ABSTRACT

Title of dissertation: ESSAYS ON BUDGETARY INSTITUTIONS THEORY AND EVIDENCE

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The dissertation offers an analysis of the role of budgetary institutions on the determination of fiscal outcomes. In the second chapter I provide a theoretical model that rationalizes differences in fiscal outcomes of two countries that are supposed to obey the same set of numerical constraints on the budget. I argue that these differences arise from heterogeneity in the degree of budgetary transparency that make these rules more or less binding. Moreover, the model is able to accommodate not only long run results, where stronger institutions will always cause more constrained fiscal outcomes, but also short run implications, where countries with relatively stronger institutions can be paired with relatively unconstrained outcomes. The main lesson of the chapter is that, in a democratic environment, transparency of the budgetary process is the main ingredient responsible for the good behavior of the government, and that numeric constraints will have very different effects depending on the level of transparency.

In the third chapter I conduct an empirical investigation across a set of countries, of the effects of budgetary institutions on fiscal outcomes. I exploit a new

dataset on budgetary practices across countries, to construct several measures of the three recognized budgetary institutions: numerical rules, procedural rules, and budgetary transparency. The main finding of the chapter is that among budgetary institutions, transparency is the only one that is consistently associated with more fiscal discipline, a finding that goes in hand with the results of the model in the previous chapter.

The fourth chapter provides an empirical investigation of the effects of budgetary transparency on fiscal outcomes in the American States. I construct a transparency measure across time from the mid 1980s that allows me, not only to look at the evolution of transparency in the American States, but to take account of possible fixed effects in the estimations. My results essentially corroborate those obtained elsewhere in the literature, that greater fiscal transparency among the American States is associated with larger size of government, but I show that this effect is less robust and economically relevant than previously thought.

ESSAYS ON BUDGETARY INSTITUTIONS THEORY AND EVIDENCE

by

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Dissertation submitted to the Faculty of the Graduate School of the
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Dedication

To my beloved wife, Natalia, and our precious Paula.

To my parents, Irma and Nicolás.

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Lastly, and although this dissertation is dedicated to you: Thank you Mom. Thank you Dad. For everything. To you Natalia, a simple thank you would come short of making you any justice. I just hope we can have enough time to repay you so much love, understanding, support and patience.

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Chapter 1

Introduction

In this dissertation I examine the role of budgetary institutions on the determination of fiscal outcomes. Budgetary institutions are defined as the set of all the rules and regulations according to which budgets are prepared, approved and carried out (Alesina and Perotti (1999)). These institutions have generally been divided into three different categories. The first are rules that impose *numerical constraints* on the deficit. The second are *procedural rules* that dictate the timing and mechanisms by which the budget is drafted within the executive and approved by the legislature. The third and final category, is the degree of *transparency of the budgetary process*. Each one of the next three chapters is a self-contained essay that explores different aspects of budgetary institutions. They have in common, though, one of these institutions: the transparency of the budgetary process.

The purpose of Chapter 2 is to explain how is it possible that two different countries that are supposed to obey the same set of numerical constraints on the budget, like the members of the European Union subject to the Maastrich Treaty, can have such dissimilar fiscal outcomes. I argue that differences in outcomes arise from heterogeneity in the degree of budgetary transparency that make these rules more or less binding. Moreover, it is postulated that budgetary transparency is the key ingredient in shaping fiscal outcomes. To this end, I provide a career concern

model in which the government is in an agency relationship with their constituents and *might* enjoy some information advantages, depending on the degree of transparency of the budgetary process. The results of the model show how transparency is enough to generate differences in fiscal outcomes while numeric budgetary rules are effective only if the budgeting process is transparent enough.

When compared with other models that look at similar issues, the novel characteristics of the model presented here are twofold: First, from a technical point of view, the model's dynamic structure arises from first principles. This structure allows the study of policy decisions over *long* periods of time. Second, from a conceptual point of view, the model shows that lack of transparency is a sufficient condition for generating *undesirable* levels of debt and deficits.

The main lesson of the chapter is that, in a democratic environment, transparency of the budgetary process is the main ingredient responsible for the good behavior of the government, and that numeric constraints will have very different effects depending on the level of transparency.

In Chapter 3, I pursue an empirical investigation across a set of countries, of the effects of budgetary institutions on fiscal outcomes. Following the common strategy in the literature, I exploit a new dataset on budgetary practices across countries, to construct several measures of the three recognized budgetary institutions: numerical rules, procedural rules, and budgetary transparency. I then perform a battery of econometric tests to asses the relative importance of these institutions, proxy by the constructed measures, on several fiscal outcomes. The first finding of the chapter is that among budgetary institutions, transparency is the only one that is consistently

associated with more fiscal discipline, a finding that goes in hand with the results of the model in the previous chapter. However, the hypothesized conditional effect of numerical rules becoming more binding as transparency increases, from Chapter 2, fails to show up for the sample of countries analyzed in Chapter 3.

Chapter 4 is also an empirical assessment of budgetary institutions but differs in several aspects from Chapter 3. First, I concentrate only on the implications of budgetary transparency on fiscal outcomes. Second, the object of study is the American States instead of a set of countries, which eliminates one source of heterogeneity. Finally, I am able to construct a transparency measure across time from the mid 1980s that allows me, not only to look at the evolution of transparency in the American States, but to take account of possible fixed effects in the estimations. My results essentially corroborate those obtained elsewhere in the literature (Alt, Lassen and Skilling (2003)), that greater fiscal transparency among the American States is associated with larger size of government, but I show that this effect is less robust and economically relevant than previously thought.

Finally, Chapter 5 provide the conclusions.

Chapter 2

Transparency and Numeric Rules in the Budgeting Process and the Provision of Public Goods in an Agency Model

2.1 Introduction

"*Elected officials typically enjoy an immense informational advantage over the voters that limits how accountable such agents will be to the voters desires. This is a consequence of the complexity of modern government.*" (Ferejohn 1999).

What is the role of budgetary institutions in shaping the size of the budget and, ultimately, the delivery of public goods? How independent are these institutions from one each other and which ones, if any, are truly necessary and/or sufficient to affect fiscal outcomes? This paper explains how two different countries that are supposed to obey the same set of rules, like the members of the European Union and the Maastrich Treaty, can have such dissimilar fiscal outcomes. In other words, it will provide an explanation of how and when these rules will be an active constraint on the government.

In this chapter, I provide a career concern model in which the government is in an agency relationship with their constituents and *might* enjoy some information advantages, depending on the degree of transparency of the budgetary process. The results of the model show how transparency is enough to generate differences in

fiscal outcomes while numeric budgetary rules are effective only if the budgeting process is transparent enough. This model was inspired by two well known pieces in the political economy literature: the political business cycle model with prospective voting (Rogoff and Siebert (1988), Rogoff (1990), Shi and Svensson (2001)), and the elections as a disciplining device model with retrospective voting (Ferejohn (1986)).

To the best of my knowledge, no other work –besides Milesi-Ferretti (2004)– provides a theoretical framework for the relationship between transparency and numeric constraints on the budgeting process and their implications over deficits or other fiscal variables. Although I contrast in full the work of Milesi-Ferreti in the next section, it bears noting that the novel characteristics of the model presented here are twofold: First, from a technical point of view, the model's dynamic structure arises from first principles. This structure allows the study of policy decisions over *long* periods of time. Second, from a conceptual point of view, the model shows that lack of transparency is a sufficient condition for generating *undesirable* levels of debt and deficits.

The main lesson of the chapter is that, in a democratic environment, transparency of the budgetary process is the main ingredient responsible for the good behavior of the government, and that numeric constraints will have very different effects depending on the level of transparency.

The policy recommendation of the chapter is that citizens of democracies should, in their own best interest, push for a more transparent budgetary process and dedicate less effort towards controlling the government by imposing numeric constraints such as maximum deficit rules. Supranational organizations could play

a decisive role in this task.

The rest of the chapter is organized as follows: In section 2 I review the literature and contrast it with the proposed model. In section 3 I present the model and the political economy equilibrium is derived in section 4. The concluding remarks are presented in section 5.

2.2 Literature Review

Shi and Svenson (2001) propose a moral hazard model of electoral competition to explain a set of empirical findings about the *size of electoral budget cycles*, and conclude that these depend on the rents of those remaining in power and the *share of informed voters*. Alt and Lassen (2003) slightly modify the Shi and Svenson model and reinterpret the share of informed voters as *transparency in the budgeting process*, and conclude that lower transparency produces higher levels of debt and larger deficits. The problem with their model is that in the absence of electoral cycles (i.e., if there were no elections or if elections occurred in every period), no debt or deficit could be generated. In other words, the Alt and Lassen model predicts that transparency affects fiscal outcomes *only* in the electoral year. In contrast, the model presented here builds on some of the structure of the Shi and Svenson model, but eliminates the political fiscal cycle motive by allowing elections to occur in every period. In spite of this removal, the current model still generates an inverse relationship between transparency and debt. This is relevant not only from a conceptual perspective, but also because the majority of empirical tests (Alesina et

al (1998), Alt and Lassen (2003) themselves) analyze the cross-sectional implications of transparency in fiscal outcomes and none of them show evidence that an election dummy is significant. Shi and Svenson do test their dynamic model with a good proxy for the share of informed voters (number of radios per head) but that could hardly be considered a good proxy for budgetary transparency.

In a seminal paper, Ferejohn (1986), obtained optimal reelection rules when the incumbent's actions can not be directly observed by retrospectively inferring these actions based on realized outcomes. This *pure outcome* evaluation can be interpreted in the context of the model presented here as a case of full opacity, where the signal drawn by the electorate is simply uninformative. Persson, Roland and Tabellini (1997) (PR&T), in a similar setup, also derive the case of full information, where voters can observe incumbent's actions, and show that even in this case the incumbent will extract rents from being in power. In terms of the present model this could be associated with a case of full transparency where the signal drawn from the private sector perfectly identifies the current shock. Whereas the structure for obtaining the optimal reelection rule is similar to these two previous works, there are several differences that are worth mentioning. Here I explicitly use two goods, private and public, from which voters derive utility, allowing me to trace *real* world policy decisions. Further, the *state of the world* is not only determined by an exogenous shock, but also by the history of policy decisions made by the incumbent. This feature allows situations where the incumbent will optimally choose to perform actions that are costly only to him and be reelected, even under the most adverse of shock realizations, provided he has enough fiscal resources, i.e.

that issuing new debt is not too costly. In this regard, a final difference between this model and those mentioned previously lies in the fact I analyzed different degrees of informational asymmetry, and their relation to fiscal outcomes in addition to welfare. Unfortunately, the complexity of the model does not allow for a closed form solution, unlike the previously mentioned works.

The work that is most closely related to the model presented here is Milesi-Ferretti (2004) which is the first, and to the best of my knowledge, the only paper that looks at the effects of budgetary rules and budgetary transparency simultaneously on fiscal outcomes. In a two-period model, with heterogenous policymakers that seek to minimize an arbitrary loss function, Milesi-Ferretti show that the extent to which a myopic ruler will engage in creative accounting (defined as deviations from a preestablished budgetary rule) depends negatively on the transparency of the budgetary process. A fundamental difference between the two models, in addition to the dynamics, is that in Milesi-Ferretti transparency is a necessary condition for sound fiscal policy whereas in my model transparency is not only necessary but also sufficient.

2.3 The Model

I consider an economy populated by a continuum of mass one of identical and infinitely lived individuals called *voters*. At every moment in time an *incumbent*, picked randomly from within the economy, is in charge of the government and will remain in power until he is voted out and replaced by an identical agent, who was a

voter at the end of the last period, and who now becomes the new incumbent. The former incumbent returns to the population as a voter, and while nothing forbids him from being elected again, the probability of this event happening is equal to zero. The assumption that the voted out politician rejoins the general population is a key element for the solution of the model; I explain this in detail later in the chapter.

Each voter obtains utility from two types of goods: a privately endowed good and a public good produced by the incumbent. The total period utility for voters, U_t^v, is aggregated as follows:

$$U_t^v = \tilde{g}_t + u(c_t), \tag{2.1}$$

where $\tilde{g}$ represents per capita amounts of the public good and c denotes private consumption. Each period, voters receive an exogenous and constant amount of income, y, and pay the sum of taxes demanded by the incumbent, τ_t. Private consumption takes place residually, according to the individual budget constraint: $c_t = y - \tau_t$. It is assumed that the sub-utility of the private good, u, is twice continuously differentiable and strictly concave. What is important to note about equation (2.1) is that voters know exactly how much of the public and private goods they are consuming in each period.

The incumbent's period utility function is identical to that of voters, since the incumbent rose from within the population, but incorporates costs and benefits of being in office:

$$U_t^I = \tilde{g}_t + u(c_t) + \chi - \phi(e_t), \tag{2.2}$$

where χ represents ego rents from being in office, charged every period t, and ϕ is the disutility function of the effort variable, e_t, which is the amount of effort measured in *dollars* that the incumbent devotes to public good production in the present period, and that is unobserved by voters. I assume that ϕ is twice continuously differentiable and strictly convex, representing the idea that the extra unit of effort is ever costlier. Both the incumbent and voters are assumed to be *expected utility maximizers*.

The production of the public good is described by the following equation:

$$\tilde{g}_t = \theta_t[\tau_t + d_t + e_t] - D(d_{t-1}), \tag{2.3}$$

where d_t is the per period government new debt maturing in the following period, and $D(d_{t-1})$ is the amount of debt plus interest payments maturing this period. Whereas τ, d and e are choice variables for the government, θ_t represents an exogenous shock to the production of public goods. It can be thought of as an input shock summarizing the cost and composition of raw materials in the production of public goods. I assume that the set of possible values that θ can take is continuous, compact, time invariant, and common knowledge for voters and incumbent alike: everyone knows that $\theta_t \in [\underline{\theta}, \overline{\theta}]$. I further assume that θ is identically independent distributed (iid) over the mentioned set with $E(\theta) = 1$. I will give some intuitive examples of θ later in the chapter when I introduce the notion of transparency.

With respect to the cost of public debt, I follow the same assumptions as Shi and Svensson (2001) or Alt and Lassen (2003), where $D(d)$ is defined as a convex borrowing function. In particular, $D(0) = 0$, $D'(0) = 1$, and $D''(d) > 0$ for all $d > 0$.

The convexity of D means that the marginal cost of borrowing is increasing in the amount of the principal, which can be linked to the country risk premium.

2.3.1 Transparency in the Budgeting Process

Transparency of the budgetary process is understood along the lines of Kopits and Craig (1998), who define transparency as openness towards the public at large about government structure and functions, fiscal policy intentions, public sector accounts, and projections. Transparency involves ready access to reliable, comprehensive, timely, understandable, and internationally comparable information on government activities, so that the electorate and financial markets can accurately assess the government's financial position and the true cost and benefits of government activities, including their present and future economic and social implications[1].

Here, I condense this notion of transparency in the budgeting process as *the ability of voters to observe the true costs and composition of inputs involved in the production of the public good. That is, the potential to assess the true value of* θ. In this respect, I assume that only the incumbent can directly observe θ. On the other hand, voters obtain an *estimate*[2], $\tilde{\theta}$, of the true value of the shock, conditional on the degree of transparency and the actual realization of θ. The government will always have incentives to understate θ in order to make voters think that effort was higher.

Some real world examples that help us understand this mechanism would be:

[1]The definition is almost *verbatim* and was originally taken from Alt and Lassen (2003).

[2]Also called *signal* throughout the chapter.

- Price of cement, steel, aluminum, etc: Voters can see new infrastructure but they can't know for sure what materials were used to build it. More importantly, without periodical revisions of the expending accounts, expenses at the end of the year can be justified claiming the material was purchased at the peak of the price within the year.

- The (audited) report of energy sources: if oil prices decline the government can argue that it had previously engaged in unfavorable futures contracts. If the price rises, it can argue it didn't have those contracts to hedge.

- Detail over contractors (suppliers): if payments to contractors are fully aggregated (Low Transparency), then it is easy to overstate costs. If on the contrary they are more disaggregated, this possibility is reduced.

To incorporate this idea in the model, I consider the *degree* of transparency of the budgetary process to be inversely related to a measure $\epsilon \in [0, \overline{\epsilon}]$, that is, more transparent regimes are associated with a lower value of ϵ. I treat ϵ as a parameter that is both exogenous and known to the incumbent and voters alike. The reason for this is that I am interested in the effect of transparency over fiscal outcomes rather than on the dynamic properties of transparency itself which, although a very interesting question, goes beyond the scope of this work. I then assume voters will draw a $\tilde{\theta}$ that depends on the given exogenous value of ϵ, the unobserved realization of θ, and its distribution $f(\theta)$. I treat $\tilde{\theta}$ as a continuous uniform random variable that can take any value over the *moving* interval $[\max(\underline{\theta}, \theta_t - \epsilon), \min(\overline{\theta}, \theta_t + \epsilon)]$.

The inference process about the true value of the shock is *informative* if it

helps to further bound the set of possible θ. Depending on the level of transparency there are four possible information regions:

1. Full Transparency ($\epsilon = 0$): in this case $\tilde{\theta} = \theta$. This is the most informative case.

2. High Transparency ($\epsilon \leq \frac{\overline{\theta}-\underline{\theta}}{2}$): in this case the inference process is always informative in the sense that the signal will give a range of the true value of the shock that is fully contained in $[\underline{\theta}, \overline{\theta}]$ or $\tilde{\theta} \Rightarrow \theta \in [\max(\tilde{\theta}-\epsilon, \underline{\theta}), \min(\tilde{\theta}+\epsilon, \overline{\theta})]$.

3. Low Transparency ($\frac{\overline{\theta}-\underline{\theta}}{2} < \epsilon < \overline{\theta} - \underline{\theta}$): in this range, depending on the realization of $\tilde{\theta}$, voters will or will not be able to get more accurate information about θ.

4. Null Transparency ($\epsilon > \overline{\theta} - \underline{\theta}$): a case in which the inference process is simply not informative.

Given the voter's inference process, the conditional expectation of θ on the estimated shock will be:

$$E(\theta|\tilde{\theta}, \epsilon) = \int_{\max[\tilde{\theta}-\epsilon, \underline{\theta}]}^{\min[\tilde{\theta}+\epsilon, \overline{\theta}]} \theta f(\theta) d\theta \tag{2.4}$$

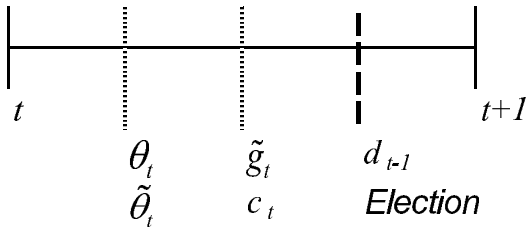
2.4 The Political Economy Equilibrium

This section describes the agency game in which voters (the principal) and incumbent (the agent) engage to maximize their respective expected utilities.

The game is characterized by a succession of identical periods. A period starts with an incumbent in office who observes θ and $\tilde{\theta}$. Meanwhile, voters can only

observe $\tilde{\theta}$. Next, the incumbent decides fiscal policy: τ_t, d_t and e_t. He repays principal and interests of outstanding debt, $D(d_{t-1})$, and produces the public good, $\tilde{g}_t$. Voters (and the incumbent), after paying τ_t, consume both types of goods, c_t and $\tilde{g}_t$. The period ends with the revelation of d_{t-1} and an election in which voters reappoint the incumbent only if the total utility they got in the period was *high enough*. Otherwise, a new government is put in place, the defeated politician returns to the population as a voter, and the game proceeds to the next period.

Figure 2.1: Timing of the Game.



