Ferejohn's model all politicians are 'bad' types, that is, motivated only by rents, so the model has no screening effects and focuses entirely on moral hazard issues. Besley (2006) remarks on the incompatibility between voters' commitment to a standard for evaluating actions and the presence of good types.

9. In the hybrid equilibrium bad incumbents adopt a mixed strategy, pooling with probability $q/(1-q)$. The case arises when voters believe the probability of being in the high cost state (q) is not sufficient to induce unconditional pooling by incumbents.

10. There is a non-monotonicity in one equilibrium in which retention can increase between lowest and moderate levels of taxation, but falls above moderate levels.

with a sign that depends on the (unobservable) proportion of good types.¹¹ In terms of the tax rate, transparency about the cost shock makes the separating equilibrium more likely and pooling less likely. Incumbents who pool set tax rates lower in the first period but higher in the second. Therefore, whether transparency raises or lowers taxes depends on unobservable parameters like discount rates, the relative size of maximal taxes versus a low-cost public sector, as well as the proportion of good types. Without placing restrictions on these parameters, we cannot unambiguously sign the interaction between transparency and how strongly tax changes affect retention, though in general higher taxes should reduce incumbent retention.

Nevertheless, inspired by these models even if not always directly testing them, we examine the following set of questions. Does higher tax growth reduce and transparency increase the retention of incumbent politicians? Is more transparency associated with tax growth, holding the current scale of taxation constant? Moreover, does increased budget transparency diminish the effect of raising taxes on retention of incumbents, as both models (conditionally) predict? And finally, do these relationships hold up if we treat transparency (and its interaction with tax growth) as endogenous?

Data and Specification

To examine these relationships, we use panel data from the American states. We first estimate a three-equation model in which the endogenous variables are incumbent retention, changes in the level of taxation, and budget transparency. Each equation includes one or more endogenous variables on the right-hand side; additionally, the interaction between transparency and tax changes is included in the retention equation. The sample period is 1972–2000. All monetary values are reported in constant 1982 dollars, using the national CPI-U deflator. Alaska and Hawaii are omitted (lacking data on candidate characteristics), as are Minnesota in 1972 and Nebraska in all years (lacking measures of legislative competition) and as are a handful of cases with independent governors.

Data

We first define the three main endogenous variables, followed by the explanatory variables, then the specification and expectations. Details on sources and descriptive statistics are in Table 1.

11. In the hybrid equilibrium, increasing transparency can increase the probability that good types survive, offsetting the effect of transparency on equilibrium rents from pooling (or hybrid) which ‘tends to reduce discipline’ so that ‘bad incumbents are less likely to survive re-election’ (Besley, 2006: 204–5). But this raises the posterior probability that a better outcome was produced by a good type, changing the voters’ re-election rule and thus the equilibrium. In a different way, if good types are always retained, anything that increases the quality of the candidate pool *ex ante* will increase retention and any transparency that takes the form of pre-screening candidates could do that.

Table 1. Summary Statistics

	<i>M</i>	<i>SD</i>	<i>Min.</i>	<i>Max.</i>
Endogenous Variables				
Governor is re-elected	0.59	0.49	0	1
Budget transparency	0.45	0.20	0	0.89
Tax growth	0.05	0.09	-0.28	0.55
Budget transparency* Tax growth	0.02	0.04	-0.08	0.19
Exogenous State-level Variables				
Divided government	0.53	0.50	0	1
Growth in federal transfers	0.04	0.14	-0.73	0.60
Growth in state debt _{t-2}	-0.08	0.13	-0.49	0.57
Income growth	0.03	0.05	-0.24	0.23
Incumbent does not run	0.22	0.42	0	1
Legislative competition	-0.04	0.06	-0.24	0
Ln(Population)	14.82	1.07	12.81	17.27
Media penetration	1.11	0.17	0.71	1.57
Per capita taxes _{t-2}	636.35	188.97	222.25	1324.97
Polarization	0.62	0.17	0.24	1.14
Spending growth	0.04	0.07	-0.21	0.30
Unemployment	6.11	2.09	2.40	15.50
Incumbent Governor's Characteristics				
Governor's age	53.07	8.30	34	74
Lagged vote share	56.24	7.21	36.2	83.2
Lawyer	0.51	0.50	0	1
Years' experience	29.22	9.55	6	55
Proportion in politics	0.41	0.24	0	0.96
Years' of education	18.91	3.02	11	27
Number of cases = 263				

Note: Data for the retention model except for budget transparency, media penetration rates and unemployment were graciously provided by Tim Besley. Data on unemployment, taxes and government spending have been updated from U.S. Census Bureau (2008). Data on taxes and income in the tax growth model are from Besley (2006); data on federal transfers and state debt are from U.S. Census Bureau (various). See Alt et al. (2006) for sources of variables used to predict budget transparency.

Retention. Retention is a dummy variable coded 1 if an incumbent governor is re-elected. Following Besley (2006), we limit the data to cases where the governor is eligible to run for re-election, and treat cases where the incumbent voluntarily chooses not to run as defeats.¹² Insofar as we can, we subsequently examine the effects of alternative codings.

12. Besley's Table 3 contains cross-section time-series estimates of linear models for the probability of re-election and per cent of votes received by the winner. Another alternative would be to code the dependent variable as one if the incumbent party is retained. However, we lack data on individual candidate traits for non-incumbents. Using the incumbent candidate's share of the vote introduces other complications such as how to handle minor parties and independent candidates, so we do not pursue this. We discuss some additional results ahead in the section on sensitivity analysis.

Tax changes. Our fiscal scale variable is the two-year rate of changes in taxation, based on the sum of real, per capita personal and corporate income and general and selective sales tax revenue. Subsequent analyses examine different definitions of taxes.