Given that there are no decisions involved in the production of the private good and that the private sector is not allowed to save, the only decision that voters face is how much to demand from the incumbent in each period, in other words, what is the *reelection rule* (See Ferejohn (1986) for a classical example).[3] On the agent side, the incumbent chooses fiscal policy, subject to the government budget constraint and to the reelection rule. In other words, every period the incumbent selects optimal policy under reelection and under *expropriation*. Expropriation is defined as a situation in which the incumbent, optimally exerts the minimum level of effort given that he will not be reappointed next period. To select the optimal policy,

[3]It is assumed that voters agree on the reelection rule, i.e. I ignore any coordination problem.

the incumbent must take into account the endogenous probability of reelection, and then picks the one that yields the highest lifetime expected discounted utility. One can immediately see the tension introduced by the reelection rule: in the long term, higher reelection rules (the ones that demand higher utility levels) necessarily imply higher levels of effort.[4] As I show later in the chapter, higher levels of effort will imply a non-decreasing probability of expropriation, and thus, when expropriation occurs, lower levels of the public good. On the other hand, lower reelection rules will perpetuate incumbents that put in little effort and thus deliver low levels of utility.

Formally, the voter's problem is to:

$$\max_{\{\bar{U}(\tilde{\theta}_t|\epsilon)\}} E_t \sum_{t=1}^{\infty} \beta^{t-1} U_t^v \tag{2.5}$$

subject to

$$\max_{\{\tau_t, d_t, e_t|\bar{U}(\tilde{\theta}_t|\epsilon), \theta_t\}} E_t \sum_{t=1}^{\infty} \beta^{t-1} U_t^I \tag{2.6}$$

which in turn is subject to

$$\begin{aligned} c_t &= y - \tau_t, \\ \tilde{g}_t &= \theta_t[\tau_t + d_t + e_t] + D(d_{t-1}), \end{aligned}$$

where at the beginning of period t $E_t U_t^v = [(p)(U_t^v \geq \bar{U}) + (1-p)(U_t^v < \bar{U})]$, and p the probability that the incumbent will choose to fulfill the reelection rule.

[4]The incumbent can use more debt to finance higher levels of public good, but only in the short run since perpetual roll over will violate a No Ponzi Game condition.

In order to obtain the solution to (2.5), I start by finding the solution to (2.6) for *any* $\bar{U}$. Define $V_t^I = U_t^I + \beta E_t V_{t+1}^I$ as the incumbent's expected present discounted value of being in office next period, which can be decomposed into his utility at t of providing $\bar{U}$, and the continuation value of holding office. In the same manner, define $V_t^o = U_t^o + \beta E_t V_{t+1}^v$ as the incumbent's expected present discounted value of being out of office next period, which is decomposed into his utility at t of reneging $\bar{U}$, and the continuation value of returning to the population as a voter. Suppose voters have instituted the reelection rule $\hat{\bar{U}}$. Then, upon the realization of θ and $\tilde{\theta}$, the incumbent at time t will choose to deliver (at least) $\hat{\bar{U}}$ *only if* it is *incentive compatible*, that is, only if:

$$U_t^I + \beta E_t V_{t+1}^I \geq U_t^o + \beta E_t V_{t+1}^v \tag{2.7}$$

The solution to (2.7) is not trivial: first, although it is clear that p affects V_{t+1}^I, equation (2.7) shows that due to the return of the incumbent to the voter pool, p also affects V_{t+1}^v. Second, it is easy to see that V_{t+1}^v is the solution to (2.5) at the optimum $\bar{U}^*$, for which (2.5) and (2.6) must be jointly solved.

In the remainder of this section the model is solved for three particular cases. First, I consider the *dictatorship*, a political economy environment in which voters have no power to dethrone the incumbent and so, regardless on the transparency level, $\bar{U}$ plays no role. The dictatorship is not only the easiest case to solve, but a necessary first step in the solution of any democratic case: it provides us with U_t^o in (2.7). I then proceed to solve the polar cases of full transparency ($\epsilon = 0$), and full opacity ($\epsilon > \overline{\theta} - \underline{\theta}$).

2.4.1 No Elections: The Dictatorship

Assume a dictator is in power during period t and that, after observing the amount of debt outstanding from period $t-1$ and the contemporaneous shock, decides his policy action for period t in order to maximize the present discounted value of his utility, knowing that he will remain in power forever. In other words, the dictator's maximization problem is:

$$\max_{(\tau_t, d_t, e_t)} E_t \sum_{t=1}^{\infty} \beta^{t-1} [\tilde{g}_t + u(c_t) + \chi - \phi(e_t)], \tag{2.8}$$

subject to

$$\begin{aligned} c_t &= y - \tau_t \\ \tilde{g}_t &= \theta_t[\tau_t + d_t + e_t] + D(d_{t-1}) \end{aligned}$$

from which one can write the dynamic programming version of the problem as:

$$V_t^o(d_{t-1}, \theta_t) = \max\{\tilde{g}_t + u(c_t) + \chi - \phi(e_t) + \beta E_t V_{t+1}^o(d_t, \theta_{t+1})\} \tag{2.9}$$

subject to the individual and governmental budget constraints.

The first order conditions to this problem are:

$$\theta_t - u'(c_t) = 0 \tag{2.10}$$

$$\theta_t + \beta E_t \frac{\partial V_{t+1}^o}{\partial d_t} = 0 \tag{2.11}$$

$$\theta_t - \phi'(e_t) = 0 \tag{2.12}$$

where the envelope condition is $\frac{\partial V_t^o}{\partial d_{t-1}} = -D'(d_{t-1})$. After updating, one get the following set of equations:

$$\theta_t = u'(c_t) \tag{2.13}$$

$$\theta_t = \beta D'(d_t) \tag{2.14}$$

$$\theta_t = \phi'(e_t) \tag{2.15}$$

The first establishes that the private good is negatively correlated with the contemporaneous shock or, alternatively, that it is more convenient to finance the public good, by means of higher taxes, when inputs are relatively cheaper (θ is high). The second shows, by the same reasoning, that it will be optimal to incur higher debt to produce the public good when it is relatively cheap to do so; however, note that for β sufficiently high, there would be states for which debt will be zero. Also note that, given the assumption that θ is *iid*, optimal decision is not history dependant. The last optimality condition also exhibits a positive relationship between public good productivity and effort; whether effort would be positive or the condition would be always binding depends on ϕ and $\overline{\theta}$. I assume that no incumbent, whether dictator or not, will voluntarily exert any effort by imposing the following *No-Effort Condition*: $\overline{\theta} \leq \phi'(0)$.

2.4.1.1 Dictatorship Simulation

In order to perform comparisons of policy, fiscal outcomes and welfare across different degrees of transparency (and political organization) I simulate the proposed model, starting with a dictatorship but assuming the same functional forms and

parameters for all scenarios. Table 2.1 presents the specific functional forms and parameters. Given the simplicity of functional forms, tax policy turns out to be independent of the level of transparency. Instead of choosing a different functional form, I have assumed that taxes had to be decided before θ and $\tilde{\theta}$ are revealed which makes $u'(c_t) = E(\theta_t) = 1$ for all t [5]. The solution is obtained by iterating over the value function until convergence is reached.

Table 2.1: Parameters and functional forms

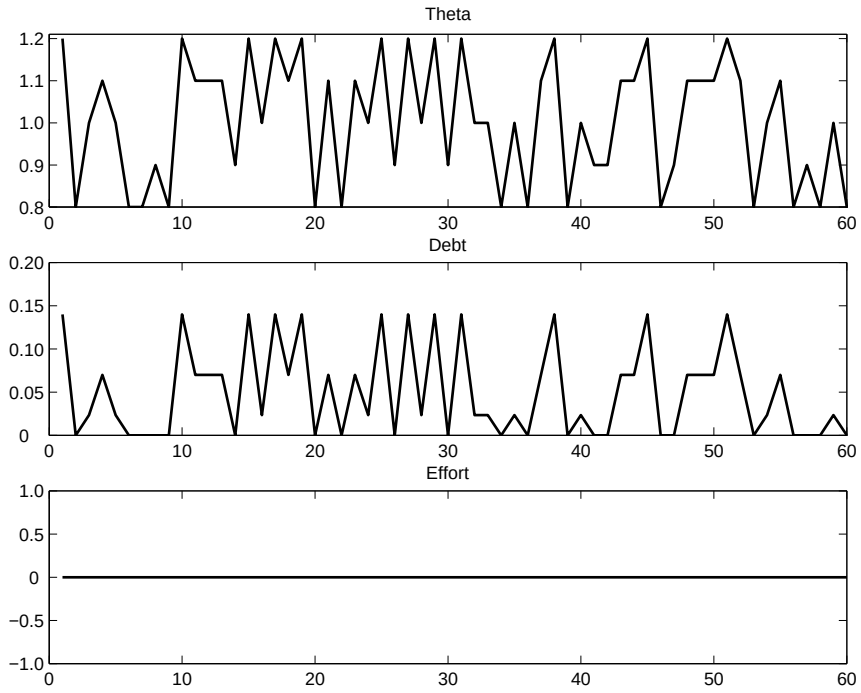
parameters	*functional forms*
$y = 4$	$u(c) = \ln(c)$
$\beta = .95$	$\phi(e) = \exp(1.2e) - 1$
$\chi = 3$	$D(d \geq 0) = d + d^2$
$\theta_t \in [0.8, 0.9, 1.0, 1.1, 1.2]$	

Figure 2.2 presents the dictator policy responses for 60 periods of the simulated model. I have transformed the continuous variable θ into a discrete one that can take any of five possible values with the same probability. The figure reflects the two optimality conditions, where effort is always zero, and debt responds positively with, and is uniquely determined by, the contemporaneous shock. Moreover, it shows the debt optimality condition binding at sufficiently low levels of θ, i.e. debt is zero for $\theta \leq 0.9$.

In terms of welfare, measured by V^I and V^v, while the dictator gets an expected PDV of 119.93, voters receive only 59.93. The difference is the PDV of

[5] This can be though of reflecting the real world fact that tax rates are considerably less volatile than debt.

Figure 2.2: Shock and Policy in the Dictatorship.



ego rents for being in office, χ. Note that, for the parameters of the model, these two values are the boundaries of any solution of the democratic scenarios, for the incumbent and voters, respectively.

2.4.2 The Role of Elections as a Disciplining Device

Next I analyze a democratic environment under the polar cases of transparency, assuming that the unique instrument voters have to punish the incumbent is their ability to vote against him.

2.4.2.1 Full Transparency

Under full transparency, the observed signal is the true value of the shock. Both, the incumbent and voters, observe the same variables, and this is common knowledge. Thus, there are no informational asymmetries. Voters can exactly predict the incumbent's behavior for each reelection rule, and so, optimally they will propose a $\bar{U}$ schedule that maximizes their utilities by simultaneously providing enough incentives for the incumbent to ensure he never chooses to expropriate. I formalize this idea in two propositions:

> **Proposition 1.** *Under full transparency the optimal rule is incentive compatible with equality and* $p = 1$.

To prove this, it is easy to see that among all $\bar{U}$ schedules associated with $p = 1$, the one that is incentive compatible, $\bar{U}^{ic}$ dominates the rest. Now, consider a new, higher schedule $\bar{U}^h = \bar{U}^{ic}$ for all $\theta \neq \hat{\theta}$ and $\bar{U}^h(\hat{\theta}) > \bar{U}^{ic}(\hat{\theta})$, making it a potential candidate for the optimal reelection rule. But $p(\hat{\theta}) = 0$ so $\bar{U}^h(\hat{\theta})$ is never delivered by any incumbent and thus $\bar{U}^h$ cannot dominate $\bar{U}^{ic}$.

> **Proposition 2.** *Rent extraction is positive even if there are no information asymmetries* [6].

To prove it, consider a regime which differs considerably from a democracy, in which a contract to run the government forever in a fully transparent world is auctioned among the population. The contract is enforced by killing the incumbent in case

[6] Persson, Roland and Tabellini call it "rents of being in power".

he does not respect it. A first citizen will place a bid that consists of a constant per period effort level, and debt satisfying (2.14). If no other citizen places a higher bid the game ends and payoffs to the ruler and citizen are distributed according to V^I and V^v, respectively. The unique equilibrium of this game is $e^* = \phi^{-1}(\chi)$ or *zero-rent-extraction*: no citizen will offer a higher bid since his payoff as a ruler will be lower than as a citizen; on the other side, any outstanding bid $\hat{e} \in [0, \phi^{-1}(\chi))$ will not survive in the game since it is a dominant strategy for the bidding citizen to play e^* and get $V^I(e^*) = V^v(e^*) > V^v(\hat{e})$. I call the solution to this game the *social planner solution* and denote it's expected discounted utility as V^{sp}.

The social planner problem is solved following the same method outlined in the dictatorship. The idea is to choose only τ and d conditional on θ since $e = e^*$. The two first order conditions look exactly the same as in the case of the dictatorship, i.e.

$$V^{sp}(e^*) = V^v(e = 0) + \frac{e^*}{(1-\beta)} < V^o = V^v(e = 0) + \frac{\chi}{(1-\beta)}$$

In other words $U_t^{sp} < U_t^o$ for all θ by the amount $\chi - \theta e^*$. Finally, note that proposition 2 is equivalent to stating that no social planner solution can be achieved. To see this, let me assume a social planner solution can be achieved. By proposition 1 the solution has to be *IC*, thus

$$\begin{aligned} V_t^{sp} = U_t^{sp} + \beta E V_{t+1}^{sp} &= U_t^o + \beta E V_{t+1}^v \\ \Rightarrow \qquad U_t^{sp} &= U_t^o \end{aligned}$$

since $V_t^{sp} = V_t^v$, which is a contradiction.

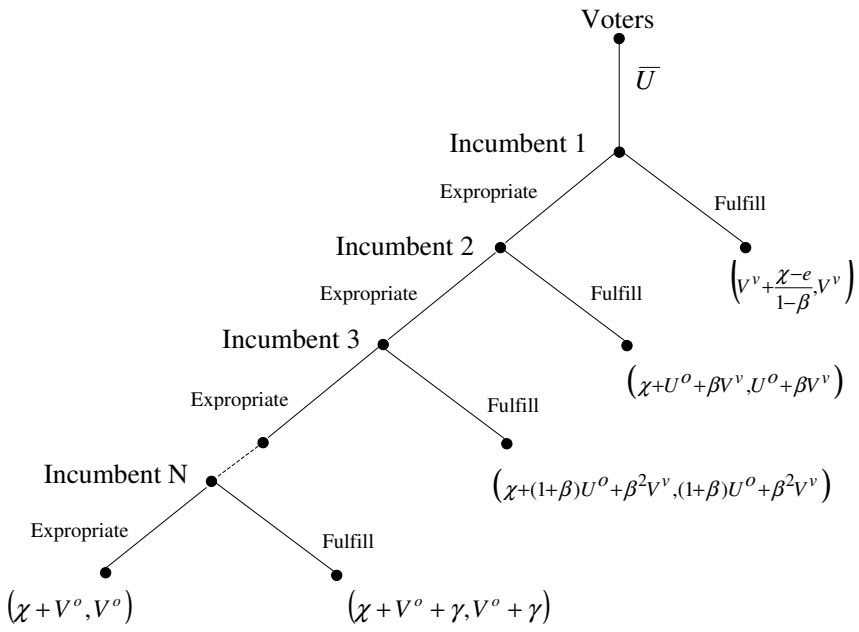
Intuitively, and even if effort were to be observable and enforceable in the democratic setup, voters cannot extract all of the incumbent's ego rents for being in office since at this effort-level, the lifetime expected utility of voters and incumbent is identical, but the period utility of expropriation versus observation of the rule is higher. Therefore, the incumbent is always tempted to expropriate today and get voters' utility in the future. In any case, under full transparency, ego rents will reach the minimum since voters can compute the incumbent's optimal policy for each contingent minimum utility level that voters demand in order to keep reappointing him. The maximum per period level of effort that voters can demand is $e^* = \phi^{-1}(\beta\chi)$, which comes from the *no-expropriation-condition* $\chi - \phi(e)/1 - \beta \geq \chi$.

Figure 2.3 presents an extensive form of the game and helps to visualize the equilibrium concept. Each ending node shows the payoffs for Incumbent 1 and Voters, respectively. Voters move first by proposing the reelection rule $\bar{U}$. I have claimed that there exists only one reelection rule, $\bar{U}^*$ that solves the Full Transparency problem, which is IC. Suppose $\bar{U} > \bar{U}^*$ and that the equilibrium strategy for any incumbent is to Fulfill $\bar{U}$. Then, given that Incumbent 2 should Fulfill, Incumbent 1 has incentives to deviate and choose to Expropriate. Thus, Fulfill cannot be an equilibrium. If, on the other hand, voters demand $\bar{U} < \bar{U}^*$, the best response for any incumbent is to choose Fulfill, just as with $\bar{U}^*$, which is the only equilibrium.

Full Transparency Simulation

To obtain the solution for full transparency I make a guess for $\bar{U}$, calculate V^I and V^v and check the IC constraint. A new $\bar{U}$ is proposed and the process repeated. Both rules are compared and kept the one that renders the higher V^v. A

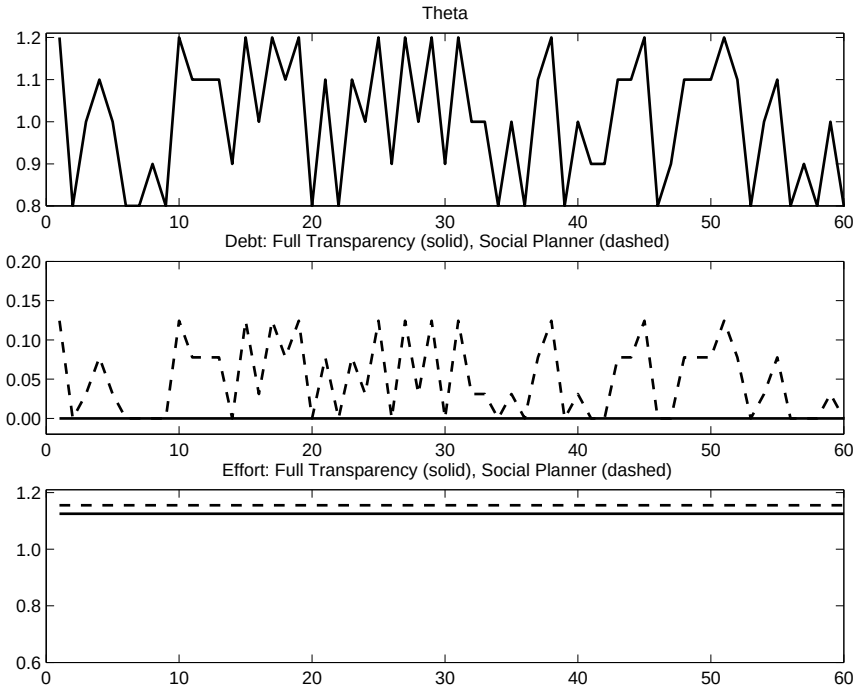
Figure 2.3: Full Transparency in Extensive Form.



new $\bar{U}$ is then proposed and the iteration continues until no $\bar{U}$ is beaten (which, not coincidentally, occurs when $p = 1$).

Figure 2.4 shows the policy path of the full transparency equilibrium, for the same stream of shocks as in figure 2.2. In this case, the incumbent's effort is always positive and constant at the level of $e^* = \phi^{-1}(\beta\chi)$. For comparison purposes the figure also shows the Social Planner's levels of effort and debt. Under full transparency debt equals zero in equilibrium, even when θ is high. This outcome is the result of $\bar{U}$ being conditional only on the signal, therefore, asking for higher $\bar{U}$ when θ is high, would bring expropriation if also d_{t-1} is high. In other words, the reelection rule is not a full contingency contract, perhaps because it is too costly to

Figure 2.4: Shock and Policy under Full Transparency and Social Planner.



write down such a contract.[7]

At equilibrium, voters obtain an expected discounted utility of 82.47, contrasted with the 59.93 that they get in the dictatorship. In the Social Planner's benchmark case, where debt follows the optimal path and effort can be set at a no-rent-extraction level, voters and incumbent would have obtained 83.20. Fiscal outcomes are left for the next section where I compare them across transparency levels. I now turn to analyze the other polar case.

[7]Admittedly, this feature is not part of the model.