Transparency. Endogenous transparency is measured as an index based on nine items reflecting different aspects of budget transparency, including whether all appropriations are included in a single bill, reporting follows GAAP or includes multi-year expenditure forecasts and performance measures, and independent or non-executive agencies create the revenue forecast. The full set of items is listed in Appendix 2.¹³ In the spirit of Besley's and Ferejohn's models, we interpret this transparency as 'conveying more or better information' about fiscal policy or the cost of public spending (or even policy choice), rather than open access to the policy process or personal character or past records of candidates. To deal with missing items, we re-cast the transparency variable as the ratio of items coded 'yes' to the total items answered.¹⁴

We also introduce an alternative measure of transparency, media penetration, as a control variable in some specifications. This variable aggregates newspaper circulation and cable reception by state and year (details appear in Appendix 2).

Economic cycle. Existing literature indicates that any of incumbent retention, tax changes and indeed transparency could be affected by cyclical economic changes. We include, where appropriate, measures of the state unemployment rate and growth rates of real income per capita, real expenditures per capita, real per capita federal revenue transfers, and the lagged growth rate of real per capita debt, all measured in per cent, as well as the lagged level of real tax revenue per capita.

Incumbent characteristics. Once again following Besley, we include the incumbent's vote share in the last election, an indicator for those governors retiring voluntarily, and a vector of variables describing the incumbent: age, training as a lawyer, years of work before becoming governor, fraction of previous experience in politics, and total years of education.

13. Data based on publications of the National Association of State Budget Officers (NASBO) and the National Conference of State Legislatures (NCSL) and on a follow-up survey of state budget officers. The result is annual fiscal transparency scores for each state for each year between 1972 and 2002, about 1500 observations of nine dichotomous budget procedures, as well as an index equal to the number of items for which each state had the more transparent procedure. Some items could not be reconstructed for all states in all years, but no case is missing more than two items, so overall about 97 per cent of the items are present.

14. This method can induce some oddities. For example, if a state had three items coded 'yes' out of eight for which there was data, and then in a subsequent year we recorded a 'yes' on the item that was missing earlier, the state's transparency score would go from .375 (3 of 8) to .444 (4 of 9), even though it is possible that no real change actually took place.

Other explanatory variables. Besley (2006) includes (the log of) state population in the retention equation, so we do as well. Following Alt et al. (2006), we also include measures of legislative competition, political polarization, and the presence of divided government in our budget transparency equation. Construction of these variables is discussed in Appendix 2. We also include full sets of unit and year fixed effects in those equations in which they are jointly statistically significant.

Specification and Expectations

Retention. To show how our results relate to his, the linear probability model for incumbent retention follows Besley's (2006) specification. We expect that the (endogenous) two-year growth rate of real income and sales taxes per capita has a negative effect. An interaction term (see later for the instrument) between transparency and the growth in taxes (both endogenous) should have a positive effect, if more transparency reduces the vote costs of raising taxes, a (conditional) prediction of both models. We include direct effects of (endogenous) budget transparency and media penetration as well as unemployment, real income and expenditure growth, the natural log of state population, the incumbent's vote share in the last election, and personal characteristics. Conditional on appearing in other equations, all fixed effects are jointly insignificant in this equation and we consequently omit them. Identification in this equation comes through the exogenous economic variables in the tax growth equation, exogenous determinants of budget transparency, and fixed effects variables.

Tax changes. We use a specification based on Alt and Lowry (1994, 2000). Explanatory variables include (endogenous) incumbent retention and transparent budget procedures: following Ferejohn (1999), the latter could have a positive effect. We also include media penetration, expecting the same effect. We include the indicator for governors retiring voluntarily and economic controls: lagged tax revenue, unemployment, and change in real per capita income, federal revenue transfers, and lagged growth in real per capita debt. Identification comes through the exogenous variables in the retention and transparency equations, and fixed time effects. It may be argued that the growth in expenditures in the retention equation is not exogenous with respect to tax growth, but dropping this variable would risk omitting variable bias in the retention equation (Lowry et al., 1998). Note that expenditure growth is measured using all general expenditures regardless of the revenue source, whereas the growth in taxes is limited to revenue from income and sales taxes. We return to this issue in our sensitivity analysis, after presenting our main results. This equation also includes a full set of unit fixed effects.

Transparency. Neither Besley nor Ferejohn offer a model that explains variations in transparency. Ferejohn (1999) suggests that the party most favorable to large government might prefer more transparency, but heterogeneous policy

preferences are not part of his model. We include (endogenous) tax changes to allow for the possibility that decisions on taxes (incumbent performance) precede decisions about offering transparency. Based on Alt et al. (2006), we expect that the effects of legislative competition, political polarization, and the presence of divided government will be positive, and these provide identification.¹⁵ The equation also includes a full set of unit fixed effects.

Transparency–tax change interaction. The product of two endogenous variables is itself endogenous, but instrumenting budget transparency and tax growth separately and then multiplying their predicted values produces inconsistent coefficients (Achen, 1986; Wooldridge, 2002).¹⁶ We therefore include a fourth equation to create an instrument for the endogenous interaction: it includes the two endogenous variables (transparency and tax changes) and a full set of year fixed effects, which enter the system only through this equation.

Empirical Results

We initially estimated our structural model using three-stage least squares to allow for simultaneous causation between incumbent retention, tax growth and budget transparency.¹⁷ This imposes a number of restrictions, however. It requires that we estimate the dichotomous outcome for incumbent retention using a linear probability model; it limits the cases used for each equation to election years where the incumbent is eligible to run and cases where there are no missing data for any variable in the system; and it does not allow for robust or clustered standard errors.¹⁸ We then conducted a series of single-equation analyses of our retention, tax growth and budget transparency models treating all right-hand side variables as exogenous. This allows us to experiment with various changes in specification, functional form, data sample, and standard errors and other estimation assumptions.

15. Alt et al. (2006) argue that polarization could lead to an increase in transparency because incumbents want to tie the hands of possible successors, or it could decrease the likelihood of an increase in transparency because it makes it more difficult to reach agreement on changes. Their empirical results imply that the former effect dominates. Stasavage (2007) presents a formal model in which causation goes the other direction: transparency leads to polarization as office holders feel the need to make statements and take stands that appeal to certain constituents. ‘Transparency’ for Stasavage means open debate, as opposed to legislators meeting in closed session. It is not clear how well his model applies to the kinds of budget procedures we study. Coglianese et al. (2009) explicitly distinguish transparency from public participation in their Task Force Report.