2.4.2.2 Full Opacity

Full opacity of the budgetary process is defined as the situation in which voters' estimate or signal, $\tilde{\theta}$, of the true fiscal shock is not informative, meaning that the observation of any $\tilde{\theta}$ assigns the same probability of occurrence to an specific θ. In this case the type of solution of the model is similar to that of Ferejohn 1986, in which voters will ask for a time invariant minimum utility level and will keep reappointing the incumbent as long as he continues to fulfill this requirement. There is an important difference with the Ferejohn model though, which is that now the actual shock, θ, does not uniquely determine the policy outcome since debt carried from the last period will now play a role.

Solution and Simulation for Full Opacity

Table 2.2 describes the full opacity equilibrium. If voters were to demand 3.70 as the cutoff rule for reelection, the incumbent will always choose to follow the rule, that is, the probability of expropriation is zero. The PDV for incumbent and voter are 93.64 and 74.29 respectively.

Raising the bar to 3.80 per period makes no difference in the decision of the incumbent with respect to expropriation; even when there are some possible states of the world in which the incumbent should choose to expropriate, namely a combination of a bad shock ($\theta = .8$) and a very high level of outstanding debt, these states have a zero probability of occurrence (unless, of course, those are the initial conditions, but even in such case this can only happen for the first government since the outstanding debt for the next government following expropriation will never be

high enough). Accordingly, the PDV for incumbent and voter under a rule of 3.80 are 87.09 and 76.29, respectively. As can be seen, given the non linearity of the disutility of effort, a slight increase in voter's utility causes a large decrease in the incumbent's utility.

Going beyond 3.80, progressively increases the probability of expropriation, but this does not necessarily mean that V^v will be lower since at first the marginal gains for demanding a higher $\bar{U}$ will dominate the loses in case of expropriation, given that $1 - p$ is very low. As one progress with increments in $\bar{U}$, the second effect gains in importance over the first, reaching equilibrium at the point where they equal each other. The maximum is attained at $\bar{U}^* = 3.830$ with a probability of expropriation of .018 and expected PDV for incumbent and voter equal to 85.54 and 76.61, respectively.

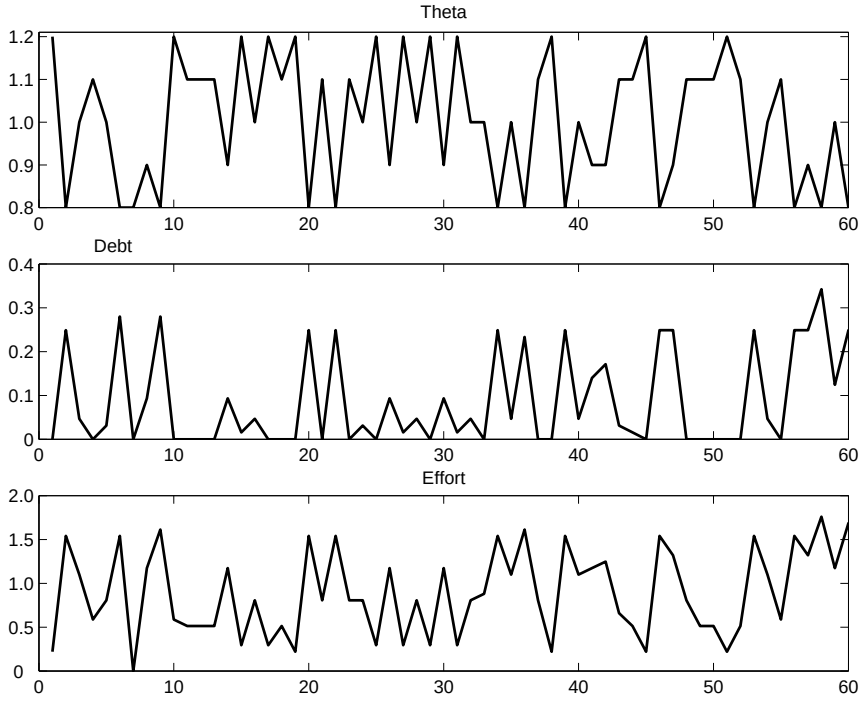
Table 2.2: Full Opacity Equilibrium Rule.

$\bar{U}$	*3.700*	*3.800*	*3.810*	*3.820*	***3.830***	*3.840*	*3.850*
1-p	0.000	0.000	0.006	0.016	**0.018**	0.036	0.052
V^v	74.29	76.29	76.37	76.39	**76.61**	76.42	76.35
V^I	93.64	87.09	86.49	86.19	**85.54**	85.47	85.31

Figure 2.5 depicts policy paths under full opacity. Debt is more volatile and average debt is higher than in the dictatorship. Moreover, the incumbent incurs in higher levels of debt when θ is low and less productive, to help him fulfill the reelection rule. The correlation between d and θ is -0.83. In contrast to the other two cases, effort shows variability and can even be higher, in some periods, than in

the full transparent case, although average effort is, of course, lower. Similarly to debt, the incumbent chooses higher levels of effort for lower levels of θ, being their correlations -0.87. In the figure we can see an expropriation period (and therefore a change of ruler) when effort reaches zero. In this case, expropriation occurs after a second consecutive *worst* shock.

Figure 2.5: Shock and Policy under Full Opacity.

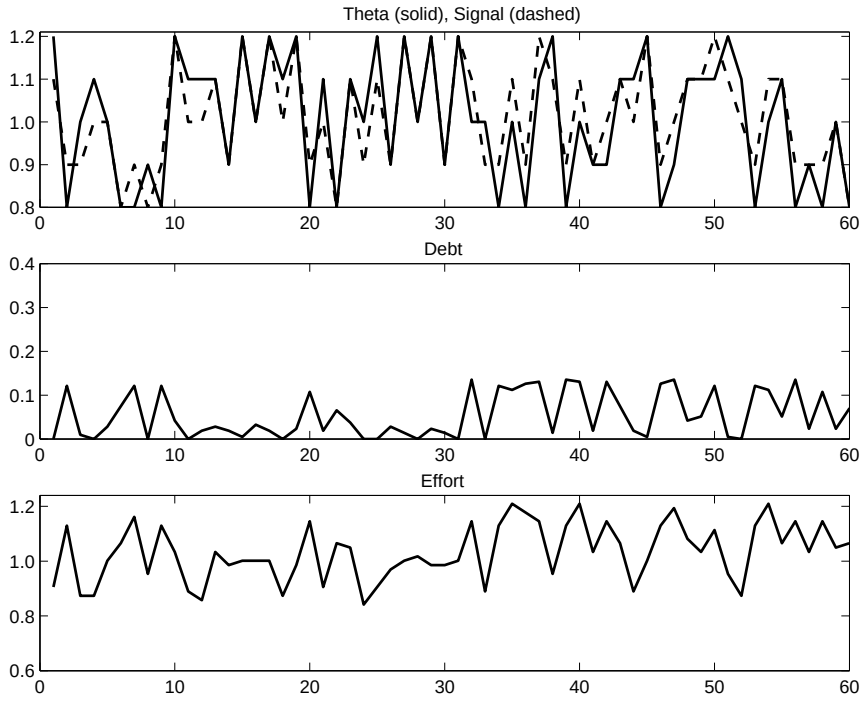


2.4.2.3 The Intermediate cases: High Transparency, Low Transparency, and High Opacity

Consider the intermediate cases. Here, I am introducing a third *de facto* state variable: $\tilde{\theta}$. Voters now condition the reelection rule on the observed signal. I explore three distinct cases. High Transparency, a situation in which the signal is always

informative; Low Transparency, a case where *sometimes* the signal is informative and; High Opacity, a circumstance in which the signal is *almost never* informative, and so it resembles Full Opacity. Figure A.1 (shown in the appendix) shows how θ and $\tilde{\theta}$ relate to each other depending on ϵ.

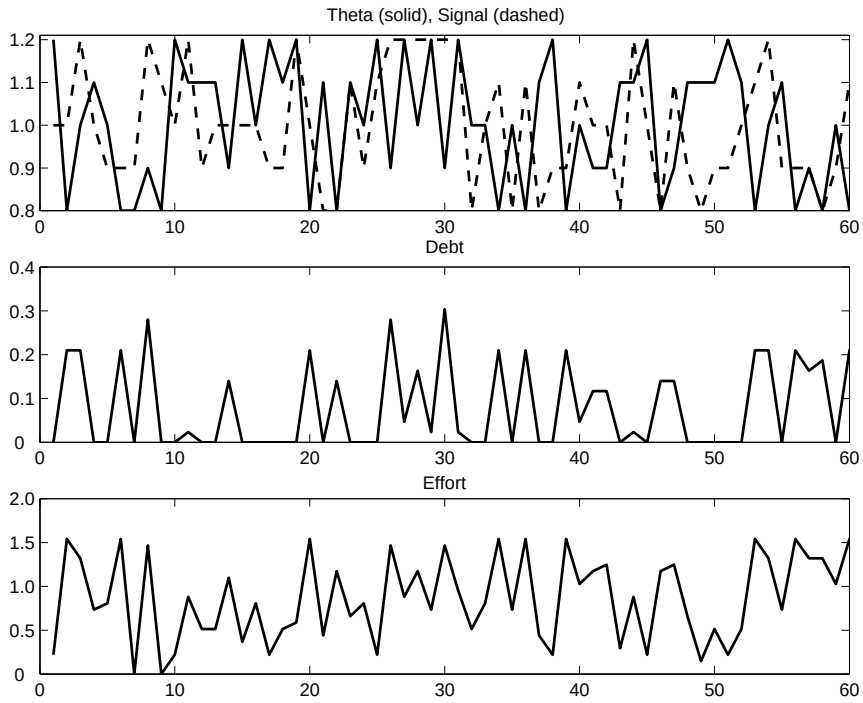
Figure 2.6: Shock and Policy under High Transparency.



In the top panel of figures 2.6 and 2.7 it can be seen how θ and $\tilde{\theta}$ move together across time. Although $\tilde{\theta}$ is a good approximation of θ with $\epsilon = .1$ it does a very bad job when $\epsilon = .3$. By moving towards more opaque scenarios, these figures illustrate how debt and effort are progressively employed only to salvage office, rather than for efficiency reasons, which are measured by the contemporaneous correlations of e and d with θ (look at the bottom of table 2.3).

Figure 2.7 shows to periods of expropriation. The first episode coincides with

Figure 2.7: Shock and Policy under High Opacity.



the one obtained under full opacity. This episode would have being avoided if at least one of the signals would have had coincided with the true shock. The second episode is the consequence of two consecutive very uninformative signals, that make voters demand too much from the incumbent.

2.4.3 The Effects of Transparency: Welfare, Public Good, Expenditures, and Debt

After examining the equilibrium behavior of the incumbent under a complete set of transparency regimes, I am in a position to address one of the main questions of the chapter: *how does the level of transparency in the budgetary process affect fiscal outcomes, and ultimately constituent's welfare?*

Table 2.3 compares welfare, the average level of debt, and the average levels of public good and expenditures across all regimes. Amongst the democratic regimes, Voter's welfare (V^v) is higher the more transparent the regime is. Whereas mean Public Expenditures, G_{mean} (where the period t public expenditure is defined as $G_t = \tau_t + d_t - D_t$), are the same across all regimes due to a no-violation of the inter-temporal government budget constraint, public good goes one-to-one with welfare since utility coming from the private good is identical across regimes. The highlight of the table is the average level of debt, that decreases as the level of transparency improves.

Table 2.3: Welfare, Public Goods, Expenditure, and Debt.

Descriptive Statistics

Regime	*Dictator*	*Social Planer*	*Full Transparency*	*High Transparency*	*Low Transparency*	*High Opacity*	*Full Opacity*
V^v	59.93	83.20	82.47	80.71	78.11	77.01	76.61
$\tilde{g}_{mean}$	2.92	4.18	4.12	4.05	3.97	3.89	3.89
G_{mean}	2.92	3.00	3.00	2.99	2.99	2.98	2.98
d_{mean}	0.047	0.047	0.000	0.050	0.065	0.072	0.087
e_{mean}	0.00	1.155	1.125	1.058	0.973	0.925	0.906
$\tilde{g}/G$	1.00	1.39	1.38	1.35	1.33	1.31	1.30
corr(e,θ)	—	—	—	-0.39	-0.63	-0.75	-0.87
corr(d,θ)	0.96	0.96	—	-0.48	-0.64	-0.74	-0.83

2.4.4 Numeric Constraints

Transparency in the budgetary process is by no means the only force that conditions the realization of fiscal outcomes. In fact, the institutional arrangement that seems to capture most of the attention in the literature is the set of numeric rules that the executive has to face at the moment of elaboration, approval and execution of the budget. These numeric constraints can take the form of specific limits to expenditures, debt and deficit, or restrictions to the flow of resources between and within programs, agencies and levels of government. The constraints could even be restrictions to the flow of resources between different fiscal periods. Across the world (at the aggregate level), the most extended use of a numeric constraint is an explicit cap on the budget deficit.

To incorporate this set of restrictions into the model, I condense them into a single *de jure* budgetary rule. This allows me to evaluate, in the simplest manner, the effect these rules can have when there are asymmetries in the information that players are receiving, and thus address the possibility that the government can escape legal consequences by exploiting financial loopholes. Specifically, I introduce an *at-most-zero-deficit* rule that has to be observed by the incumbent with the same consequences as the minimum utility rule already imposed. That is, if the incumbent fails to fulfill it, he will be voted out of office in the following election. The problem with this rule, in contrast to the minimum utility rule, is that voters cannot directly observe the actual levels of expenditure, but rather, they can only observe the reported level by the incumbent. Henceforth, I will call any deviation

of the reported level from the actual level *creative accounting*. The extent to which the incumbent can use creative accounting as an instrument will be determined by the transparency level of the economy.

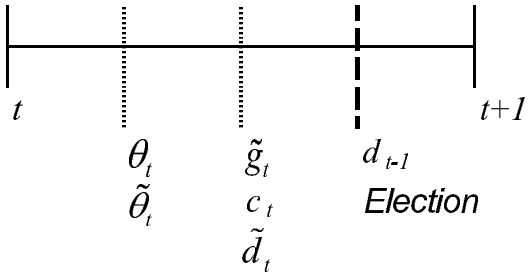
Formally, the at-most-zero-deficit rule means that the incumbent would be reelected if, in addition to delivering $\bar{U}$, he also fulfils:

$$G_t \leq \tau_t \tag{2.16}$$

The problem is that, even when τ is directly observed by voters, G is not since the actual d is revealed with one period lag, and so equation (2.16) is not enforceable. At this point it is necessary to introduce a bit more structure about how *creative accounting* can take place in the model. Following Milesi-Ferretti (2004) I assume that the extent of creative accounting is inversely related to the degree of transparency, but I do not attempt to derive it from within the model. This ad-hoc formulation is a convenience. Otherwise, one would have to introduce more structure about effort which would be as arbitrary as directly modelling creative accounting. In particular, the game is modified by assuming that after the delivery of the public good, the government reports the amount of debt that accrued during its production, $\tilde{d}_t$.

Any deviation from the true value of debt, that is if $\tilde{d}_t \neq d_t$, will be considered creative accounting. To make things simple, I assume that the government's maximum amount of creative accounting without being caught is: $d_t \pm \epsilon d_t$, but that any attempt to engage in creative accounting outside this interval will be detected

Figure 2.8: Timing of the Game.



by voters with probability one. For example, $\epsilon = .1$ means that the government can falsely report up to 10 per cent of the period debt without being caught.

Note that equation (2.16) is equivalent to $d_t \leq D(d_{t-1})$. In terms of the model I then introduce the *enforceable* at-most-zero-deficit rule:

$$\tilde{d}_t - err = (1 - \epsilon)d_t - err \leq D(d_{t-1}) \tag{2.17}$$

For all positive d_{t-1} the maximum amount of possible diversion increases with ϵ. The term err, used for errors and omissions, is assumed to be constant across transparency and is needed in order to avoid a zero-debt trap: without err, once d_{t-1} reaches zero the maximum amount of diversion is zero independently of the degree of transparency, something that would trivialize the solution. In other words, instead of zero, the rule is transformed to an at-most-err-rule. In any case, err is set to the minimum.[8]

[8]The minimum err depends on how fine the discrete state space is; the finer the grid the smaller err will be, defined such that, if the d state space consists of n points and we index d by n where $d(1) = 0$, $d(n) = d_{max}$, then $err = d(2) - d(1)$. In other words, if $d_{t-1} = 0$, d_t can take the first positive value.

Figure 2.8 shows how the rule affects policy decision. After observing $\tilde{g}_t$, c_t and $\tilde{d}_t$ voters learn if $\bar{U}$ was satisfied and they have a rough idea of how much debt was utilized. After the (audited) value of d_{t-1} is released voters also learn if the enforceable rule was satisfied. In this game, a government is voted out for three possible reasons: If $\bar{U}$ is not satisfied, if creative accounting is detected ($\tilde{d}_t < (1-\epsilon)d_t$), or if the enforceable at-most-zero-deficit rule is violated.

Even when the ad-hoc rule obviously makes it easier for opaque regimes to engage in creative accounting, it does not trivialize the outcome since the rule will be binding for some states in all regimes. That is to say, it imposes an effective cap on the per period debt. This can be seen in figures 2.9 and 2.10. The imposition of the deficit rule modifies the government's choice of optimal debt: even when debt moves in the same direction as in the unconstrained case—this is more pronounced as opacity increases—debt volatility is significantly reduced. In the constrained case debt is almost never as high as in the unconstrained case, but it is never as low either, reaching levels of zero debt only in the expropriation periods. Therefore, even when one should never expect to see debt levels as high as in the unconstrained case, this does not imply that average debt will be lower. The government finds it optimal to carry positive amounts of debt from period to period, since this gives it bigger room for engaging in creative accounting in order to smooth effort. In particular, in scenarios where there is no full transparency, the incumbent uses debt to fulfill the requirements and be reappointed, precisely in bad states of the world, when he is demanded relatively high levels of public good. But now the amount of debt that can be issued will be constrained by the amount outstanding last period, giving him

the incentive to always carry over positive amounts of debt. This incentive will be enhanced as opacity increases.

Figure 2.9: Policy Comparison under High Transparency.

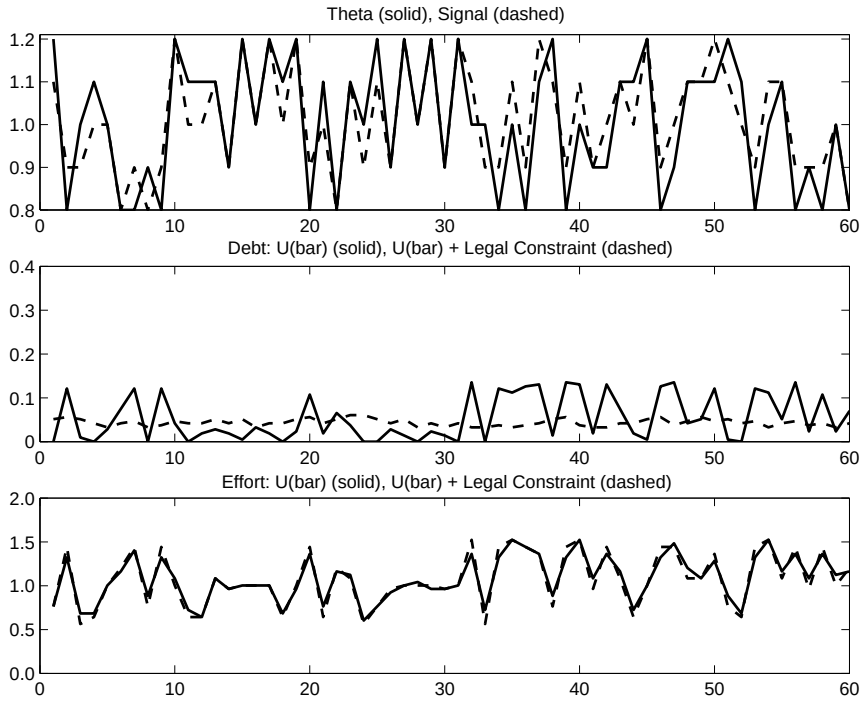
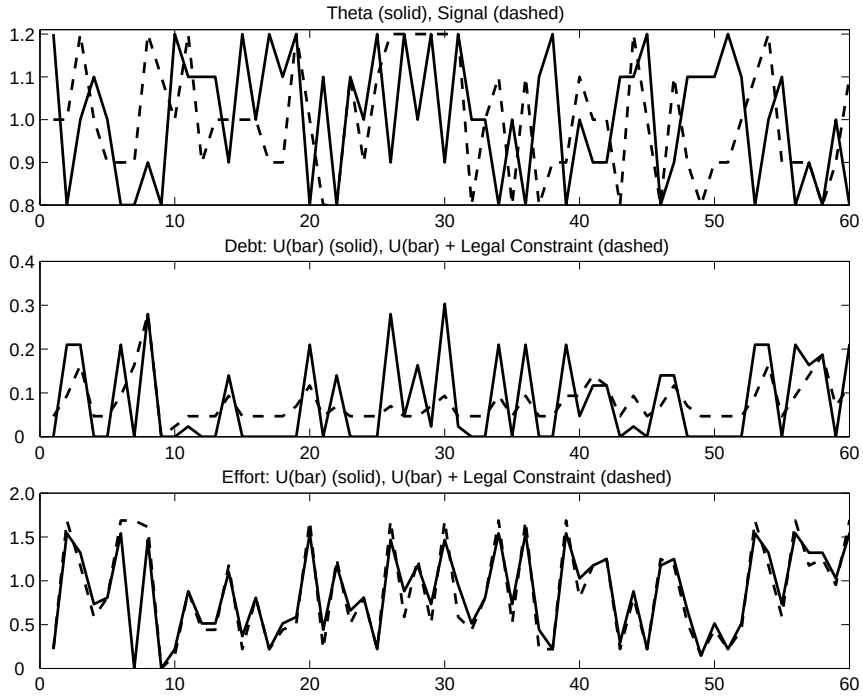


Table 2.4 presents the same set of results as table 2.3 but with the addition of the deficit rule for all the democratic regimes. As mentioned, this cap does not necessarily imply a lower average debt across all regimes. Whereas the highly transparent regime does reduce its average debt, the more opaque regimes increase average debt by non-insignificant magnitudes. Moreover, the introduction of the numerical rule improves voter's conditions in the highly transparent scenario and worsens it in the more opaque ones.

Figure 2.10: Policy Comparison under High Opacity.



2.5 Concluding Remarks

In a simple model in which voters can coordinate perfectly to demand results from the policymaker in charge of the government (who typically will enjoy an informational advantage about the true actions taken in the production of public goods), the model shows that the best way to curtail his unproductive activities and curb a tendency to incur greater debt is by reducing the informational advantage directly. That is, by increasing the level of transparency of the whole budgetary process. On the contrary, if voters' strategy is to impose numeric constraints over imperfectly observed fiscal outcomes, these will have the desired effect only if the level of transparency is sufficiently high. When transparency is non-existent, the imposition of a numeric constraint will in fact carry the contrary effect, that is,

Table 2.4: Welfare, Public Goods, Expenditure, and Debt.

Descriptive Statistics with at-most-zero-Deficit Rule

Regime	*Social Planer*	*Full Transparency*	*High Transparency*	*Low Transparency*	*High Opacity*	*Full Opacity*
V^v	83.11	82.47	80.82	77.39	76.08	75.54
$\tilde{g}_{mean}$	4.17	4.12	4.06	4.00	3.91	3.91
G_{mean}	3.00	3.00	2.99	2.99	2.98	2.98
d_{mean}	0.000	0.000	0.044	0.072	0.083	0.102
e_{mean}	1.155	1.125	1.061	0.956	0.921	0.931
$\tilde{g}/G$	1.39	1.38	1.35	1.34	1.31	1.31
corr(e,θ)	—	—	-0.43	-0.71	-0.80	-0.93
corr(d,θ)	—	—	0.07	-0.44	-0.54	-0.66

higher average debt and lower expected welfare.

Chapter 3

The Relevance of Budgetary Procedures on Fiscal Outcomes in Rich and LDC

3.1 Introduction

Fiscal outcomes depend not only on the history and presently enacted policies but on the institutions that restrict these policies. In this chapter, I investigate empirically how budgetary institutions influence several fiscal outcomes.

Budgetary Institutions are defined as the set of all the rules and regulations according to which budgets are prepared, approved and carried out (Alesina and Perotti (1999)). In the literature of budgetary institutions, these have generally been divided into three different categories (Alesina and Perotti (1996) and Stein, Talvi and Grisanti (1999)). The first are rules that impose *numerical constraints* on the deficit, such as balanced-budget rules that, by law, do not allow public deficits to go above a pre-established threshold.

The second category are the *procedural rules* that dictate the timing and mechanisms by which the executive drafts the budget, its discussion and approval in the legislature, and its posterior implementation. These procedural rules determine the relative strength of the players involved in the budgeting process within the executive and between the executive and the legislature. In this literature, procedural

rules are classified on a *hierarchical-collegial* spectrum. At the stage of budgeting drafting, hierarchical rules are those that tilt the balance of power in favor of the finance minister, who faces the whole government budget constraint, and in detriment of spending ministers, who care almost exclusively about their own portfolio. On the contrary, collegial rules are those in which the role of the finance minister is more passive and limited. At the approval stage, hierarchical rules are those that impose more constraints on the legislature's ability to modify the budget proposed by the executive, and in particular, on its ability to increase the size of the budget or the deficit. At the execution stage, hierarchical rules are those that limit the possibility of the legislature to increase the budget once it has been approved.

The third category of budgetary institutions is the degree of *transparency of the budgetary process*. A more transparent budgetary process involves ready access to reliable, comprehensive, timely, understandable, and internationally comparable information on government activities, such that the electorate and financial markets can accurately assess the government's financial position and the true cost and benefits of government activities, including their present and future economic and social implications (see Kopits and Craig (1998)). Typically, policymakers have no incentives to be truthful. For instance, in order to delay unpopular measures to cut a foreseen fiscal deficit, the government can overestimate the rate of growth of the economy to hide such deficits or simply move some liabilities to special extra-budgetary accounts. The ability of the government to act in this manner, without detection, will be determined by the degree of transparency of the budgetary process.

The empirical treatment on the effects of budgetary institutions encompass

works that concentrate on a specific category as well as more integral approaches that study budgetary institutions as a whole and then tries to disentangle the individual effects.

In a series of papers, von Hagen (1992) and von Hagen and Harden (1994) and (1996), study the effects of budgetary institutions as a whole. They do this by lumping together, in a single index, hierarchcal/collegial procedures with measures of transparency, in twelve European Community countries. They find that more hierarchical and transparent budgetary institutions are associated with more fiscal discipline. Exploring further, von Hagen (1992) suggests that transparency comes second to hierarchical features in order of importance. De Haan et al (1999) use new information available to update von Hagen's index for an almost identical sample. These authors corroborate von Hagen's result that better budgetary institutions as a whole induce fiscal discipline. However, although the results are statistically significant, they are not economically important as was previously claimed.

Alesina et al (1999) pursue a more integral approach by constructing separate measures for every category of the budgeting process that were mentioned earlier, and an aggregate measure as well, for a sample of twenty Latin American countries. Employing fiscal deficits as their fiscal outcome measure, these authors arrive at the conclusion that fiscal procedures matter for fiscal deficits among Latin American countries, but when they look at the disaggregated indexes, they find that numerical rules and hierarchical procedures matter but transparency does not. They do acknowledge, however, that the "results on transparency probably say more about the difficulty of measuring it, than about its effect on fiscal discipline" (quote from

Alesina and Perotti (1996)). Filc and Scartascini (2004), employing a new data set that permits them to measure budgetary institutions ten years later, closely follow Alesina et al (1999), and perform the same exercise for a sample of eleven Latin American countries arriving at the same conclusions.

Alt and Lassen (2003), using data from 19 OECD countries concentrate exclusively on the effects of fiscal transparency on public debt and the central government expenditure. These authors make a successful attempt at providing guidance about what should contain a good measure of transparency. They find significant and economically important effects of transparency, especially for public debt.

Kontopoulos and Perotti (1999) study the effects of hierarchical vis-a-vis collegial institutions in the form of *government fragmentation* for twenty OECD countries. From the legislative side, a government is more fragmented as the total number of parties in the ruling coalition increases (Coalition Size). From the executive side, a government is more fragmented as the number of spending ministers increases (*Cabinet Size*). More fragmented governments are associated with more collegial institutions. They found that cabinet size had a strong effect on expenditures during the seventies and early eighties but that this relationship disappeared in the late eighties and nineties. Coalition size, on the contrary, only seemed to play a role on fiscal outcomes during the late eighties and nineties, but this result is not very robust since it vanishes under different specifications.

As can be noted from the preceding paragraphs, the general strategy has been to construct some measure of budgetary institutions and regress an indicator of fiscal outcomes—public debt, public expenditures, or public deficits—on this measure,

controlling for a variety of other potentially influential variables.

One weakness in the cross-country literature is that the available studies involve a very small set of countries selected either according to their development level, or else paired according to their geographical position. In principle, there is no reason to suspect that budgetary procedures lead to different effects in fiscal outcomes in rich versus poor countries, once *all* other things have been taken into account. The degree of development of a country, or other socioeconomic factors, might affect the way in which budgetary procedures act over fiscal outcomes. However, to the best of my knowledge, no study has taken this question into consideration.

There are two possible reasons for this shortcoming: In terms of supply, the lack of *institutional* data for a broad set of countries is a fact. Researchers have tried to create this data in the most economical way by sending surveys to officials in the countries of interest. It is easier for the researcher to obtain a completed survey if respondents belong to a club like the OECD, the European Commission, or the OEA and these organizations are the ones requesting and validating the information. Demand could also account for this shortcoming, given that the sample size is small in nature, and it will be very difficult, if not impossible, to take into account all other characteristics besides budgetary institutions that affect fiscal outcomes. By avoiding countries that are too dissimilar in the same data set one can potentially reduce one source of heterogeneity.

A new (and still growing) data set of a survey on budgetary practices, with the broadest country coverage so far, has recently been made available to the public

(OECD/World Bank (2003)). Following the common strategy in the literature, in the present chapter I exploit this new data set to construct measures of the three budgetary institutions that were described above, the set of numerical rules, the set of procedural rules, and the degree of budgetary transparency, and assess their influence on a series of fiscal outcomes. Taking advantage of the diversity of countries surveyed, I test the generality of the results obtained here and elsewhere. Moreover, the two principal conclusions of the theoretical model presented in the previous chapter are empirically tested.

The common strategy of constructing indexes to account for budgeting institutions is by no means the optimal approach but rather (and probably) the only one available. In particular, quoting Poterba and von Hagen (1999), the use of "such additive indexes assume a strong form of substitution between different components of the budget process, and there is little evidence to support the assumption underlying such aggregation". In this chapter, I conduct an experiment to understand the severity of this assumption. The results of this exercise show that the constructed measures are indeed very sensitive to the information included in each index and thus, in general terms, these components are far from being good substitutes.

The main results of this chapter are twofold. First, when the whole sample of countries are studied together, budgetary institutions affect the level of fiscal outcomes, but this effect seems to come only from the level of transparency and not from numerical constraints on the budget or more hierarchical procedures. These results, however, are not independent of the country's level of economic development. In particular, the results are reinforced for the richest countries but basically

disappear for less developed economies, which suggests that in the whole sample the results are driven by more advanced economies. Second, contrary to what was postulated in the previous chapter, for this sample of countries these does not seem to exist an interaction effect between transparency and numerical constraints.

Before leaving the introduction to this chapter it is important to point out that in the literature, and this work is no exception, budgetary institutions are treated as being exogenous, while it is also recognized that they are indeed endogenous, particularly to past fiscal outcomes. The justification to this treatment is that, at least in the short run, institutions are reasonably difficult to change, and therefore are changed relatively infrequently. Basically, "since it is costly and complex to change institutions, the existing ones have to be very unsatisfactory before it is worth changing them; as a result, there is a strong "status quo" bias in institutional reform. Therefore, at least up to a point, one can use institutional features as explanatory variables" (quote from Alesina and Perotti (1999)). The rest of the chapter is organized as follows: section two explains the methodology for the construction of the budgetary institutions indexes; in section three the standard econometric model is presented; section four addresses the issue of perfect substitution between the components of each index; section five explores the possibility of interaction effects and, finally, the conclusions of the chapter are presented in section six.

3.2 Measuring Numerical Rules, Procedural Rules, and Transparency

The data for the construction of the indices was obtained from the OECD/World Bank *Survey of Budget Practices and Procedures (2003).* The database contains more that 350 question covering all sorts of issues about the budgeting process. I started by selecting those questions that were directly related to the three institutional categories mentioned earlier. From that set, I eliminated questions that were too similar—after corroborating that answers were the same—and I eliminated questions with ambiguous interpretations. At the end I ended up with 11 questions that were relevant to numerical rules, 10 questions relevant for procedural rules (hierarchical/collegial), and 14 questions for transparency.

To construct each index, every answer was given a value that ranged between zero and one, where higher values reflected institutions that should enhance fiscal discipline. Since, in general, questions had more than two answers, partial weights were proportionately distributed, following the methods of Alesina et al (1999). Finally, the three indices were standardized so that each ranges from zero to one, which eased comparisons between them.

3.2.1 Transparency

What is transparency? How can one budgetary process be defined to be more transparent than other? Transparency is not a one-dimensional concept; the literature contains many definitions that agree on the central issues of transparency, but authors assign different weights on its components, and omit others. In this manner,

the answer to the first question determines the answer to the second.

Poterba and von Hagen (1999) define a transparent budget process as one that provides clear information on all aspects of government fiscal policy. Budgets that include numerous special accounts and that fail to consolidate all fiscal activity into a single "bottom line" measure are not transparent. Budgets that are readily available to the public and to participants in the policy-making process, and those that present consolidated information, are transparent.

Kopits and Craig (1998) define fiscal transparency as openness towards the public at large about government structure and functions, fiscal policy intentions, public sector accounts, and projections. It involves ready access to reliable, comprehensive, timely, understandable, and internationally comparable information on government activities, such that the electorate and financial markets can accurately assess the government's financial position and the true cost and benefits of government activities, including their present and future economic and social implications.

Based on these and other definitions, Alt and Lassen (2003) try to rationalize and provide guidance of what a good measure of budgetary transparency would be. For this purpose they identify four main characteristics of transparency. First, more transparent procedures should process *more information*, and other things being equal, use *fewer documents*. This speaks to openness and ease of access and monitoring. Second, transparency is increased by the possibility of *independent verification*, which has been experimentally shown to be a key feature in making communication persuasive and credible. Third, there should be a commitment to *non-arbitrary language*: words and classifications should have clear, shared, unequivocal mean-

ings. Finally, the presence of *more justification* increases transparency, reducing the possibility of strategic creativity that I have perviously mentioned.

To construct the transparency index, the following questions were employed, shown under the Alt and Lassen (2003) classification:

- More information, other things equal, in fewer documents
  - Does the annual central government budget documentation submitted to the legislature/parliament contain multi-year expenditure estimates?
  - At what interval is information on the in-year budget implementation released?
  - Are the following accounts (assets, liabilities, government equity, revenues, expenses) integrated into the accounting system to facilitate the preparation of financial statements?
- Independent verification
  - Does the government announce the release dates for information on the in-year budget implementation in advance?
  - Are economic assumptions available for scrutiny?
  - Is this information audited?
  - Are audited final accounts published and available publicly?
  - Are internal audit procedures clear and subject to effective process review by external auditors?

  - Are the findings of the National Audit Body available to the public?
  - Are government entities subject to financial audits by an external auditor?

- Non-arbitrary language
  - Does the government uses accrual accounting in its financial statements?
  - Is there a unified accounting and budgeting classification system?

- More justification
  - Does the budget documentation contain a discussion of what impact variations in the key economic assumptions (sensitivity analysis) would have on the budget outturn?
  - Does the published information have a comparison between actual and planned spending for the period covered?

The main transparency index has more weight on the verification side and in the type of information presented, and less on the amount of information per se. It seems more important to have fewer pieces of transcendental, bottom-lined and audited information at the relevant time than tons of data that might confuse rather than clarify the government objectives. In any case, for robustness, several alternative measures of transparency are later employed.

3.2.2 Measuring Numerical Constraints

The possibility of running larger deficits or increasing the level of expenditures is, in principle, established in the legislation. Other things being equal one should observe higher fiscal deficits, debt levels or higher expenditures the less constrained the budgetary process is.

Ideally it would be possible to distinguish between restrictions to the overall budget and to the composition of it and, presumably, only the first type should affect aggregate fiscal outcomes. In practice, such separation might not exist; budgetary processes that allow inter program transfers, for instance, can create a bigger budget by ex-ante inflating accounts or programs that are not so jealously watched in comparison to others and then making ex-post transfers. If this type of connection is of true importance or just a second order effect is a question that I try to answer here. For this reason, the questions used to construct the numerical constraint index were separated in three categories: those that refer to direct restrictions to the overall budget, those that refer to transfers within the fiscal budget, and those that refer to transfers between different budgetary years.

- Direct Restrictions
  - In developing the budget, are there fiscal rules placing limits on Executive fiscal policy discretion?
  - Can you change expenditures outside the budget process?
- Between Restrictions

  - Is it possible to carry-over unused appropriations for operating costs (salaries, etc.) from one year to another?
  - Is it possible to carry-over unused appropriations for investments (building construction, etc.) from one year to another?
  - Is it possible to carry-over unused appropriations for transfer programs from one year to another?
  - Is it possible for managers of ministries/government organizations to borrow against future appropriations for operating costs (salaries, etc.)?
  - Is it possible to borrow against future appropriations for investments (building construction, etc.)?

- Within Restrictions
  - Are there laws, regulations or policies that define the permitted uses of the budget reserves and the decision-making authorities for approving allocations from the reserves?
  - Are government organizations allowed to transfer funds between operating expenditures, investments and program funds?
  - Can appropriations be reallocated from one program to another?
  - More generally, are transfers permitted between capital investments or transfer programs (social security pensions, etc.) and operating expenditures?

I compute three main numerical constraints indices. The first one assigns

equal weight to each question which implicitly gives more importance to *within* and *between* constraints since both represent nine out of eleven questions. Two additional measures are then computed to tackle this problem. The second index gives half the weight to *direct* restrictions and the other half to the within and between constraints. The third index disregards the within and between effects concentrating only on direct constraints.

3.2.3 Measuring Procedural Rules

There are two distinguishable moments in the budgeting process in which the player's relative power can affect the size and composition of the budget.[1] First is the relative strength that the Finance Minister, assumed to be a fiscal conservative, has over the expending ministers. Second, the relative strength of the executive versus the legislative, in which each legislator has the incentive to push for pork barrel financed projects of delimited benefits. A relatively strong finance minister and a relatively strong executive power results in more hierarchical procedures. The *hierarchical index* is constructed from ten questions that, in turn, are classified as *Finance Minister Strength* and *Executive strength*:

- Finance Minister Strength
  - Are there fixed spending limits set for initial Ministry spending plans?
  - Who has the last word? How are disputes between Ministries and the central budget authority resolved?

[1] See Alesina and Perotti (1999) for a full exposition of the topic.

  - What percentage of the initial executive branch budget is decided by the President/Prime Minister/Principal Executive (i.e. not worked out between Ministries)?

- Executive strength
  - Do the expenditure estimates require authorization by the legislature/parliament?
  - If the budget is not approved by the legislature before the start of the fiscal year, which of the following describes the consequences:
  - Are there any restrictions on the rights of the legislature to modify the detailed budget proposed by the executive?
  - What form do these restrictions take?
  - Notwithstanding any legal restrictions on the legislators ability to modify the budget, is a vote on the budget considered a vote of confidence in the government, i.e., the government would resign if any changes are approved to its budget proposal?
  - Does the legislature have any opportunity to formally debate/discuss overall budget policy prior to the introduction of (or just after) the executives's budget?
  - If allowed to modify the governments budget, what is the treatment of amendments proposed by members of the legislature to the governments budget proposal?