16. This is an example of the so-called ‘forbidden regression’.

17. All models in this article were estimated using Stata version 9.2.

18. Standard errors are not clustered in our three-stage least squares model in part because the Stata’s REG3 command does not have that option, but also because theory suggests that the observations should be clustered by incumbent governor for our retention equation and by state for the tax growth and transparency equations.

Three-stage Least Squares

Table 2 shows the results for our structural model estimated with three-stage least squares. The effects of transparency are shown in the incumbent retention and tax growth equations. Neither budget transparency nor media penetration has a direct, statistically significant effect on incumbent retention. The negative effect of tax growth on retention found by Besley (2006) is evident. However, the coefficient on the interaction between budget transparency and tax growth is positive and significant. Thus, the negative effect of tax growth is significantly dampened in states with high budget transparency. Several of the control variables also affect incumbent retention, in the expected directions. Higher unemployment rates lower the probability of retention and higher income growth raises it, although both effects are only marginally significant. Older incumbents are less likely to be retained, but controlling for age, those with more experience and a larger fraction of their careers spent in politics are more likely to be retained.

The predicted effect of tax growth conditional on budget transparency is shown in Figure 1, which shows the change in the predicted probability of retention for a 15 percent increase in taxes compared to a 5 percent decrease (these are roughly the 95th and 5th percentiles in our data). At the lowest level of transparency in our data, the negative change in the predicted probability is greater than 1.0 in absolute value; this infeasible effect is due to the fact that we are using a linear probability model. More important, the upper bound of the 90 percent confidence interval is below zero for values of budget transparency below 5/9, and above zero for higher values. At very high levels of transparency, this model predicts that greater tax growth can actually increase the probability of retention, though there are not very many observations at the very highest levels of transparency.

Turning to the tax growth equation, both budget transparency and media penetration have positive, significant effects on the growth of per capita income and sales taxes. Recall that Besley's (2006) model is inconclusive with respect to the effect of transparency on fiscal scale, but Ferejohn (1999) predicts that greater transparency leads to greater investment (higher taxes) by voters. Again, a number of control variables also have statistically significant effects: the rate of tax growth is negatively associated with lagged per capita levels and the unemployment rate. It is positively associated with the growth rates of per capita income and federal transfers, and there is a marginally significant, positive association with lagged growth in state debt.¹⁹ Predicted tax growth may be higher when the incumbent chooses not to run for re-election, though this is not significant at the 90 percent level. The endogenous probability that an incumbent who runs will be

19. The positive effect of federal transfers could well be due to the importance of matching funds (e.g. Medicaid) in state revenues. Any negative (substitution) effect of federal for state own-source dollars might be dominated by the positive, matching-funds effect. We urge caution in interpreting the estimated effect of federal transfers as causal.

Table 2. Structural Model of Incumbent Retention, Tax Growth and Transparency

Incumbent Retention		Tax Growth	
Variable	Coef. (z)	Variable	Coef. (z)
Budget	-0.15	Budget	0.61
Transparency+	(0.74)	Transparency+	(4.54)
Media penetration	4.4e-4	Media penetration	0.10
	(0.00)		(1.96)
Tax growth+	-5.32	Incumbent governor is retained+	-0.01
	(4.31)		(0.50)
Budget transparency*	9.57	Incumbent does not run	0.02
Tax growth+	(3.30)		(1.01)
Unemployment	-0.03	Unemployment	-0.01
	(1.74)		(2.21)
Income growth	1.38	Income growth	0.66
	(1.73)		(5.11)
Spending growth	0.34	Growth in state debt _{t,2}	0.06
	(0.76)		(1.71)
Ln(population)	-0.03	Growth in federal transfers	0.11
	(0.96)		(3.41)
Vote share, Last election	-4.5e-3	Per capita taxes _{t,2}	-4.1e-4
Governor's age	(1.16)		(6.43)
	-0.02		
	(5.21)		
Lawyer	0.04		
	(0.71)		
Work experience	0.01		
	(3.68)		
Fraction in Politics	0.47		
	(3.94)		
Years of Education	0.00		
	(0.25)		
Fixed state effects	No	Fixed state effects	Yes
Fixed year effects	No	Fixed year effects	No
Constant	1.83	Constant	++
	(3.31)		

Table 2. Structural Model (continued.)

Budget Transparency		Budget Transparency*Tax Growth	
Variable	Coef. (z)	Variable	Coef. (z)
Tax Growth+	0.11 (1.61)	Tax growth+	0.33 (14.91)
Polarization	0.14 (3.55)	Budget transparency+	0.05 (8.91)
Legislative Competition	0.39 (2.22)		
Divided Government	0.01 (0.79)		
Fixed state effects	Yes	Fixed state effects	No
Fixed year effects	No	Fixed year effects	Yes
Constant	0.35 (5.90)	Constant	0.04 (2.24)

Notes

Number of observations = 263.

R² = .159 for incumbent retention, .258 for tax growth, .853 for budget transparency, and .856 for budget transparency

*tax growth.

+ indicates endogenous variable.

++ The estimating procedure dropped the constant term rather than one of the fixed state variables.

re-elected has no discernible effect on tax increases. Finally, the unit fixed effects (not shown) are jointly significant at the 99 percent level.

Finally, consistent with Alt et al. (2006), states that are politically polarized and have highly competitive legislatures tend to choose higher levels of budget transparency. The coefficients on endogenous tax growth and divided government are positive but not significant at the 90 percent confidence level. Much of the predictive power of our budget transparency equation comes from the unit fixed effects, as budget transparency varies much more across states than over time within states.