3.2.4 Budgetary Procedures and its Components

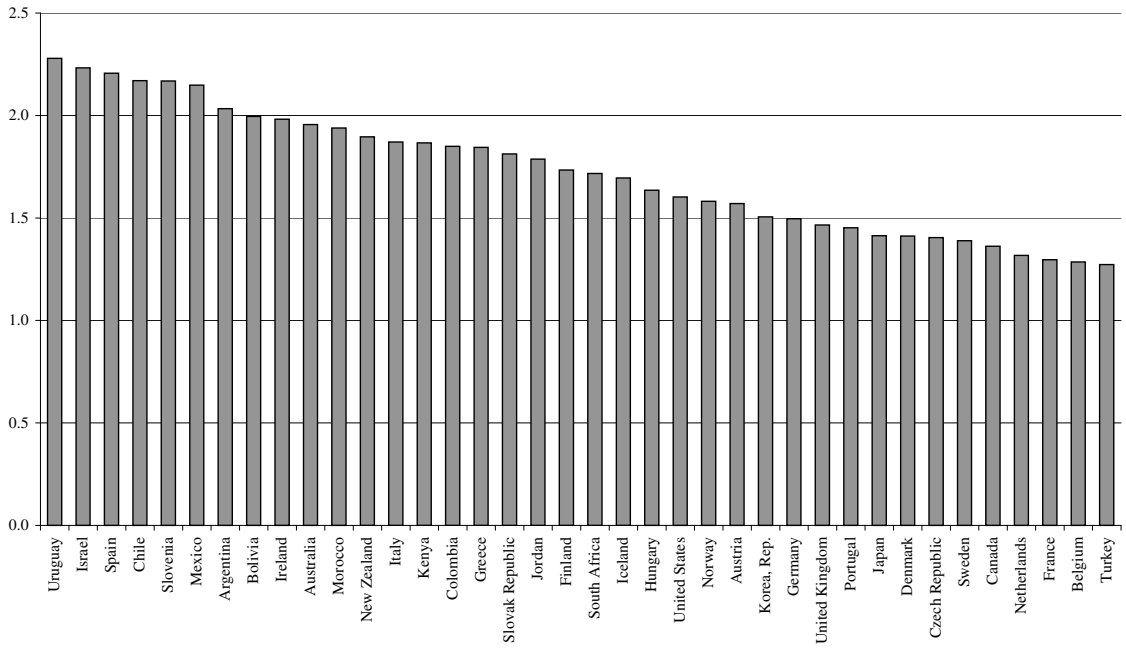
The addition of the three sub-indices, that is, numerical rules, hierarchical, and transparency, constitutes what we will refer hereafter as the *budgetary procedures index*, following the convention in the literature as Alesina et al (1999), von Hagen (1996) or de Haan et al (1999). Table 3.1 and Figures 3.1 to 3.4 describe these indexes.

Table 3.1: Summary Statistics.

	Numerical Rules	*Hierarchical*	*Transparency*	*Budgetary Procedures*
No. of questions	11	10	14	35
Max	0.86	0.88	0.82	2.28
Min	0.14	0.28	0.42	1.27
Average	0.51	0.59	0.64	1.73
Standard Deviation	0.20	0.16	0.12	0.30
Std. Dev./Average	0.39	0.27	0.17	0.18
Corr. vs. Num. Rules	1.00	0.42	-0.13	0.82
Corr. vs. Hierarchical	–	1.00	-0.13	0.75
Corr. vs. Transparency	–	–	1.00	0.20

Figure 3.1 shows the budgetary procedures index. It shows that budgetary institutions are more fiscally conservative in Latin American countries than in Western European countries as a group; or that New Zealand and Italy have broadly the same set of budgetary institutions, and that these countries have more stringent institutions than the United States. Looking deeper into the components of budgeting procedures—figures 3.2 to 3.4—, we can see that countries can have the same aggregate level for very different reasons. Comparing again New Zealand and Italy, the

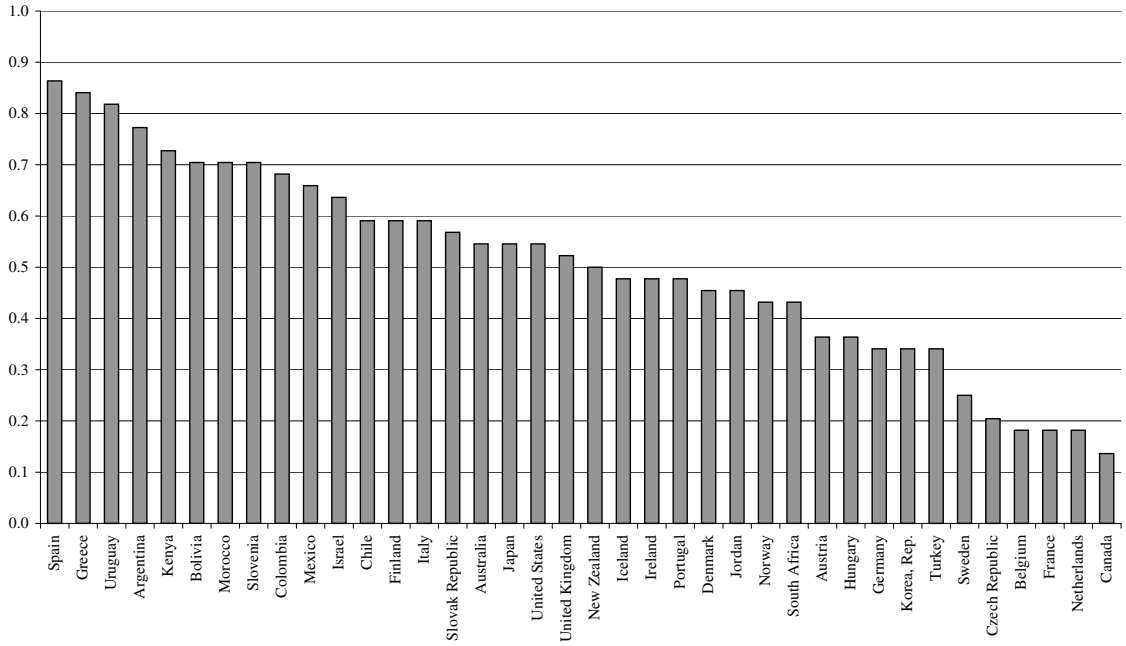
Figure 3.1: Budgetary Procedures Index.



former country scores below average in numerical rules and hierarchical procedures but has the most transparent process of the sample, while Italy has average marks in all categories. The United States and Belgium have institutions that situate on the extremes: both countries rank amongst the highest on budgetary transparency but amongst the lowest on hierarchical procedures—Belgium, also, is one of the least numerically restricted countries.

These figures send the message that any conclusion based on aggregated measures of budgetary institutions (Alesina et al (1999), de Haan et al (1999)) are hard to interpret since the relative forces of each institutional feature cannot be

Figure 3.2: Numerical Constraints Index.

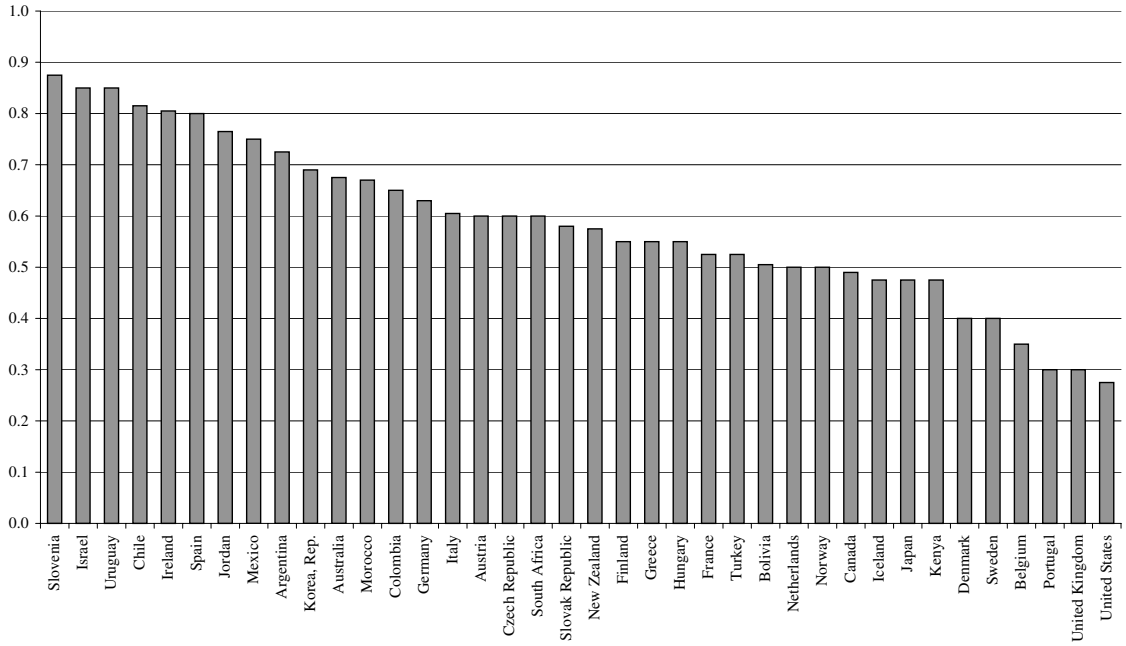


addressed. Moreover, given that not all institutional categories move together, aggregate measures could tend to neutralize the true effect of budgetary institutions on fiscal outcomes.

3.3 The Effects of Budgetary Institutions on Fiscal Outcomes.

This section presents a series of econometric models that try to answer the question of how the different budgetary institutions, in the form of the constructed indices, affect fiscal outcomes across countries. First, I introduce the benchmark model, which controls for economic and demographic variables that has been shown

Figure 3.3: Hierarchical Procedures Index.

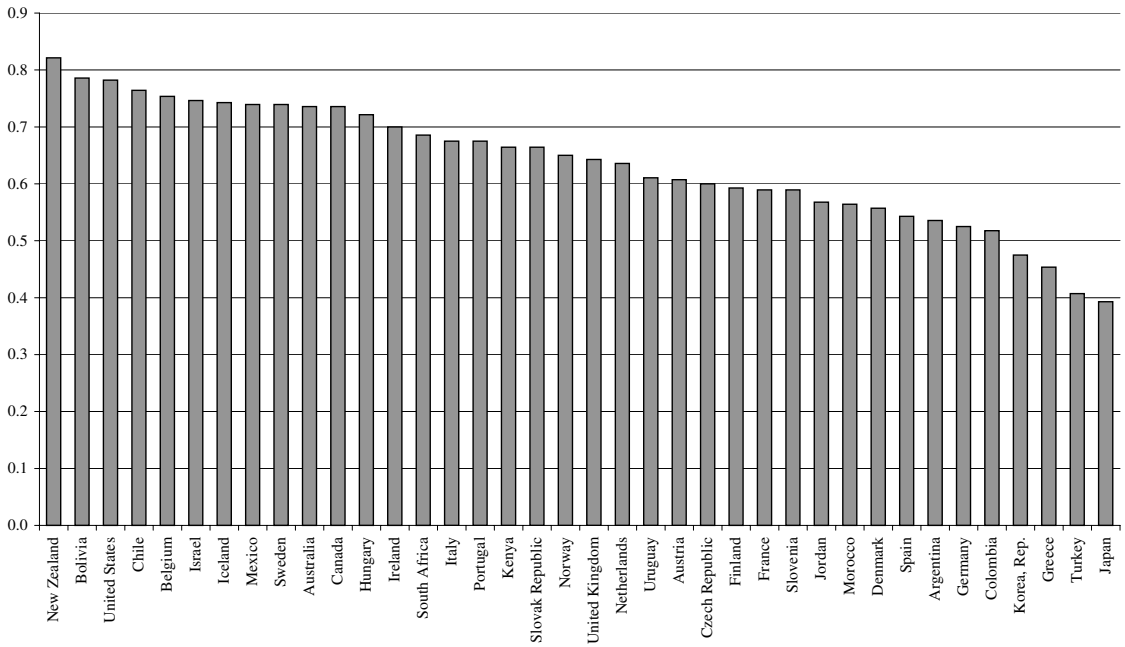


to affect fiscal outcomes. Second, I study possible differences in the estimated parameters, depending on the degree of development of the countries in the sample. Finally, I add to the model a series of political variables that can also affect fiscal outcomes.

3.3.1 Data and the Benchmark Model

The sources for the *fiscal outcomes* variables are the *World Economic Outlook* (WEO), produced by the International Monetary Fund, the *World Development Indicators* (WDI), produced by the World Bank, and the OECD. I tried to use only

Figure 3.4: Transparency Index.



WDI data complemented with OECD data but this turned out to be impossible. The reason is that WDI data is very incomplete and volatile due to periodical revisions—I ended up having less observations with the 2005 version of the data set than with the 2003. The latest year for which a fiscal outcomes variable could be reasonable completed using WDI and OECD is 1999. This has two main disadvantages. First, the constructed institutional measures reflect the state of budgetary practices for the years 2002; even when it is very likely that institutions did not changed much during those three years, we do not really know how big this problem could be. If institutions in general evolved towards obtaining more stringent fiscal outcomes,

then I would potentially be underestimating the true effects of these institutions. Second, in order to avoid atypical years, it is common practice to construct the fiscal variables as averages of a delimited period of time. Using WDI will imply going earlier than 1999 which will aggravate the problem mentioned above. WEO data, by the contrary, contains more detailed fiscal variables and is reasonably available up to 2003. A potential problem with WEO data is that it is not periodically revised. For these reasons I had no choice but to use WEO data. All fiscal outcome variables were constructed as averages of the period 1999-2003.

All the remaining economic and population variables are directly extracted, or constructed from, WDI. The political variables are from the *Database of Political Institutions* (DPI2004) by Philip Keefer (*District Magnitude* and *Number of Effective Parliamentary Parties*), and from The Economist (*Cabinet Size*).

The empirical strategy is to fit the following benchmark model:

$$FO = \beta_0 + \beta_1 NumericalRules + \beta_2 Hierarchical + \beta_3 Transparency + \vec{\beta}' X + \epsilon, \quad (3.1)$$

where FO, that stands for *Fiscal Outcomes*, can alternatively take the form of *General Revenues, General Expenditures, General Balance, Central Balance, General Net Debt,* and *General Gross Debt*, all expressed as ratios to GDP and, as was mentioned earlier, averaged over the 1999-2003 period. $NumericalRules$, $Hierarchical$, and $Transparency$ are the computed institutional indexes that were described in the previous section. X is a vector of economic and demographic control variables that can potentially influence fiscal outcomes. The controls are, first, the average

growth of GDP for the 1990-2003 period (*Avg. Growth*) which is believed to be directly related to revenues due to the progressivity of the tax structure and higher tax revenues from job creation, and inversely (or neutrally) related to expenditures, due to lower unemployment benefits paid by the state. Together, these effects should also have a positive effect on fiscal balances and a negative effect on public debt. Second, the *Dependency Ratio*, defined as the sum of population under 12 and over 65, divided by total population and averaged over the 1999-2003 period, is expected to have the opposite effects to *Avg. Growth* on fiscal outcomes since a higher dependency ratio represents a lower taxable base on one hand, and higher expenditure on education and in the pension system, other things being equal. The third variable (*Wagner*) is the average GDP per capita over the 1999-2003 period, measured in dollars and adjusted by PPP, that is used as a proxy for the country's development level. This variable controls for Wagner's law, the prediction for a positive correlation between the development level of an economy and it's share of public expenditure to GDP. The last control is the degree of openness of an economy, defined as the ratio of the sum of total exports and total imports to GDP (*Openness*). This variable is included to account for the empirical finding (Rodrik (1996)) that more open economies tend to have larger levels of government. I have also included the value of the dependent variable in 1990 as a control for the evolution of the analyzed fiscal outcome during the last decade; the intuition comes from the general agreement that changes in fiscal institutions have occurred more dramatically since 1990.

The benchmark results for *General Revenues*, *General Expenditures*, and *Cen-*

tral Balance, are presented in table 3.2, and results for *General Balance*, *General Net Debt*, and and *General Gross Debt* in table 3.3. For each fiscal outcome, the model with only the economic controls, is reported in the left columns, and the economic controls and budgetary institutions in the right columns.

Looking at the models with the economic controls alone, there are three aspects that are worth mentioning. First, in none of the six fiscal outcomes analyzed are all of the economic controls significant at the same time, but nevertheless, we can confidently reject the null of all coefficients being jointly equal to zero. Moreover, every economic control enters significantly in at least half of the fiscal outcomes analyzed. Second, the economic controls appear to do a better job on explaining the fiscal outcomes reported on table 3.3 than on those of table 3.2. A possible explanation is that debt and balance summarize the relationship between revenues and expenditures, and so, effects that are not detected individually for the latter can be captured in the former. Third, of the economic controls, the dependency ratio appears to have the wrong sign for expenditures since the model would predict that a higher ratio would imply a lower level of expenditures. Remarkably, once budgetary institutions are introduced, this coefficient loses significance completely.[2]

According to Stein, Talvi and Grisanti (1999), the empirical literature on budget institutions and fiscal performance has consistently found an impact of budget

[2]Dropping one control at a time and both of them didn't change the significance level of any of the other variables and the coefficient values were pretty much the same (never changed more than 5%). Since there are good theoretical motives to suspect that the non-significant controls truly affect fiscal outcomes they are left as part of the regression.

institutions on fiscal deficits and debt, but has failed almost as consistently in finding an association with government size. This assertion can be contrasted with the results reported on tables 3.2 and 3.3 for the benchmark model. On one hand it can be seen in both tables that budgetary institutions help to explain cross-country differences in the fiscal balance, either at the central or general level, and of the general gross debt. Moreover, in this case, it seems that budgetary institutions help to explain cross-country differences in the size of government when looking at the general level of expenditures. On the other hand, it can be seen that it is not budgetary institutions in general but only the level of transparency in the budgetary process that matters in explaining cross-country differences in these fiscal outcomes.

The interpretation of the point estimates of *Transparency* is that an increase in this variable of one standard deviation (0.12) from its midpoint (0.69) is associated with a reduction of 2.3 percent on General Expenditures, with a fiscal stance improvement of 1.2 and 1.6 percent on the Central and General Balance, respectively, and with a 12.4 percent reduction of the General Gross Debt, all these measures relative to GDP.

In terms of the explained cross country variation, the inclusion of budgetary institutions in the benchmark model improves considerably the R-squared of the regressions in which *Transparency* enters significantly, particularly for both fiscal balance and gross debt.

Table 3.2: Benchmark Model.

	General Revenues		General Expenditures		Central Balance	
Dep. Var. 1990	0.343	0.383	0.298	0.323	0.084	0.077
	(0.158)**	(0.160)**	(0.135)**	(0.154)**	(0.056)	(0.082)
Avg. Growth	-0.015	-0.015	-0.021	-0.014	0.007	0.006
	(0.013)	(0.016)	(0.011)*	(0.015)	(0.005)	(0.006)
Dependency Rat.	-0.218	-0.211	-0.324	-0.229	0.094	0.042
	(0.139)	(0.159)	(0.139)**	(0.174)	(0.060)	(0.061)
Wagner	0.003	0.003	0.001	0.001	0.002	0.002
	(0.001)**	(0.0015)**	(0.0011)	(.0014)	(0.0005)***	(0.0007)**
Openness	0.059	0.075	0.028	0.035	0.023	0.019
	(0.046)	(0.050)	(0.043)	(0.054)	(0.013)*	(0.014)
Transparency		-0.067		-0.194		0.106
		(0.113)		(0.109)*		(0.050)**
NumericalRules		0.062		-0.014		0.025
		(0.069)		(0.077)		(0.028)
Hierarchical		-0.025		-0.024		0.000
		(.078)		(.079)		(.029)
Constant	0.305	0.304	0.453	0.534	-0.123	-0.173
	(0.118)**	(0.130)***	(0.115)***	(0.170)***	(0.050)**	(0.069)**
R^2	0.74	0.75	0.61	0.66	0.46	0.57
No. of Observations	37	37	37	37	36	36

Robust standard errors in parenthesis.*** significant at 1%, ** significant at 5% and,

* significant at 10%.