Sensitivity Analysis: 3SLS

We first re-estimated our system of equations using seemingly unrelated regression, then performed a Hausman test on the results compared to our 3SLS model. We were able to reject the null hypothesis of no systematic differences in the coefficients, which supports 3SLS and indicates that we need to account for endogeneity. We then estimated the system without the growth in expenditures variable in the retention equation. There are only minor shifts in the coefficients or standard errors for the remaining variables, and the implications for our hypotheses of interest do not change at all. Similarly, using a non-linear coding for the incumbent’s age or dropping all of the incumbent’s personal attributes except age have only minimal effects.

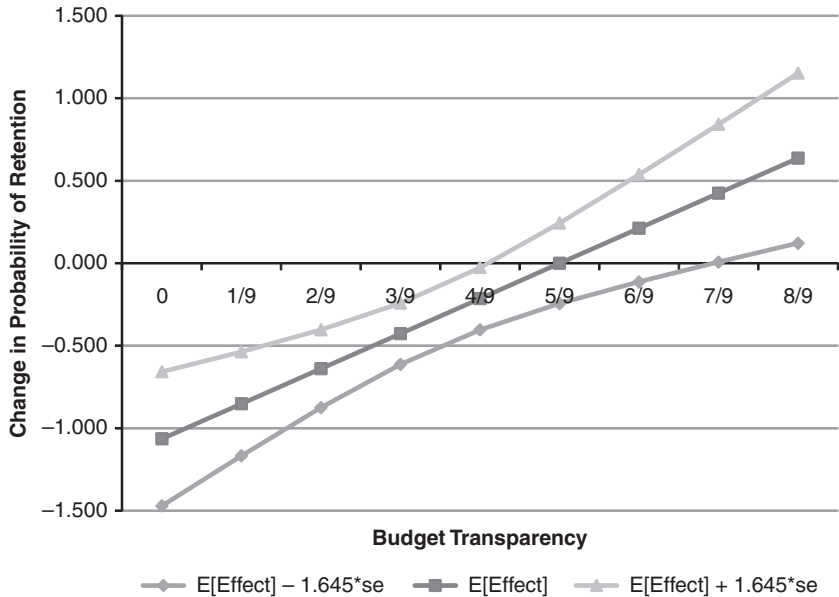


Figure 1. Effect of a Change in Tax Growth from -0.05 to 0.15 on the Probability of Retention, Linear Probability Model

Note: Estimates are calculated from the results for the incumbent retention equation in Table 2.

Our measure of budget transparency is bounded by 0 and 1, and therefore does not satisfy the classic assumptions of the linear regression model. We re-estimated the model using a logistic transformation of our budget transparency variable.²⁰ All of our key results are qualitatively the same. We also estimated the system using two-stage least squares and obtained substantially similar results, save that the effects of media penetration on tax growth is significant at the 90 percent level rather than the 95 percent level.

We then re-estimated the system with 3SLS using different subsets of the data. We first used only those cases where the incumbent governor chose to run for re-election. The number of cases drops from 263 to 205, but our main results hold up. The coefficient on tax growth in the retention equation is positive, the coefficient on the interaction between tax growth and budget transparency is negative, and both are significant at the 99 percent level. In the tax growth equation, the coefficient on budget transparency is positive and significant at the 99 percent level; the coefficient on media penetration is positive, but loses significance. The

20. We arbitrarily recoded four cases where transparency is zero as 0.05 before making the transformation. We added a constant to the transformed index so that all values are non-negative in order to make interpretation of the interaction term feasible.

effects of political polarization and legislative competition remain positive and significant at the 95 percent level in the budget transparency equation.

Next, we omitted all cases for the southern and border states that tend to have more conservative fiscal policies (Alt and Lowry, 1994). This reduces the number of cases to 195. The main results of interest in the retention and tax growth equations are qualitatively similar to Table 2. The coefficient on media penetration is less precisely estimated in the tax growth equation, but is still significant at the 90 percent level. In the budget transparency equation, polarization has a positive, significant effect, the effect of divided government is positive but not quite significant at the 90 percent level, while the effect of legislative competition is insignificant. Nevertheless, the main structural effects of interest remain evident.

If we add a full set of year fixed effects to the tax growth equation, the results for the incumbent retention and budget transparency equations are essentially unchanged. Most important, the coefficient (lz-score) in the retention equation is -5.07 (4.07) for tax growth and 9.91 (3.39) for tax growth*budget transparency. In the tax growth equation, the effects of media penetration and the growth in income and state debt are suppressed, but the coefficient (lz-score) is 1.06 (3.71) for budget transparency. In addition, the effect of an incumbent who does not run for re-election is positive and significant at the 95 percent level. Overall, the qualitative interpretation of the results is essentially the same as in Table 2.

Extensive investigation of outliers and influential observations indicates that the only effect which is at all sensitive to the exclusion of particular cases is the effect of budget transparency on tax growth. However, there is no theoretical reason to exclude selected cases, and otherwise the results are very robust.²¹ The coefficients on tax growth and tax growth interacted with transparency in the retention equation are always significant at the 95 percent level, while the coefficient on tax growth in the transparency equation is never significant.

Finally, we consider alternative treatments of fixed effects. An intriguing result arises when we estimate the system with all 263 cases but include fixed unit effects (even though jointly insignificant) in the incumbent retention equation. The effects of tax growth conditional on budget transparency remain, but we also get a positive, significant coefficient on budget transparency itself and

21. We investigated outliers by generating residuals for the 3SLS model and then focusing on cases where the absolute value of the residual exceeds the root mean square error in at least two of the three equations for retention, tax growth, and transparency. If we exclude cases that have large residuals in both the retention and transparency equations, then the effect of transparency on tax growth is not significant. If we exclude cases with large residuals in any other combination of equations, the effect of transparency on tax growth is positive and significant at the 95 percent level. We then checked for influential observations using single-equation models and calculating Cook's distance, DFITS, and DFBETA for our key explanatory variables. Looking across the results, it appears that Rhode Island is particularly influential, but excluding Rhode Island from the 3SLS model has no effect on the results. Finally, we excluded each of the other states one at a time. All of our key results remain.

a negative, marginally significant ($|z| = 1.79$) coefficient on media penetration.²² However, this version of the model also generates a negative R-squared for the incumbent retention equation,²³ so ultimately we chose to omit unit fixed effects from the incumbent retention equation in Table 2. They are jointly insignificant in that equation, at least conditional on being included in some of the other equations.

Sensitivity Analysis: Retention

Table 3 shows some single-equation results for our incumbent retention model with measures of transparency.²⁴ The first column shows a linear probability model with all regressors treated as exogenous. Standard errors are adjusted assuming that observations are clustered by incumbent governor. Results for this model are similar to the incumbent retention equation in our structural model in Table 2, though omitting considerations of endogeneity does affect the tax growth coefficients. The second column shows a maximum likelihood Probit model that is more appropriate for our dichotomous dependent variable, with standard errors again calculated for observations clustered by incumbent governor.²⁵ The result for this model is qualitatively similar to the linear probability model in column 1, though of course the non-linear form makes the coefficients look different, in a way that is consequential for the model's predictions.

Figure 2 shows the effect of tax growth conditional on transparency predicted by our Probit model.²⁶ Now the entire 90 percent confidence interval lies within the feasible range, due to the Probit specification. Other than that, the predicted effects look similar to those for the linear probability model shown in Figure 1. At low levels of budget transparency, an increase in tax growth has a negative, statistically significant effect on the probability of retention. The negative effect is dampened as transparency increases, and the mean predicted effect reaches

22. Besley (2006) provides a model without taxes in which incumbents choose whether or not to make a policy decision consonant with voters' wishes and voters receive signals of the incumbent's type and policy choice. This empirical result resonates with that model if we interpret media penetration as providing information about incumbent's type and budget transparency as providing information about policy actions.

23. Because final coefficients are calculated using the instrumented values while R-squared is calculated using the actual data, it is possible for the model to do a worse job of predicting than the mean value of the dependent variable, resulting in a negative R-squared.

24. Sub-period estimation shows that Besley's (2006) statistically significant coefficients for the growth in taxes and income using data for 1950–96 are driven primarily by the earlier years in his data set, largely before our transparency data begins. Besley also inadvertently used the growth rate of nominal, aggregate personal income.

25. We tried to estimate a model with endogenous transparency using Stata's IVPROBIT command, but it would not converge.

26. Results in Figure 2 were generated using Tomz et al.'s (2001) CLARIFY program, which does not support three-stage least squares. For Figure 1, we calculated the conditional standard errors from the variance-covariance matrix for the incumbent retention equation.

Table 3. Sensitivity Analysis: Retention of Incumbent Governors

	<i>Linear Probability</i>	<i>Probit</i>
Budget transparency	0.02 (0.15)	0.07 (0.15)
Media penetration	-0.01 (0.04)	0.02 (0.05)
Tax growth	-2.21 (3.49)	-7.44 (3.08)
Tax growth* transparency	4.11 (2.44)	13.96 (2.46)
Unemployment	-0.02 (1.46)	-0.07 (1.51)
Income growth	0.76 (0.97)	2.32 (0.97)
Spending growth	0.08 (0.17)	0.38 (0.27)
Ln(population)	-0.03 (1.09)	-0.09 (1.17)
Vote share, last election	-4.6e-3 (1.12)	-0.01 (1.19)
Governor's age	-0.02 (5.32)	-0.06 (4.85)
Lawyer	0.06 (0.88)	0.19 (0.89)
Work experience	0.01 (3.53)	0.04 (3.28)
Fraction in politics	0.49 (3.89)	1.50 (3.75)
Years of education	2.7e-3 (0.25)	0.01 (0.32)
Constant	1.74 (3.23)	3.78 (2.27)
<i>R</i> ² or pseudo- <i>R</i> ²	.224	.182

Number of cases = 263. Numbers in parentheses are absolute z-scores with observations clustered by governor.

zero when our transparency index equals 5/9. For this model, the 90 percent confidence interval still includes zero even at very high levels of transparency.

Sensitivity Analysis: Tax Changes

Table 4 shows single-equation results for our model of tax changes. All equations are estimated using Plümper and Troeger's (2007) fixed-effects vector decomposition model with budget transparency treated as rarely changing. Plümper and Troeger show that their method produces more reliable estimates than a fixed effects regression with rarely changing independent variables, as long as the unobserved

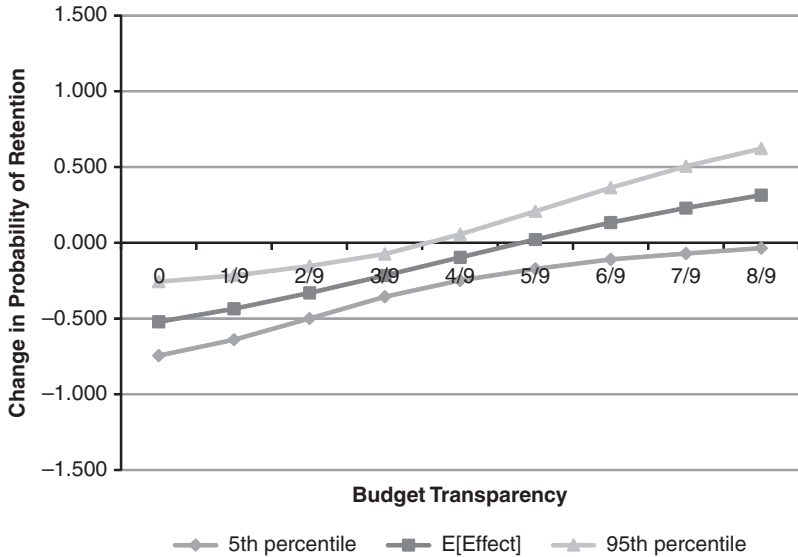


Figure 2. Effect of a Change in Tax Growth from -0.05 to 0.15 on the Probability of Retention, Probit Model

Note: Results are based on 1000 simulations calculated for the Probit Model in Table 3, using CLARIFY v. 2.0. (Tomz et al., 2001) All variables except Budget Transparency, Tax Growth, and their product are set to their mean values.

correlation between these variables and unit effects is small.²⁷ Model 1 replicates the specification from our structural model but without a dummy for whether the governor runs and is retained, because this cannot be exogenous to tax growth over the two years prior to the election. The results are very similar, except that the coefficient on budget transparency is positive but significant at only the 90 percent confidence level. We also estimated a series of models for fiscal scale measured in levels, that is, real, per capita sales and income taxes. The same basic results emerge.