3.3.2 Different Specifications for Numerical Rules

As was already mentioned, one can immediately suspect a wrong specification of the numerical rules index employed above, since it gives the same weight to factors

Table 3.3: Benchmark Model.

	General Balance		General Net Debt		General Gross Debt	
Dep. Var. 1990	0.204	0.242	0.799	0.793	0.779	0.753
	(0.099)**	(0.126)*	(0.079)***	(0.091)***	(0.109)***	(0.074)***
Avg. Growth	0.005	-0.002	-0.116	-0.098	-0.122	-0.098
	(0.006)	(0.007)	(7.026)***	(0.037)**	(0.027)***	(0.022)***
Dependency Rat.	0.102	0.016	-2.956	-2.766	-1.718	-1.150
	(0.058)*	(0.057)	(0.696)***	(0.860)***	(0.554)***	(0.396)***
Wagner	0.002	0.002	-0.003	-0.004	0.000	0.001
	(0.0006)***	(0.0008)***	(0.0036)	(0.0043)	(0.0028)	(0.0027)
Openness	0.035	0.041	-0.227	-0.212	-0.266	-0.204
	(0.016)**	(0.018)**	(0.113)*	(0.142)	(0.130)*	(0.100)*
Transparency		0.136		-0.454		-1.063
		(0.068)*		(0.333)		(0.315)***
NumericalRules		0.056		-0.009		0.057
		(0.042)		(0.206)		(0.178)
Hierarchical		0.008		-0.107		-0.085
		(0.037)		(0.246)		(0.156)
Constant	-0.140	-0.216	2.022	2.296	1.439	1.826
	(0.053)**	(0.082)**	(0.416)***	(0.488)***	(0.348)***	(0.369)***
R^2	0.50	0.63	0.87	0.89	0.74	0.86
No. of Observations	37	37	26	26	30	30

Robust standard errors in parenthesis.*** significant at 1%, ** significant at 5% and,

* significant at 10%.

that directly constrain the size of government and deficits, and to those that can affect them indirectly. The other two proposed specifications for *Numerical Rules*

are presented in table 3.4, where I have omitted to report the control variables. *NumericalRules 2* gives half of the weight to direct restrictions on the budget and the other half to between and within restrictions. *NumericalRules 3* takes into account only direct restrictions. As can be seen, the lack of significance of the numerical rules index is not due to its specification. The *Transparency* measure, is not affected by these changes in specification.

Table 3.4: Benchmark Model: Different Numerical Rules.

	General Revenues	General Expenditures	Central Balance	General Balance	General Net Debt	General Gross Debt
Transparency	-.0622	-.1881	.1062	.1324	-.4574	-1.078
	(.1120)	(.1108)	(.0507)**	(.0722)*	(.3078)	(.3191)***
NumericalRules 2	.0647	.0246	.0057	.0283	-.0208	.0156
	(.0633)	(.0703)	(.0239)	(.0361)	(.1505)	(.1273)
Hierarchical	-.0315	-.0412	.0099	.0185	-.0993	-.0733
	(.0754)	(.0788)	(.0283)	(.0366)	(.2494)	(.1447)
R^2	0.75	0.66	0.56	0.61	0.89	0.86
	General Revenues	General Expenditures	Central Balance	General Balance	General Net Debt	General Gross Debt
Transparency	-.0643	-.1845	.1047	.1270	-.4544	-1.0848
	(.1140)	(.1077)*	(.0501)**	(.0725)*	(.2963)	(.3172)***
NumericalRules 3	.0273	.0267	-.0105	-.0046	-.0120	-.0054
	(.0377)	(.0435)	(.0168)	(.0215)	(.1034)	(.0892)
Hierarchical	-.0179	-.0465	.0220	.0370	-.0989	-.0646
	(.0751)	(.0793)	(.0300)	(.0401)	(.2540)	(.1357)
R^2	0.74	0.66	0.57	0.60	0.89	0.86

Robust standard errors in parenthesis.*** significant at 1%, ** significant at 5% and, * significant at 10%.

3.3.3 Budgetary Institutions and Development

In the benchmark model I have tried to account for all sources of heterogeneity, even the development level of a country. But if the degree of development is correlated with budgetary institutions but it is not—or in a different way—with the *measures* of budgetary institutions, the results obtained above will be inexorably biased. Suppose, for example, that the punishment for a policymaker that is caught cheating is more severe in a rich than in a poor country. Then, it will be expected that the same degree of transparency will exert a higher influence on fiscal outcomes in rich than in poor countries, something that the transparency index will not capture. In trying to account for this possibility I divided the data set into rich and poor countries, using the original OECD as rich countries, and ran the same set of regressions to see if the estimated parameters are stable to sample specification. The results are reported in table 3.5.

The *Hierarchical* index appears to be marginally important amongst less developed countries for General Revenues. This relationship is not robust. By dropping one economic control at a time, the coefficient loses significance when the Wagner effect or openness are not part of the regression whereas the estimate gains significance if growth or the dependency ratio are left out.

Additionally, in the Gross Debt specification for less developed countries, *NumericalRules* enters significantly but with the opposite sign of what is expected. Dropping one economic control at a time does not destroy this result except when growth is left out. A possible interpretation of this result is that less developed coun-

Table 3.5: Rich vs. Poor Countries.

Rich Countries	General Revenues	General Expenditures	Central Balance	General Balance	General Net Debt	General Gross Debt
Transparency	.0681	-.2141	.1843	.1806	-1.356	-1.3134
	(.1399)	(.0801)**	(.0874)*	(.0949)*	(.3013)***	(.5184)**
NumericalRules	.0158	-.0179	-.0040	.0144	.04193	.0956
	(.0689)	(.0486)	(.0526)	(.0538)	(.2198)	(.3687)
Hierarchical	.1183	.1029	.0680	.0699	-.2106	.1137
	(.0919)	(.0855)	(.0882)	(.0948)	(.4007)	(.3974)
R^2	0.87	0.88	0.64	0.57	0.95	0.86
No. of Observations	18	18	17	18	17	18
Poor Countries	General Revenues	General Expenditures	Central Balance	General Balance	General Net Debt	General Gross Debt
Transparency	-.0950	-.2248	.1017	.1242	–	-.5812
	(.0908)	(.1598)	(.0840)	(.1142)		(.3770)
NumericalRules	.0619	-.0477	.0507	.1172	–	.9301
	(.0615)	(.1257)	(.0695)	(.0971)		(.3600)*
Hierarchical	-.1245	-.1140	-.0162	-.0234	–	-.5262
	(.0587)*	(.0929)	(.0461)	(.0521)		(.3325)
R^2	0.87	0.73	0.49	0.50	–	0.96
No. of Observations	19	19	19	19	9	12

Robust standard errors in parenthesis.*** significant at 1%, ** significant at 5% and, * significant at 10%.

tries typically face credit constraints from the private sector which can be softened if balanced budget rules are in place. Of course, this or any other interpretation should be taken with caution given the small sample size.[3]

[3]I also employed the other two definitions of *NumericalRules* and while the results are preserved for the intermediate specification(*NumericalRules 2*), the coefficient loses all significance for the

Looking at the regressions for the sub-sample of rich countries, we can see that the results for *Transparency*, *NumericalRules*, and *Hierarchical* are preserved. Moreover, *Transparency* enters significantly in the Net Debt regression once the less developed countries are left out. This suggests that *Transparency* being the only budgetary institution that matters in the whole sample, for most fiscal outcomes, is basically driven by rich countries; the inclusion of less developed countries do not destroy this relationship. Given that I have controlled for economic differences across countries and that splitting an already small sample is very costly in terms of degrees of freedom, I have chosen to continue with the whole sample. Nevertheless, the results presented so far in this section help to understand discrepancies in the literature of budgetary institutions and fiscal outcomes. For example, the Latin American experience, composed of all under-developed countries, was documented by Alesina et al (1999), and Filc and Scartascini (2004) who found that only numerical constraints and hierarchical procedures motives are important in determining fiscal outcomes.

3.3.4 Political Controls

So far, I have analyzed the effects of budgetary institutions on fiscal outcomes taking account of economic variables that have been shown to influence fiscal policy. Here, I add to the model a variety of political variables that have also been shown to be correlated with fiscal outcomes. All of these political variables capture, one way or another, the idea of fragmented government. Government fragmentation arises

more strict one (*NumericalRules 3*).

when several agents or groups participate in the fiscal decision-making process, each with its own interest and constituencies to satisfy, and each with some weight in the final decision. To participate in the majority, each group demands a share in the budget; as all groups do this, the end result is a high level of expenditure or a large deficit (Kontopoulos and Perotti (1999)). In other words, fragmentation is an expression of a common pool problem.

First, I add to the model a measure of *district magnitude*, defined as the average number of representatives elected per district to the Lower House. Several theoretical and empirical studies show that, other things being equal, the degree of government fragmentation increases with the number of political parties. In turn, the number of political parties increases with district magnitude. Consequently, one should expect the common pool problem to be enhanced as average district magnitude augment.

The second variable of consideration is the *effective number of parliamentary or legislative parties*(ENPP), defined by the Laakso and Taagepera (1979) formula, $1/\sum s_i^2$, where s_i is the percentage of seats won by the i^{th} party. While district magnitude is a direct characteristic of the electoral system, its effect on fiscal policy is expected to go through *outcomes* of the electoral system as, in this case, the ENPP. A larger ENPP represents a more fragmented government and thus, countries with a higher ENPP are expected to have larger governments, to be more indebted, and to run larger deficits.

Following Kontopoulos and Perotti (1999), the third variable under consideration is the *cabinet size*, defined as the sum of all spending ministers. While this

variable does not reflect government fragmentation per se, it is related to the idea of more decision-makers wanting to maximize their share of the budget; in this case, from the executive side of the budgeting process. In other words, it is expected that more numerous cabinets will tend to be associated with bigger governments and larger deficits.

Finally, I control for the degree of income inequality using the Gini coefficient.[4] The idea for including it is that, if agents are altruistic, they will care for their descendants and thus the current generation of taxpayers will refrain from redistributing wealth from future generations of taxpayers by contracting public debt. Cuckierman and Meltzer (1989) as well as Tabellini (1991) have pointed out that this altruistic effect becomes weaker the higher the income inequality, and consequently higher levels of public debt should be expected.[5]

In table 3.6 I present the regression results of including these political controls. I first proceed to estimate each equation including all three budgetary institutions, but in no case were either *NumericalRules* or *Hierarchical* significant. I re-estimated all regressions dropping these variables in order to gain a couple of degrees of freedom and to avoid a problem of possible multi-collinearity since the *Hierarchical* index and the political variables are trying to capture the same effect. Since none of the estimated coefficients changed qualitatively from one specification to the other, I

[4]Although inequality is not a political variable, it is not commonly used in the budgetary institutions literature so I decided to use it as an additional control rather than in the benchmark model

[5]See Feld and Kirchgassner (1999) for a complete elaboration of this idea.

report the latter, omitting once again the results of the other controls.

District Magnitude does not seem to affect fiscal outcomes and the only time it enters a regression significantly it has the wrong sign. The lack of *District Magnitude*'s explanatory power is consistent with the results of Stein, Talvi and Grisanti (1999) on a sample of Latin American countries. The reason for this outcome, as mentioned above, could be due to *District Magnitude* affecting fiscal outcomes only indirectly, and that this effect is either too low or that it fails to show up in this short and static data set.

The *Effective Number of Parliamentary Parties* enters in all regressions with the expected sign and is significant for General Revenues, General Expenditures and General Gross Debt. The better performance of *ENPP* compared with *District Magnitude* is exactly what was expected since *ENPP* is a direct measure of the common pool effect.

The *Cabinet Size* variable enters in the set of regressions changing signs but the only time it enters significantly it does so with the expected one. Overall *Cabinet Size* does not seem to play an important role on conditioning fiscal outcomes, contrary to the finding by Kontopoulos and Perotti (1999) on a sample OECD countries. In a second reading of their result though, they report that Cabinet Size effect seems to have been washed out during the nineties and dominated by the legislative side of the common pool problem. These results are consistent with the ones presented here, where *ENPP* is more important than *Cabinet Size*.

The *Gini* coefficient enters significantly in the General Revenue, General Expenditures and General Net Debt regressions. As mentioned above, the only im-

plied relationship from theory was that more inequality should be paired with more indebtedness due to a decrease in the bequest motive of an altruistic agent. In principle, the relation of inequality to revenues and expenditures could take any direction and still be consistent with a positive association to public debt. In this case, the negative sign in both coefficients can be interpreted as the tax rate not being progressive enough so higher levels of inequality will bring less government revenues and, other things being equal, less expenditures.

Finally, and more importantly, *Transparency* remains very robust to the inclusion of the political controls and the *Gini* coefficient. The only instance in which *Transparency* loses explanatory power is for Central and General Balance after the inclusion of *Cabinet Size*. This result is not driven by the the countries included in the regression since re estimating the benchmark model using only the data points for which *Cabinet Size* is available, still yielded levels of significance equivalent to those when the full sample was employed. What drives this result is the fact that *Cabinet Size* and *Transparency* are highly and positively correlated (0.43) at a .02 significance level. This partial collinearity problem has the effect of dampening their significance levels when both variables are included. Why *Transparency* and *Cabinet Size* are correlated is a question that is not treated here but that surely needs further exploration; there is no a priori reason to think the former causes the first which would have resulted in *Cabinet Size* being the true underling force. For clarification purposes, it's worth mentioning that *Transparency* is not correlated with any of the other control variables.

3.4 Index Aggregation and Substitutability

The results from the econometric analysis establish that the constructed measures of transparency are correlated with fiscal outcomes, but that the numerical rules and hierarchical indexes are not. I now turn to the sensitivity of these results to the questions that form each index. This exercise gains relevance in the fact that every study that measures budgetary institutions through indexes employs a different information set.

In table 3.7 I present the results for the sensitivity of transparency in Gross Debt. The information set for transparency are the fourteen question mentioned earlier. The first row of the table indicates the number of questions utilized in the construction of a transparency index. The second row indicates the number of possible indices that can be constructed given the information set and a fixed number of questions. For example, there are 2002 ways of choosing 5 questions from a set of 14. The third to fifth rows indicate, respectively, the percentage of cases, from the whole set of combinations, of obtaining a significant negative, an insignificant positive, and a significant positive relationship between transparency and gross debt, using the benchmark model with the original controls. For example, the Alesina et al (1999) transparency measure is made of two questions. By randomly choosing two questions out of 14, I have a 0.44 probability of obtaining a negative (and significant) relationship between transparency and gross debt in the benchmark model. Choosing 7 out of 14 questions elevates that probability to 0.84. There are three main things that can be said from the table. First, the more questions

included in the determination of the index, the more likely it would be to find a significant negative relationship between transparency and gross debt. Second, that there is no possible combination of questions that will give a positive and significant relationship between these variables, something that reinforces the idea that the true relationship is in fact negative. Lastly, in terms of significance, there is no difference if the index is made of 11 or more questions.[6]

Does this means that one should stop at 11 questions? In general, the answer is no, at least until one can determine which questions are good reflections of reality and which ones diversions from it. Moreover, to put things in perspective, table 3.8 depicts the same exercise, but now between transparency and General Balance. It is again true that indices obtained using more questions have a higher probability of confirming the hypothesized relationship (positive in this case), but now the number of questions included at the high end has an effect. From these observations, it could be said that the assumption that these questions are perfect substitutes does not hold.

The same exercise was performed for numerical rules and hierarchical procedures (see the appendix for these tables). In general terms it can be said that the lack of significance of these two institutional measures were not driven by the number of questions included. The only puzzling result is that when some significance was found, either in the hypothesized direction or contrary to it, these occurred for indices that contained a relatively low number of questions.

[6]The significance threshold is set to be at most 10%.

3.5 Testing for an Interaction Effect between Transparency and Numerical Rules

Lastly, I analyze the possibility of conditional numerical constraints. The consistent failure of finding any significant relationship between the different measures of numerical constraints and fiscal outcomes may be due to the impossibility of enforcing those constraints. Specifically, if the budgetary process is sufficiently opaque, it would be hard for the constituents to detect any deviation from the rule, and therefore the constraints might not bind. There are, at least, two empirical strategies to test for conditional numerical constraints. The first consists of dividing the data set between transparent and non transparent countries and running the same set of regressions in both sub-samples. One should expect to obtain a significant coefficient for *NumericalRules* in the transparent sub sample and still a non-significant one for the opaque set of countries. The advantage of dividing the sample is a straightforward interpretation of the test since, provided that *Transparency* is exogenous and independent, one is comparing two sets of countries that will only differ in their transparency level. Of course this comes at the high cost of dropping a lot of observations which in a small cross-section like this one might turn out to be prohibitive. I tried this strategy, separating the data set in two halves, but I did not find any significant coefficient for *NumericalRules* in any of its specifications, either in the high or low *Transparency* group.

The second strategy is to take advantage of the whole data set and test for an interaction effect between *Transparency* and *NumericalRules* directly. The short-

coming of including an interaction effect in the model resides in its' interpretability since the model loses its additivity. Moreover, it is not clear that an interacted variable, like the one constructed by multiplying *Transparency* and *NumericalRules*, will capture the true relationship between these variables. The interaction assumes a continuous relationship between the two constituent variables, though it is plausible that a minimum level of transparency is required for numerical constraints to become binding. This effect might not be captured by a standard interaction model. To investigate this possibility I follow two approaches: First, I evaluate a standard interaction model and then multiply the *NumericalRules* measures with a dummy variable that separates countries by their *Transparency* level with the aim of capturing any discontinuity in this interaction.

3.5.1 The interaction model

To test for relevant interactions I add to the benchmark specification an interaction variable, *Interaction* that is the product of *Transparency* and *NumericalRules*; the two constituent variables that need to be present in the regression.

$$FO = \beta_0 + \beta_1 NumericalRules + \beta_2 Hierarchical + \beta_3 Transparency + \beta_4 Interaction + \vec{\beta}' X + \epsilon, \tag{3.2}$$

The p-value provided for the t-test indicates the level of significance of the product term. Only if the product term is significant can one conclude that the hypothesized interaction actually exists in the data. The only fiscal outcome for which I obtained a significant *Interaction* is General Balance; thus one can confidently say

that there is no interaction effect for the rest.

With respect to General Balance things are somewhat different. Table 3.9 shows that an interaction effect is present but, surprisingly, of opposite sign than expected. For comparison, the first column reports the coefficients, robust standard errors and significance level for *Transparency* and *NumericalRules* in the additive model (controls and *Hierarchical* coefficients are not reported) where, as was already mentioned, only *Transparency* enters significantly. The second column reports the coefficients for the institutional variables and their interaction which is significant at a .05 level, but that indicates that as *Transparency* (*NumericalRules*) increases, *NumericalRules* (*Transparency*) tends to reduce the General Balance.

One would be tempted to conclude that the inclusion of the interaction variable helps to disentangle the true effect of *Transparency* and, specially, *NumericalRules* since now the latter appears with a significant and positive coefficient, and the explained variation of the dependent variable improves considerably going from an R-squared of 0.63 to an R-squared of 0.70. Even *Transparency* appear to gain statistical significance and economic importance. The problem, of course, is that the model is no longer additive and therefore the interpretation of the coefficients attached to the constituent variables have changed: Now they represent the influence of *NumericalRules* (*Transparency*) on the General Balance when *Transparency* (*NumericalRules*) is equal to zero, which by itself has no economic interpretation, considering that the minimum value for *Transparency* and *NumericalRules* are 0.39 and 0.14, respectively. The only valid interpretation for any of the constituent variables is, in this case, to consider their total condi-

tional effect. According to equation (2), the total effect of *NumericalRules* on the General Balance is given by $\hat{\beta}_1 + \hat{\beta}_4 Transparency$, with a robust standard error of equal to: $\sqrt{[\hat{var}_{\beta_1} + 2(Transparency)\hat{cov}_{\beta_1,\beta_4} + (Transparency)2\hat{var}_{\beta_4}]}$, where $\hat{var}_{\beta_1}$is the variance of the *NumericalRules*, $\hat{var}_{\beta_4}$ is the variance of the *Interaction* coefficient, and $\hat{cov}_{\beta_1,\beta_4}$ is the covariance of the two. Similar statistics were computed for the *Transparency* conditional on *NumericalRules*. It is common practice to pick meaningful values of the constituent variables to analyze the conditional total effects. Here, I have chosen the average value and one standard deviations from it. Table 3.10 shows the conditional effects of *Transparency* and *NumericalRules* on the General Balance.

The effect of *Transparency* on the fiscal balance, conditional on *NumericalRules* is always positive, the effect decreases with *NumericalRules* and loses significance for high levels of *NumericalRules*. The effect of the *NumericalRules* conditional on *Transparency* is indeed puzzling, since it goes in the opposite direction of what was postulated in the previous chapter. *NumericalRules* appears to have a positive and significant effect on the fiscal balance only for low levels of *Transparency*, which is certainly discouraging in terms of the model presented in the earlier. However, this empirical outcome should be taken with extreme care since it might not be a general result. First, there is evidence of an interaction effect only for General Balance but not for the remaining fiscal outcomes. Second, the interaction effect found in the benchmark model is very sensitive to model specification, since by dropping some of the benchmark controls or adding some of the political controls the interaction effect disappears. Third, when the measure of numerical constraints

is *NumericalRules 2*, the interaction term is only significant at 0.10 and disappears when *NumericalRules 3* is used as measure of numerical constraints. Finally, the last incongruence of this result has do to with the test of a discontinuous effect to which now we turn.

3.5.2 Testing for a Discontinuous Effect

Table 3.9 also reports the possibility of a discontinuous or cut off value of *Transparency* for *NumericalRules* to be binding. The conjecture is that the numerical constraint variable interacted with a dummy is going to be significant, in the same direction as *transparency*, and further that the interaction with *NumRule X Third* will be stronger than with *NumRule X Half*.

The results in columns three and four tell us that the *NumericalRules* effect of the top half most transparent countries is indistinguishable from the bottom half, but that if we compare the top third of most transparent countries with the remaining countries, there exists a distinguishable effect, although of the opposite direction of what was hypothesized. The negative sign in front of *NumRule X Third* is similar to the negative interaction in the model above. The coefficient of *NumRule X Third* tells us the marginal effect of *NumericalRules* of the most transparent countries. Hence, the total effect for these countries is that numerical constraints actually decrease the General Balance (0.055-0.100), something that was not picked up by the interaction model. Once again, General Balance was the only fiscal outcome for which a discontinuous effect could be found.

3.6 Concluding Remarks

I use a new survey on budgetary practices, with the broadest country coverage so far, to construct several measures of the different budgetary institutions recognized in the literature: numerical constraints, procedural rules, and transparency.

The results for the whole sample of countries indicate that not all budgetary institutions affect fiscal outcomes in the same manner. In particular, only the level of transparency shows a significant and economically important effect on Central and General Deficits, as well as on General Debt. On the contrary, numerical constraints and procedural rules fail to show any significant effect on fiscal outcomes. These results, however, are not independent of the country's level of economic development. In particular, the results are reinforced for the richest countries but none of the budgetary institutions enters significantly for less developed economies.

To the question of perfect substitutability between different components of the budgetary process, I provide evidence that the constructed indexes are very sensitive to the information included. This suggests that the results obtained here and elsewhere should be taken as preliminary until we have a better way to define these institutions.

Finally, contrary to what was postulated in the previous chapter, for this sample of countries it does not seem to exist an interaction effect between transparency and numerical constraints.

Table 3.6: Political Controls.

	General Revenues	General Expenditures	Central Balance	General Balance	General Net Debt	General Gross Debt
Transparency	-.0643	-.1824	.1059	.1242	-1.0397	-1.0765
	(.1122)	(.1024)*	(.0489)**	(.0687)*	(.2213)***	(.3336)***
District Magnitude	-.0002	-.0001	-.0000	-.00007	-.0007	-.0018
	(.0002)	(.0003)	(.0001)	(.0001)	(.0005)	(.0004)***
R^2	0.748	0.659	.561	.590	.942	.889
No. of Observations	37	37	36	37	23	25
Transparency	-.1167	-.2589	.1183	.1456	-.9721	-1.194
	(.1109)	(.0890)***	(.0552)**	(.0788)*	(.2073)***	(.3381)***
ENPP	.0178	.0186	-.0001	-.0004	.0200	.0350
	(.0073)**	(.0072)***	(.0029)	(.0032)	(.0155)	(.0182)*
R^2	.758	0.695	.572	.603	.938	.883
No. of Observations	34	34	33	34	24	24
Transparency	-.1941	-.2800	.0982	.1288	-.9422	-1.437
	(.1116)*	(.1275)**	(.0855)	(.1105)	(.2453)***	(.2850)***
Cabinet Size	.0016	-.0029	.0016	.0016	-.0071	.0189
	(.0031)	(.0034)	(.0024)	(.0023)	(0101)	(.0084)**
R^2	0.826	0.784	.574	.604	.941	.887
No. of Observations	30	30	30	30	23	23
Transparency	-.0196	-.1884	.1260	.1517	-.6676	-1.266
	(.1040)	(.0850)**	(.0543)**	(.0793)*	(.2625)**	(.2780)***
Gini Coefficient	-.0080	-.0068	-.0008	-.0004	.0105	.0088
	(.0021)***	(.0016)***	(.0012)	(.0012)	(.0040)**	(.0052)
R^2	.825	.765	.580	.605	.914	.879
No. of Observations	33	33	32	33	25	24

Robust standard errors in parenthesis.*** significant at 1%, ** significant at 5% and,

* significant at 10%.

Table 3.7: Different Transparency Indexes on Gross Debt.

Number of Questions	2	3	4	5	6	7	8	9	10	11	12	13	14
Combinations	91	364	1001	2002	3003	3432	3003	2002	1001	364	91	14	1
% cases (-) sig.	44	46	61	68	77	84	91	96	98	100	100	100	100
% cases (+)	12	6	2	0	0	0	0	0	0	0	0	0	0
% cases (+) sig.	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 3.8: Different Transparency Indexes on General Balance.

Number of Questions	2	3	4	5	6	7	8	9	10	11	12	13	14
Combinations	91	364	1001	2002	3003	3432	3003	2002	1001	364	91	14	1
% cases (+) sig.	11	16	19	23	26	30	34	39	45	51	58	77	100
% cases (-)	17	6	3	2	1	0	0	0	0	0	0	0	0
% cases (-) sig.	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 3.9: Different Model Specification for General Balance.

	Benchmark	Multiplicative	Cut off: Half	Cut off: Third
Transparency	0.136	0.440	0.207	0.306
	(0.068)*	(0.160)***	(0.115)*	(0.090)***
NumericalRules	0.056	0.431	0.064	0.055
	(0.042)	(0.177)**	(0.041)	(0.030)*
Interaction		-0.583		
		(0.253)**		
NumRule X Half			-0.039	
			(0.039)	
NumRule X Third				-.100
				(0.032)***
R^2	0.63	0.70	0.65	0.75
No. of Observations	37	37	37	37

Robust standard errors in parenthesis.*** significant at 1%, ** significant at 5% and, * significant at 10%.

Table 3.10: Conditional Effects on General Balance.

	Numerical Rules			*Transparency*		
	Low	Average	High	Low	Average	High
Transparency	0.260	0.146	0.032	—	—	—
	(0.089)***	(0.056)**	(0.057)			
NumericalRules	—	—	—	0.100	0.032	-0.035
				(0.042)**	(0.028)	(0.039)

Robust standard errors in parenthesis.*** significant at 1%, ** significant at 5% and, * significant at 10%.

Chapter 4

Fiscal Transparency in the American States: A Re-Examination

4.1 Introduction

This chapter is almost entirely focused on the relation between budgetary transparency and fiscal outcomes, with the difference that in this case the object of study consists of the American states, instead of a group of countries as in the previous chapter. The biggest advantage of restricting the study of budgetary transparency to a sub-national level is that so doing eliminates factors that are inherent to every country and which are difficult to control, such as political structures, language, etc, but are essentially the same among the American states.

The first part of the chapter builds upon the work of Alt, Lassen and Skilling (2003) (ALS), who have analyzed the effect of budgetary transparency on government size. To do so, ALS constructed an index of fiscal transparency reflecting the state of this institution by the end of the nineties. ALS found the novel result that there is a positive correlation between transparency and government size. This result follows from the intuitive argument that voters across American states are willing to sacrifice private consumption for a greater share of public goods, provided they have a better idea of how these resources are actually spent. Note, however, that this necessarily implies an under-provision of public goods.

In this chapter I construct an index similar to the ALS index, with the added

advantage that the measurement spans the period 1985 to 2002. This allows me to observe the evolution of transparency starting from the mid-eighties, and thus, evaluate the impact of this evolution on fiscal outcomes.

In the second part of this chapter I compare the aforementioned longitudinal transparency index with a new index calculated by Alt, Lassen and Rose (2005) (ALR) that spans the years 1972 to 2002. Both indices share a common source, which leads to the expectation that the measurements should be identical if we focus on the common source and time span. However, it will be shown this is not so because, even if the sources are the same, information gathered differs in time.

The main result of the chapter is that the ALS measure of transparency must be necessarily biased because it ignores state fixed effects. If these effects are taken into account, the effect of fiscal transparency on government size is significantly reduced, although not to the point of rendering it statistically and economically insignificant.

The rest of the chapter is organized as follows: In the second section I compare the cross-sectional index computed by ALS with the longitudinal index obtained here. The third section presents empirical results obtained using the new index. In the fourth section I compare my index with the longitudinal ALR index. In section five I establish the connection between the results obtained here and in the previous chapter, followed by the concluding remarks.

4.2 Fiscal transparency among the American States: A comparison

ALS were the first authors to provide a measure of fiscal transparency among American states. These authors constructed an index that captures characteristic features of the budgetary process of every state that make it more or less transparent. ALS obtained their data from the 1995 and 1999 surveys on Budget Processes in the States, published by the National Association of State Budget Officers (NASBO), and from the 1998 Legislative Budget Procedures survey, published by the National Conference of State Legislatures (NCOSL). ALS identify 9 key points associated with fiscal transparency, which are listed below according to their source:

NASBO Source:

1. Is the budget reported on a **GAAP** (generally accepted accounting practice) basis? (Yes = more transparent, if shared language facilitates communication).

2. Are there **multi-year** expenditure forecasts? (Yes = more transparent, since more information about plans and the expected consequences of action is disseminated).

3. **Frequency** of budget cycle (Annual = more transparent than biennial, since more frequency means more (frequent) information).

4. Are the revenue estimates **binding**? (Yes = more transparent, since estimates that are binding increases the costliness of misleading).

5. Does the executive branch have primary responsibility for the **revenue forecast**? (No = more transparent, if it is likely to be misleading or manipulative).

6. Does the budget include **performance measures** and are they published (Yes = more transparent, if these create a more explicit and therefore shareable standards for judging).

   NCOSL Source:

7. Are there **multiple appropriations** bills? (No = more transparent, if a single location facilitates monitoring).

8. Does a **non-partisan staff** write Appropriations bills? (Yes = more transparent, again implying less incentive to manipulate).

9. Can the legislature pass **open-ended appropriations**? (No = more transparent, if this means that published figures are closer to ultimate outturns).

The extent to which these questions are indeed related to budgetary transparency is open to debate, and although a deeper discussion goes beyond the scope of this work, I will return to this point later on to address it, albeit superficially. Regrettably, ALS fail to provide transparency in their own analysis by omitting scores according to State of each of their key questions numbered above, nor do they report the level of the index. In addition, they do not explain how they combined the data from the NASBO surveys given that various states report different practices in 1995 and 1999, and they wrap up by stating that, unfortunately "no historical time-series is available".

In this chapter I provide a dynamical measure of fiscal transparency, similar to the one given by ALS but extended through time. The NCOSL survey does not

help in this regard given that it only exists for 1998, but NASBO surveys have been taken roughly every two or three years starting in 1977. As can be seen from the list of questions used by ALS, most of the information contained by the index stems from the NASBO surveys, and this means that even if some relevant information can be lost it's worthwhile to analyze the evolution of fiscal transparency approximated by the sub-set of characteristics monitored by the NASBO surveys of 1977, 1981, 1987, 1989, 1992, 1995, 1997, 1999, and 2002. Not surprisingly, the NASBO survey itself has also changed through the years. The six characteristics of interest are consistently reported without interruption starting with the 1987 survey, which is why the first two surveys will be ignored herein.[1] Table 4.1 shows the value of the index per state and per survey. The index ranges from a maximum value of 6 and a minimum value of zero.

Three things become readily apparent. First, the high variability of the index among States is clear, in accordance with the results obtained by ALS, even if we are focused on a subset of the original ALS index conditions. Second, while the index value seems to be highly persistent, it does show time variability which is not necessarily trending upwards, that is, reflecting more transparent institutions. Finally, it would appear that, starting in the late eighties and all the way through the mid nineties, American states adopted less transparent budgetary practices. This trend is reversed at the end of the nineties and continues all the way through 2002.

[1]The information relevant to binding is only available starting in 1992. However, there is data starting in 1989 about who checks these estimates. Thus, binding is set equal to 1 in 1989 given it was reported as equal to 1 in 1992. Likewise, the 1987 value is taken from the 1989 value.

Table 4.1: Transparency Score for the American States 1987-2002.

	1987	1989	1992	1995	1997	1999	2002
Alabama	2	4	4	4	4	3	3
Alaska	0	2	3	3	3	3	3
Arizona	3	2	4	2	2	2	2
Arkansas	4	4	3	3	3	3	3
California	3	4	3	3	3	3	2
Colorado	5	4	3	3	3	4	4
Connecticut	5	5	4	4	4	3	3
Delaware	3	4	3	5	5	5	5
Florida	5	2	2	2	3	3	3
Georgia	4	4	4	4	4	5	5
Hawaii	3	2	3	3	3	3	3
Idaho	2	3	4	4	3	3	4
Illinois	4	3	3	3	3	3	4
Indiana	1	2	0	0	1	2	2
Iowa	3	4	4	5	5	5	5
Kansas	4	3	3	2	2	2	2
Kentucky	1	1	2	2	2	3	3
Louisiana	4	3	3	4	4	4	4
Maine	3	2	3	3	4	3	3
Maryland	2	3	3	3	3	3	3
Massachusetts	3	2	2	5	5	5	5
Michigan	6	6	6	6	6	6	6
Minnesota	4	3	3	3	3	3	3
Mississippi	2	1	3	4	5	5	5
Missouri	3	3	3	2	2	2	2
Montana	2	4	2	2	2	2	2
Nebraska	2	2	2	2	3	3	3
Nevada	3	4	3	2	2	3	3
New Hampshire	5	2	3	3	3	3	3
New Jersey	5	5	5	5	5	5	5
New Mexico	3	2	1	1	1	2	3
New York	5	6	4	4	4	4	4
North Carolina	2	4	4	4	4	4	4
North Dakota	2	2	3	2	2	1	1
Ohio	2	1	0	1	3	3	2
Oklahoma	3	4	3	3	3	3	4
Oregon	2	4	3	3	3	3	3
Pennsylvania	4	4	4	5	5	5	5
Rhode Island	5	6	5	5	5	5	5
South Carolina	1	2	2	2	2	2	2
South Dakota	3	3	4	4	4	5	5
Tennessee	3	2	2	2	2	2	3
Texas	3	4	2	2	2	2	2
Utah	4	5	4	5	5	5	6
Vermont	2	2	3	3	3	3	3
Virginia	3	2	2	2	3	3	2
Washington	2	2	2	2	3	3	3
West Virginia	5	2	2	3	3	4	4
Wisconsin	2	1	0	0	2	2	3
Wyoming	1	2	1	2	2	2	2
Minimum	0	1	0	0	1	1	1
Maximum	6	6	6	6	6	6	6
Average	3.06	3.06	2.88	3.02	3.22	3.30	3.38
Standard Deviation	1.33	1.33	1.22	1.33	1.17	1.15	1.19
Total	153	153	144	151	161	165	169

Table 4.2: Transparency Score by Question.

	1987	1989	1992	1995	1997	1999	2002
GAAP	18	13	14	18	19	18	20
Forecast	24	28	25	26	26	30	32
Frequency	28	32	30	27	27	27	27
Binding	23	23	26	27	29	30	30
Responsibility	30	21	14	14	15	15	16
Performance	30	36	35	39	45	44	44
Total	153	153	144	151	161	164	169

This u-shaped effect can essentially be explained by two factors that are apparent in table 4.2. In the first place, the elevated score of the budget reflecting GAAP practices in 1987 suggests an error during that year given the high cost incurred in changing from one accounting system to another. It's also possible this could be due to a re-definition of the meaning of the GAAP, but there's no way to test this possibility. The main factor, however, is that a total of 16 states seem to have suffered a strong reversal, from 1987 to 1989 and 1989 to 1992, of the legislature involvement in the elaboration and revision of state income estimates. With the exception of these two episodes, it can be argued that American states have, in general, moved towards greater transparency.

Before analyzing the effect of budgetary transparency, measured by the temporal index presented above, it is vital to discern how much of the variability reported by ALS is contained by the subset of 6 key points used to construct the temporal index. Table 4.3 reports the results obtained from making this comparison. The table is divided into four quadrants, one for each dependent variable. The first column of each quadrant corresponds to the ALS results, the second column lists the results

obtained by replicating exactly the ALS procedure, and the third column shows the results obtained by re-defining or approximating fiscal transparency using only the six questions for which answers are available as a function of time. Data sources are: Several issues of the Statistical Abstract of the United States, for economic and population variables; Berry et al (1998), for the Ideology Index; and Poterba and Rueben (1999) for Revenue Limitations.

Comparing columns (1) and (2) of the three nominal variable quadrants, we see that there is a very close match between the original ALS and the ones replicated here, with almost identical levels in terms of the explained variability. Perhaps the only worthy observation is that in every instance, the ALS point estimate is higher than the value obtained in the replica. The apparent irrelevance of Revenue Limitation on the original ALS equation for Nominal Total Spending is perplexing, although it could simply be a typo. Likewise, the unemployment level across states is not significant in any of the ALS estimates, but it does on my replica for the Nominal per capita Total Spending and Total Revenues. Finally, the level of significance is seen to be slightly less in the replicas of both Nominal per Capita Spending and Nominal per Capita General Revenue. The fourth quadrant, which contains the Real per Capita Total Spending as a dependent variable shows essentially the same qualitative results—with the exception of unemployment, which is significant in the replica exercises—but the ALS point estimates are smaller than the ones obtained in the replicas. This is very likely due to a difference in the base year used, where ALS probably chose a base year earlier than 1996, which is the base I chose.

Comparing columns (2) and (3) of every quadrant shows that the coefficient

Table 4.3: Index Comparison vs. ALS.