Model 2 adds fixed year effects. The main consequence is that the coefficients on income growth and growth in state debt are no longer statistically significant. The effect of budget transparency is positive and significant at the 90 percent level, while the effect of media penetration is smaller, but still significant at the 95 percent level. Model 3 includes non-election years and years when the incumbent is term limited. This increases the number of cases by a factor of five. Now the coefficients on budget transparency and income are positive and significant at the 99 percent level, and lagged growth in state debt is significant at the 90 percent level. Media penetration and the growth in federal transfers become

27. There is no bright line rule for when a variable should be treated as rarely changing, except that the ratio of its between- to within-variation must exceed one. For budget transparency, the ratio of between- to within-standard deviations is 2.35.

Table 4. Sensitivity Analysis: Tax Growth

	1	2	3	4
Budget transparency	0.05 (1.91)	0.05 (1.84)	0.04 (3.91)	0.02 (1.50)
Republican governor	—	—	—	-0.02 (2.51)
Rep. gov.* transparency	—	—	—	0.05 (2.71)
Media penetration	0.16 (4.53)	0.08 (2.19)	3.7e-3 (0.29)	4.9e-3 (0.39)
Incumbent does not run	0.01 (1.27)	0.02 (1.55)	—	—
Unemployment	-0.01 (2.89)	-0.02 (4.47)	-0.01 (6.29)	-0.01 (6.20)
Income growth	0.73 (6.12)	0.09 (0.60)	0.24 (3.68)	0.23 (3.63)
Growth in state debt _{t-2}	0.06 (1.46)	0.01 (1.11)	0.03 (1.76)	0.03 (1.76)
Growth in federal transfers	0.12 (3.42)	0.10 (2.30)	0.02 (1.10)	0.02 (1.08)
Per capita taxes _{t-2}	-3.6e-4 (7.87)	-3.5e-4 (6.42)	-4.7e-4 (17.08)	-4.8e-4 (17.18)
Fixed year effects	No	Yes	Yes	Yes
Constant	0.09 (2.28)	0.34 (3.34)	0.35 (12.64)	0.36 (12.84)
Cases	263	263	1330	1330
R ²	.426	.549	.546	.548

Note: Models are estimated using fixed effects vector decomposition, with budget transparency treated as rarely changing. Numbers in parentheses are absolute z-scores. Models (1) and (2) use the same cases as the structural model. Models 3 and 4 include non-election years and election years when the incumbent is term limited.

insignificant. Adding fixed year effects and expanding the data set thus causes the size and statistical significance of the transparency and fiscal variable coefficients to shift, but does not alter the overall conclusion implied by the structural model.

Neither Besley (2006) nor Ferejohn (1999) allow for heterogeneous policy preferences among either politicians or voters, but as part of the sensitivity analysis we considered whether the tax change results might vary by party. An intriguing empirical result emerged. We now add a dummy variable for Republican governor and an interaction term for Republican governor with budget transparency: as column 4 shows, the Republican governor coefficient is negative, the interaction term is positive, and both are significant at the 99 percent level. If we estimate the same model for election years only, point estimates for all coefficients are remarkably similar, but neither partisan effect is statistically significant.²⁸

28. We ran a full replication of this substituting Berry et al.'s (1998) measure of elite ideology for party, with similar results.

That result has a straightforward interpretation. Previous research indicates that politicians' preferences affect fiscal policy (Alt and Lowry, 1994, 2001; Reed, 2006), and the effect of transparency might be conditional on these preferences. For example, Republicans are more likely to oppose tax increases, and are expected by voters to do so (Lowry et al., 1998). They may be unwilling to support tax increases even when increases are justified unless voters can be convinced that the increase is really necessary, which is more likely to happen if the process is transparent.

Finally, if we include variables for the partisanship of the Governor interacted with tax changes and the interactions of that variable with transparency in the Probit retention equation of Table 3, we observe that the signs are the same regardless of party, but the effects are strikingly bigger (and more statistically significant) for Republican governors. However, we lack valid instruments for all these interactions, and so choose not to try to incorporate this result in the structural model.

Sensitivity Analysis: Transparency

Table 5 shows the results of our sensitivity analysis for budget transparency. Model 1 replicates the specification from our structural model, with tax growth treated as exogenous and standard errors adjusted assuming that observations are clustered by state. Model 2 expands the data to include non-election years, election years where the incumbent is term limited, and cases with independent governors. Model 3 adds two additional measures of fiscal outcomes: lagged per capita taxes, and the growth rate of state debt.

Again, the results for our single-equation models are very similar to the structural model except that statistical significance decreases with observations clustered by state. Not surprisingly, significance returns when we increase the number of cases from 263 to 1362. When we add lagged fiscal scale and the growth in state debt, the coefficients on tax growth and lagged scale are both positive and significant at the 99 percent level, while the coefficients on polarization and legislative competition retain their positive signs but become statistically insignificant. This makes sense, in that transparency causes larger tax changes in the structural model, and the lagged level of taxes reflects all those past changes cumulated. Since transparency does not change often, over time transparency comes to be associated with larger fiscal scale. Overall, consistent with Alt et al. (2006), our results imply that transparency is greater in states with larger fiscal scale and highly competitive and polarized state politics. Further experiments with variables measuring the partisanship of the governor or legislature in this equation yielded coefficients that are essentially zero for the 263 cases in our structural model, but a negative, significant coefficient on Democratic legislature in the expanded data set used for Model 3.

Table 5. Sensitivity Analysis: Budget Transparency

	1	2	3
Tax growth	0.01 (0.11)	0.01 (0.35)	0.10 (3.52)
Per capita taxes _{t-2}	—	—	2.6e-4 (4.27)
Growth in state debt	—	—	0.01 (0.31)
Political polarization	0.15 (2.01)	0.14 (2.89)	0.04 (0.93)
Legislative competition	0.40 (1.59)	0.44 (2.17)	0.27 (1.28)
Divided government	0.01 (0.58)	2.4e-3 (0.22)	-1.4e-3 (0.15)
Fixed state effects	Yes	Yes	Yes
Constant	0.47 (10.42)	0.34 (7.39)	0.32 (4.57)
Cases	263	1362	1362
R ²	.855	.844	.863

Note: Numbers in parentheses are absolute z-scores based on the assumption that observations are clustered by state. Model 1 uses the same cases as the structural model. Models 2 and 3 include non-election years, election years when the incumbent is term limited, and cases with independent governors.

Discussion

The formal models of Besley (2006) and Ferejohn (1999) each address the relationship between transparency, policy choice, and the accountability of political agents (incumbents). Besley assumes incumbents can be good or bad and that transparency can reveal information about either the incumbent’s type or policy actions. Ferejohn assumes only one kind of incumbent and one kind of transparency. Besley assumes transparency is given exogenously, while Ferejohn allows it to be determined endogenously by incumbents. Both models nonetheless show that policy-related transparency can serve the interests of both incumbents and voters. Increased transparency can improve voter welfare,²⁹ while offsetting the negative effects of tax increases on the incumbent’s chances of being re-elected.

Our empirical results in Tables 2 to 5 show how an institutional feature like budget process transparency affects whether and how voters attribute responsibility for policy changes to incumbents, and how these attributions affect incumbent retention. The results provide a degree of support for each of the

29. In Besley’s model, this requires a sufficient screening effect. Of course, we do not observe voter welfare.

models we examined. We find that the effect of tax increases on incumbent retention is negative and statistically significant at low levels of budget transparency, but the effect diminishes to zero at higher levels. This holds regardless of whether we treat tax growth and budget transparency as endogenous or exogenous. The negative effect of tax growth is predicted by Besley, but the conditioning effect of budget transparency, while not inconsistent with Besley, comes directly from Ferejohn, though only conditional on the unobserved choice to invest in action monitoring.

Ferejohn's model further implies that greater transparency leads to larger fiscal scale, and we find that both budget transparency and media penetration have positive effects on tax growth, though the statistical significance varies by model, estimation method, and whether we include non-election years. Neither Besley nor Ferejohn offers an explanation for the variation in budget transparency across states or time. It is not surprising that our results follow Alt et al. (2006), given that we use much of the same data. Our contribution here is to estimate a structural model that allows for simultaneous causation between the probability that an incumbent governor is re-elected, tax growth and budget transparency, with results that are similar to those we obtain by analyzing each variable separately.

Pulling it all together, these results suggest that the formal models of Besley and Ferejohn are valuable. Both models focus on the incomplete information problem faced by voters in seeking to discipline elected agents, though Besley also addresses the screening effects of different information regimes. Voters may dislike higher taxes, but the models and results make clear that providing better access to information about the underlying policy decisions can alter voter reactions to those political choices.

Finally, politicians are elected not just to be honest (or 'congruent' in Besley's (2006) terms), but also are expected to pursue policies favored by the winning coalition of voters, or perhaps a representative (or median) voter. They are held accountable for failure to meet those expectations, as well as for excessive rent seeking. Our further analysis in Table 4 suggests that how much voters are willing to invest in political agents is contingent on the policy preferences of agents and their supporting coalition, regardless of whether we interpret the results as revealing how the effect of party on fiscal scale is conditional on transparency or how the effect of transparency on taxes is conditional on party. Such partisan results are not in either model we discuss (both models assume that politicians and voters have homogeneous policy preferences), but Meirowitz (2007: 43) offers a formal model of competition between politicians in parties in which a representative voter can have different re-election rules for each party in equilibrium, such that 'policies (or outcomes) that are considered acceptable if implemented by one party may be viewed as unacceptable when the other party is in office'. He does not address fiscal scale specifically, and does not analyze the effects of differences in transparency. As always, there is a tension between a desire for realism and a desire for parsimony, but our empirical results suggest

that adding at least one more complication to existing models of transparency is warranted.

Appendix 1

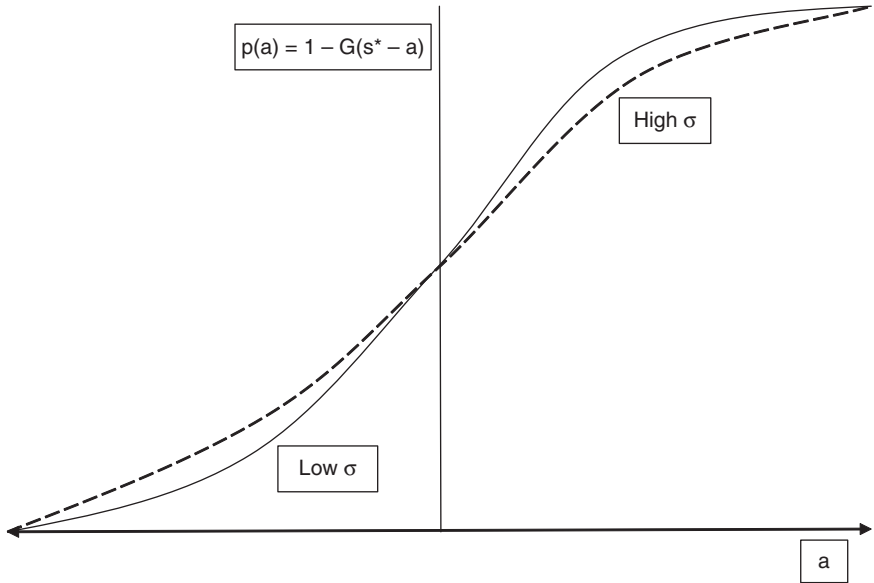
Transparency and Retention in Ferejohn's Model

Following Ferejohn's (1999) notation, let a be the action chosen by the incumbent, s be the signal received by the voter, θ be a noise shock, and start with the re-election rule which is 're-elect when the signal $s (= a + \theta) \geq s^*$ '. G is a cumulative distribution function for the signal s , whose unimodal density g has mean a and standard deviation σ , so the shock θ has mean 0 and standard deviation σ . The probability of re-election is then the probability that $s \geq s^* - a$, or $p(a) = 1 - G(s^* - a)$. Figure A1 shows $p(a)$ as a function of $a - s^*$ rather than $s^* - a$ so that a – the agent's choice variable – increases as we move from left to right. We show this function for two different values of σ . (We have drawn the above diagram as though g – the probability density function – is bell-shaped as an example of a unimodal function.)

Observe that, holding $(a - s^*)$ constant, a decrease in σ (an increase in transparency, moving from the dashed to the solid curve) causes G to decrease and hence $p(a)$ to increase if we are on the right-hand side of the graph where $(a - s^*) > 0$. The opposite happens, $p(a)$ decreases, if we are on the left-hand side. However, the second-order condition for satisfying Ferejohn's equation (2) ensures that, if g is unimodal and a is positive, $a(s^*) > s^*$. This implies that we are on the right-hand side. Therefore, conditional on action monitoring taking place, an increase in transparency increases the probability of re-election.

For any pair of unimodal cumulative distributions, monotonicity means they cross at a single point. For convenience we draw that point where $a - s^* = 0$, to the right of which in equilibrium action monitoring is chosen. If the agent chooses an action that is greater than the threshold level ($a - s^* > 0$), an increase in transparency makes it more likely that the principal will perceive this correctly, and thus raises the probability of re-election.

Of course, the choice of a depends on σ , so we cannot assume that it is fixed. However, for a fixed probability of re-election, $a - s^*$ gets closer to 0 for $a > s^*$ when transparency increases. Intuitively, an increase in transparency makes it easier for the principal to correctly perceive that the agent's action is 'good enough,' so the agent does not need as much margin for error. This tends to offset the effect described above, but doesn't change the underlying result that $p(a)$ increases so long as $a > s^*$. Conversely, if the agent chooses an action that is less than the threshold (left-hand side of the diagram where $a - s^* < 0$), an increase in transparency lowers the probability of re-election because the principal is more likely to correctly perceive this. But in equilibrium no agent offers more transparency and then chooses too small an action.



a = action chosen by the incumbent

$p(a)$ = probability of retention

σ = standard deviation of the signal observed by voters; low σ indicates high transparency.

s^* = threshold signal required for retention.

Figure A1. Probability of Retention Conditional on Transparency

Appendix 2

Further Details on Data

The nine items included in our index of budget transparency are as follows:

1. Budget is reported using generally accepted accounting principles (GAAP).
2. Multiyear expenditure forecasts are used.
3. Budget cycle is annual.
4. Revenue forecasts are binding.
5. Legislative branch has or shares responsibility for revenue forecasts.
6. All appropriations are included in a single bill.
7. Appropriation bills are written by non-partisan staff.
8. Open-ended appropriations are prohibited.
9. Budget requires published performance measures.

Further details on the rationale for the coding can be found in Alt et al. (2006).

Our index of media coverage reflects the fact that the composition of media suppliers in the United States changed considerably during the years included in our data set, due to the declining importance of newspapers and the increasing importance of first cable television and then the internet. We therefore combine data on newspaper circulation and cable penetration rates. Circulation data for daily newspapers are from *Editor & Publisher* (various) for 1983 and 1995.³⁰ Cable penetration data are available for most years but are interpolated for 1973–81 and 1984–5.³¹ Data for cable and newspapers both show distinct trends in opposite directions, reflecting the change in the composition of media markets. When combined, the data show a general increase in media coverage during the 1970s and 1980s that flattens during the 1990s. We label our measure of non-policy related transparency MEDRATE.

The control variables in our model of budget transparency are drawn from the work of Alt et al. (2006). These include political polarization, legislative competition, and divided government. Political polarization is measured as the difference in average NOMINATE scores for Democrats and Republicans in the state's Congressional delegation. If a state has a single-party delegation, we use the population-weighted mean of all contiguous states with two-party delegations. Legislative competition is measured by the folded Democratic vote share in gubernatorial elections, the product of the folded seat shares in the lower and upper houses, and a dummy variable for divided government. The first two variables are multiplied by -1 so that higher values indicate more competition. Divided government is a simple dummy variable coded one if the same party does not control the governorship and both chambers of the legislature.

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30. Circulation figures are for daily newspapers, and state totals are adjusted for newspapers that have national circulation.

31. The cable penetration data come from the *Broadcast and Cable Yearbook* (which publishes under various titles over the years). It contains data on 'number of subscribers', by state, published for 1972, 1973, 1978, 1979, and 1980. There are also data on 'number of households with cable' and 'penetration in per cent', by DMA (Designated Market Area), for 1973, 1982, 1983, and then annually from 1986 on.

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JAMES E. ALT is Frank G. Thomson Professor of Government at Harvard University and Senior Research Fellow, Nuffield College, Oxford. His research focuses on accountability, corruption, transparency, budget policy, and political institutions in American states and advanced industrial societies. ADDRESS: Institute for Quantitative Social Science, Harvard University, 1737 Cambridge Street, K307, Cambridge, MA 02138, USA. [email: jalt@iq.harvard.edu]

ROBERT C. LOWRY is Professor of Political Science in the School of Economic, Political and Policy Sciences at the University of Texas at Dallas. His research focuses on fiscal policy and institutions, political and civic organizations, and the political economy of higher education. ADDRESS: School of Economic, Political and Policy Sciences, The University of Texas at Dallas, 800 W. Campbell Road GR 31, Richardson, TX 75080, USA. [email: robert.lowry@utdallas.edu]