	Nominal pc General Spending			Nominal pc Total Spending		
	ALS (9)	Replica (9)	Replica (6)	ALS (9)	Replica (9)	Replica (6)
Transparency	76.43	62.61	57.76	97.26	77.47	65.72
	(31.49)**	(27.44)**	(32.45)*	(35.11)***	(29.32)**	(35.62)*
Real pc Income	-0.01	0.01	0.05	0.004	0.16	0.22
	(0.03)	(0.10)	(0.10)	(0.03)	(0.16)	(0.16)
Unemployment	12.55	38.74	38.69	54.85	96.15	96.85
	(37.58)	(34.51)	(37.06)	(43.25)	(39.75)**	(43.09)**
Ideology Index	10.86	9.52	8.90	13.74	10.89	10.09
	(2.37)***	(2.29)***	(2.47)***	(2.92)***	(2.56)***	(2.85)***
South	-499.22	-441.63	-436.11	-608.02	-540.82	-533.65
	(105.80)***	(95.64)***	(94.23)***	(123.4)***	(110.26)***	(109.42)***
Revenue Limitation	-98.16	-215.40	-215.76	0.31	-313.28	-312.33
	(139.20)	(141.11)	(135.91)	(152.00)	(154.27)**	(152.51)**
Constant	1915.08	1291.11	1338.46	1493.45	808.54	865.34
	(427.90)***	(342.98)***	(346.32)***	(357.30)***	(417.01)*	(432.86)*
R^2	0.49	0.47	0.44	0.56	0.55	0.51
	Nominal pc General Revenue			Real pc Total Spending		
	ALS (9)	Replica (9)	Replica (6)	ALS (9)	Replica (9)	Replica (6)
Transparency	78.80	67.15	56.35	51.55	91.02	77.38
	(38.70)**	(33.91)*	(38.33)	(23.67)**	(33.71)***	(42.11)*
Real pc Income	-0.02	-.01	0.03	-0.01	0.17	0.26
	(0.03)	(0.1)	(0.15)	(0.02)	(0.18)	(0.18)
Unemployment	23.92	39.99	40.67	-1.90	108.60	118.40
	(40.13)	(37.32)	(41.32)	(25.31)	(45.95)**	(48.85)**
Ideology Index	10.92	9.71	9.01	6.38	12.43	11.60
	(2.39)***	(2.52)***	(2.75)***	(1.68)***	(2.97)***	(3.26)***
South	-509.85	-459.61	-453.35	-304.77	-626.96	-625.94
	(110.70)***	(104.10)***	(101.52)***	(75.34)***	(127.47)***	(127.46)***
Revenue Limitation	-278.87	-259.76	-258.79	-87.41	-342.47	-362.72
	(161.3)*	(132.42)*	(125.94)**	(87.30)	(169.06)**	(175.81)**
Constant	1892.74	1363.70	1412.75	1356.07	958.90	905.67
	(452.8)***	(354.03)***	(355.63)***	(283.90)***	(484.12)*	(514.97)*
R^2	0.45	0.43	0.39	0.43	0.55	0.51

Robust standard errors in parenthesis.*** significant at 1%, ** significant at 5% and,
* significant at 10%.

associated to the transparency index decreases. This indicates that the set of 3 questions from the NCOSL source that were eliminated from the analysis are more strongly correlated positively than the six questions used to obtain the new index. To make this precise, a 10% increase from their average value represents, all else being equal, an increase in $28.17 (0.45 X 62.61) dollars of General Spending per capita using the Replica (9), while using Replica (6) the increment would only be of $17.32 (0.3 X 57.76). The level of significance also decreases in all 4 cases, which means that in the case of General Revenue, the transparency sub-index isn't statistically different from zero, within standard levels of confidence.

This exercise gives us confidence that as far as Spending goes, the relationship found by ALS is preserved by the sub-index, albeit somewhat weakly. Now, the cross sectional exercises mentioned have used averages of the period spanning 1986 to 1995 on both sides of the equation, with the exception of the transparency indices that make use of 1995 and 1999 data. It is from these that ALS concluded greater transparency allows for larger government size, all else remaining equal. However, these results are inevitably biased. To see why, consider Delaware and Florida from table 4.1. During 1995, Delaware is far more transparent than Florida, and remains so since 1989. However, Florida happens to be more transparent than Delaware during 1987, and if indeed a positive correlation exists between transparency and government size, the inclusion of 1986 and 1987 data play against this hypothesis if we assume the effect of transparency becomes manifest during the same year. It is also possible the relationship found by ALS is an artifact of temporal aggregation, but this is impossible to detect without temporal data like that of table 4.1.

The following exercise aims to establish the veracity of this relationship among American states, using as a measure of transparency, the index formed by the subset of six budgetary characteristics recorded across time. The exercise will focus on the span from 1985 to 2002. The data for every variable is annual, excepting some of the data of the transparency index that had irregular periodicity. The assumption is that budgetary practices change the year after they are reported, and 1985 was chosen as the initial year. In this case then, 1985 and 1986 share the same index as 1987, which is a year for which we have reported data; the 1988 index is the same as the 1989 index; 1990 and 1991 have the same values as 1992, and so forth.

Table 4.4 shows the results obtained from the longitudinal analysis, again split into four quadrants. The first column of each quadrant shows the results obtained from pooled OLS, and the second column the results obtained from fixed effects. Every regression is controlled by time effects, but I have omitted these coefficients for reasons of space.

By focusing on the pooled OLS columns, we see that the inclusion of the temporal dimension for the 1985-2002 period raises the levels of relevance on the side of Spending, but remains insignificant to Revenues. In every case, the coefficient associated with the transparency index suffers an important reduction in its economic importance, down to a third of the previous estimate. This confirms the suspicion of bias in the cross sectional estimates, due to the aggregation of information that fails to take into account the evolution of transparency. This problem can be ameliorated by the inclusion of the dependent variable lagged to the beginning of the time period under consideration, such as the one used in the previous chapter of

this thesis.

As far as the control variables are concerned, the real per capita income becomes extremely significant and has the expected sign in every case. Unemployment didn't play a role in the cross-sectional analysis. On the contrary, it's a highly relevant variable in all panel treatments. It's to be expected that this variable represents a greater per capita expenditure due to a wider unemployment insurance and social security coverage, as can be seen in every regression. However, it's thus also expected that a higher level of unemployment couples to a lower level of per capita revenues given a smaller taxable base but, as can be seen, all regressions show a positive and significant relation between unemployment and per capita revenues. A possible (though admittedly speculative) explanation, is that the level of unemployment is endogenous to the level of per capita income. For example, states with a high (low) level of per capita income would be net importers (exporters) of unemployed citizens, which in turn leads to greater rates of unemployment in more prosperous states. Regardless, this coefficient remains troubling and deserves closer scrutiny in the near future. The ideology index, computed by Berry et al (1998), increases as the share of democrats in the state government rises. In other words, the ideology index increases proportionately to the rate in which the government swings to the left. A positive coefficient associated with this variable means that left-leaning governments tend to spend (and collect) more than right-leaning ones. It can be seen that the importance of the ideology index is reduced by half which means that this effect is being over-estimated while performing the cross-sectional estimates reported on table 4.3. Lastly, the proportion of the explained variation is

notably increased.

However, it can also be seen that the aggregation of information isn't the only source of bias, given that the null hypothesis on the non-existence of fixed effects can never be rejected. The presence of these state fixed effects, observable and unobservable, that translate into different per capita levels of revenues and spending in each state, will be a problem with respect to transparency if they are correlated with it. In this case, transparency becomes endogenous to those effects and, therefore, we cannot asses the true influence of transparency on government spending and revenues. We can think of (a non exhaustive) list of state fixed effects potentially correlated with transparency: First, *the geographical size of the state*; presumably, the smaller the state, it will be easier, not only to corroborate in what is the government spending, but also to realize what are the true needs of the state, what is the real level of under provision of public goods. As distance increases, the effect of transparency becomes weaker. Second, *population density*; if more densely populated areas makes it more likely for the average citizen to vote, and thus get her preferences represented in the spending share. In this sense, the effect of transparency should be enhanced as population density increases. Third, *income inequality*; greater inequality will make it more difficult for voters to agree on what the money should be spent, thus making the transparency effect, other things equal, less important. Fourth, *the level of under provision of public goods*; this is just what lays underneath the more-transparency-more-revenue hypothesis. If there is no under provision, then transparency is not expected to render higher levels of government revenues or spending. Fifth, *the degree of government centralization*;

even when this variable is itself endogenous, and possibly even to transparency, it can be treated as fixed in the short term. More centralization would imply a lower probability of being represented, so other things equal, lowering the transparency effect.

Arguably, some of these variables could be collected, but others, like the level of under provision of public goods, would be very difficult to gather, at least free of measurement problems. Is for this reason that a FE estimator it is preferred, since it will wipe out the source of this kind of endogeneity. The fact that not only the presence of state fixed effects cannot be rejected, but that the estimated parameter for transparency under OLS and FE are so different indicate us that the endogeneity problem by using OLS is not negligible. Moreover, Another issue that is relevant in panel data is the problem of scale anchoring. Each State in every survey had a different Budget Officer providing the information. Using OLS implies that all Budget Officers used the same scale to provide the answers across states and in every moment in time. FE, by the contrary only assumes that that the scale has to be time-invariant in each state, but allows for variability of the scale across states, so even when it is not a panacea, it does reduces in one dimension the scaling problem.

Concerning General Spending and Total Spending, we see that the impact of fiscal transparency over these variables is overestimated as a result of not controlling for fixed effects, since their estimated coefficients by FE drop 27 and 33%, respectively. It's interesting to note that the ideology index ceases to be relevant to General Spending, and flips sign in the case of Total Spending, becoming marginally relevant even though it's economic impact is essentially null. This result truly puts

to the test the popular notion that Republican states are more fiscally conservative.

Concerning Revenues, not controlling by fixed effects has a more dramatic effect. The transparency index turns out to be irrelevant if estimated by pooled OLS, but gain statistical significance once fixed effects are taken into account, reaching levels that are comparable to those obtained for Spending with a very similar economic impact.

The cost of using the FE estimator is manifest in the loss of relevance of the Revenue Limitations variable. By its nature this variable changes at most once per state over the entire sample. Hence, it is a variable that is highly collinear to the fixed effect of each state. In other words, Revenue Limitations has become part of said fixed effect.

4.3 Index Robustness

4.3.1 Different Specifications

The set of questions chosen by ALS to construct the transparency index for the American states is curious when contrasted with the classification given by Alt and Lassen presented in the previous chapter. In particular, questions 4, 5, 8, and 9 seem to be only tangentially relevant to transparency. Moreover, in the series of surveys conducted by NASBO, there are three characteristics of the budgetary process that seem to be more related to fiscal transparency but that were left out by ALS. These are:

1. Are the agency requests contained in the Executive Budget? (Yes = more

transparent, since it provides a more informative budget document and a clearer understanding of the agencies needs).

2. Does the budget document contain justifications of numerical data? (Yes = more transparent, since it facilitates the analysis of the numbers).

3. Are interim expenditure monitoring reports issued? (Yes = more transparent, since it should be easier to detect misuse of funds).

Out of the three, a complete record from 1987 to 2002 only exists for the first two. Using this pair, two additional indices are proposed to evaluate the robustness of the results presented so far. The first proposal, Transparency 2, simply adds these two categories to the previous index, i.e.

Transparency2 = Transparency + agency requests + justifications

The second alternative, Transparency3 ignores questions 4 and 5 from the original index because they are not directly related to transparency, and adds the two new categories proposed in this section:

Transparency3 = Transparency2 - binding - revenue forecast.

The results of using transparency2 and Transparency3 as measures of fiscal transparency are presented in tables 4.5 and 4.6, respectively. In general, we see that the positive relation between transparency and government size is maintained although it becomes clearer when government size is determined based on Spending rather than Revenues. The point estimate of transparency is highly sensitive to which questions are included if it is obtained by OLS, even though these indices are, necessarily, highly correlated. By the contrary, the effect estimated using FE

is more stable. Using Transparency3 increases the confidence levels for estimates of General and Total Spending, but at the same time, the transparency effect on Total Revenue effect becomes undistinguishable different from zero at conventional levels of confidence. This asymmetry in the effect of transparency between revenue and expense becomes more relevant when we take into account the theoretical basis for the positive relation between transparency and government size stems from the side of revenues, as was mentioned briefly in the introduction of this chapter. None the less, the effect remain present in General Revenues, where it should be more readily apparent since transfers from the Federal Government to the states, which are part of the Total but not the General Revenue, can dampen the estimated effect.

4.3.2 Is there a Real Effect of Transparency?

The last quadrant of table 4.3 presents the results in terms of real Total Spending. Given that fiscal transparency is significant, ALS conclude "the effect of transparency does not depend on whether general or total figures are used, or nominal and constant-price. In short, this result is not the artefact of a particular choice of concept for size of government." In fact, it's no surprise they obtained the same qualitative results with real than with nominal variables because the correlation between real and nominal averages is equal to 1. The situation is obviously different when the temporal dimension is taken into account. All nominal measures of government size, even expressed in per capita terms, have been trending upwards in every state. As mentioned above, although there is great heterogeneity on the evolu-

tion of transparency across states, taken as a whole they have a u-shaped temporal evolution, which has been growing steadily since 1990. It is thus possible that the relation between transparency and government size could be due to a third factor responsible for both, though it is hard to guess what that factor might be. A form to lessen this problem is by subtracting from the dependent variables the part of the growth that corresponds to the change in the price level. As shown below in table 4.7, it's not so clear that fiscal transparency has an effect on government size when the size is measured in real terms. Each quadrant of table 4.7 is divided into three rows, one for every measure of transparency discussed above; the values of control variables are omitted given that they are not qualitatively altered.

The original transparency index (Transparency) loses its explanatory power on real variables. In turn, the alternative transparency measures yield a split diagnostic. On the one hand, they retain their significance to account for Real Spending, which could be interpreted as a natural consequence of these indices given that they ignore questions that are only tangentially related to transparency. On the other hand, these alternative measures of transparency seem to be unrelated to Real Revenues. This asymmetry in the measures of transparency should be addressed in the future.

4.4 Historical vs. Retrospective measures of Fiscal Transparency: Common Ground

In this section, I compare the measure of transparency of the American states, for the period 1985-2002, presented in the previous section, with a new index ob-

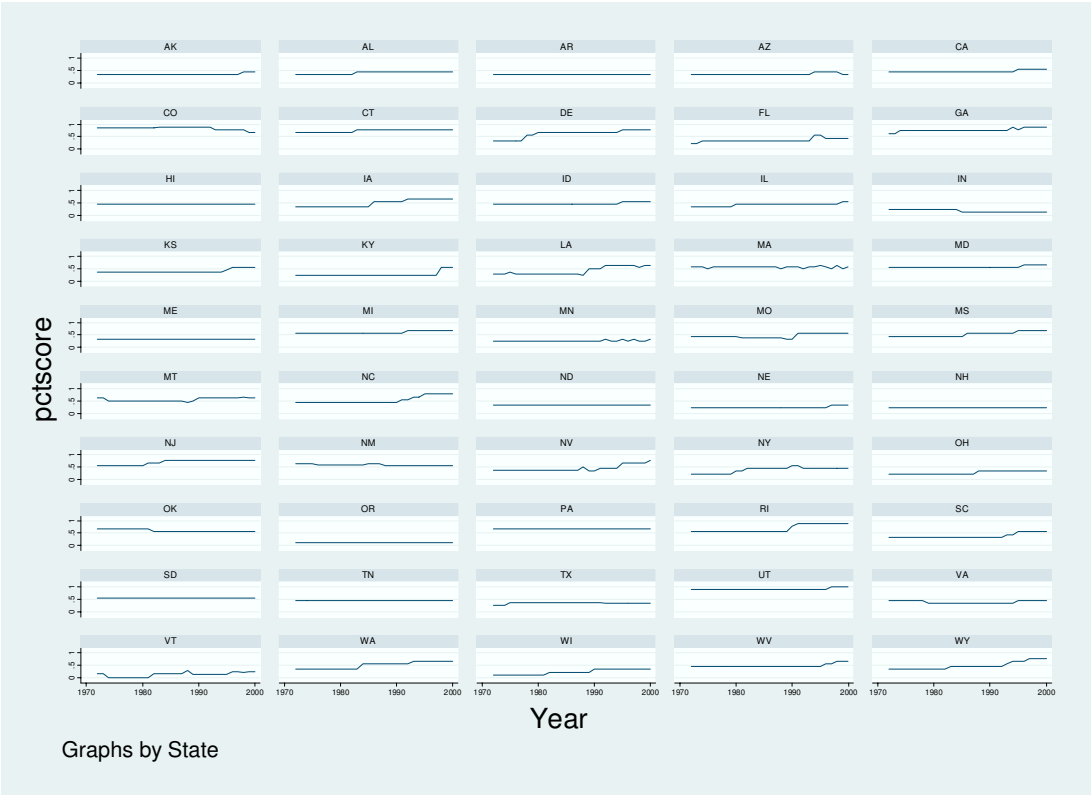
tained by Alt, Lassen and Rose (ALR) (2006) that corresponds to the period 1972-2002. As explained by the authors, the ALR index is the temporal extension to the index obtained by ALS. To do so, they "have collected a *unique* data set, comprised of survey responses to a questionnaire sent to budget officers of all fifty states, to conduct an annual score for each year between 1972 and 2002".[2] In light of the results presented earlier, it's clear this data set is not as unique as these authors presume. There are differences in the methods used to obtain the ALR index and the index I calculated in the previous section. However, if we focus only on data starting from 1985, and restrict ourselves exclusively to data from the NASBO surveys, both indices should be identical assuming no errors in the data.

Every state's budget officer is responsible for providing information for the ALR questionnaire. The budget officer is also responsible for providing information to NASBO publications. A weakness in the ALR survey is that the burden of providing information for the entire 30 year span of 1972-2002 lies on the budget officer in charge during the 2005/2006 period. This requires extreme good will on the part of the current budget officer. On the other hand, the NASBO data sets are a collection of information provided by every budget officer that has held the charge as part of their normal duties. I am not inclined to say which of the two data sets is less prone to error, but as we will see below, there are notable differences between the two.

Unfortunately, ALR do not report the exact value of their index by state nor as a function of time as I do in table 4.1. However, one may infer these values from

[2]Emphasis added

Figure 4.1: Fiscal Transparency in American States, 1972-2002, according to Alt, Lassen and Rose (2006).



their graphical representation in figure 4.1. with only a small margin of error.

The Differences:

1. ALR report nine states that suffer no change whatsoever in their transparency index during the period 1972-2002: Arkansas, Hawaii, Maine, North Dakota, New Hampshire, Oregon, Pennsylvania, South Dakota and Tennessee. There are 5 other states that have remained equally transparent since 1987: Alabama, Connecticut, Indiana, New Jersey and Oklahoma. Using my index, which is based on only the six characteristics surveyed by the NASBO, I find the only

two states that have maintained transparency are New Jersey and Michigan, which gives us only one state in common between both methods. In order to conciliate the rest, it would be necessary to assume that changes took place in the three items I am not considering; that these changes had taken place at exactly the same years, and in such a way that they were of equal magnitude and opposite sign to the sum of the six remaining items, a highly unlikely scenario. Moreover, the index computed and plotted by ALR shows the sum of answers in favor of transparency, divided by the maximum possible number of affirmative answers for every state in a given year. In those instances where information became unavailable to ALR, both the numerator and the denominator were affected, which means changes in their index values could be the result of information variability, rather than actual changes in the budgetary process. This is far from a slight problem considering that the index obtained by ALR was lacking complete information in 15.3% of their data points.

2. According to ALR there are four episodes during which the level of budgetary transparency underwent dramatic changes, which they define as periods of up to five years during which the index grew in at least 3 items: Delaware (1978-1980), North Carolina (1991-1995), Rhode Island (1990-1991) and Wyoming (1993-1997), which can be seen in figure 4.1. With this information in hand, ALR set about the task of establishing what were the important Political and economical conditions in every state that might account for such abrupt

changes. Regrettably, the documentation on budgetary transparency is insufficient given that only one of the three items is reported in each case. Of those items for which changes are documented, the one relevant to Delaware cannot be contrasted with the NASBO source because it lies outside the period spanned by the data set. About the three remaining cases, ALR report that North Carolina introduced performance measures in the 1991 budget, and similar measures were introduced in Wyoming in 1995. The NASBO publications report the inclusion of performance measures in the budget in both states as far back as 1989, which once again serves to underscore the patent differences between the data sets.[3] On the flip side, using the ALR methodology with the data on table 4.1 I find several episodes of dramatic change that are not represented in ALR: Florida during1987-1989 (3 point decrease), Massachusetts 1992-1995 (3 point increase), Mississippi 1989-1995 (3 point increase over 6 years), New Hampshire 1987-1989 (3 point decrease) and West Virginia (3 point decrease).

3. Regarding the levels of the index, and given the strong persistence this measure implies, it's easy to compare the level of transparency among states in 2002. The correlation between both indices is 0.53 (this is an approximation, given that I don't have the exact value of the ALR sample). While this number is positive, it is still somewhat low when compared to the values corresponding

[3]The case documented for Rhode Island is the introduction of *binding consensus revenue forecasting* that, as explained earlier, NASBO began reporting from 1992, time at which Rhode Island has already had incorporated this feature.

to 1995 that were used in the exercise presented in table 4.3, the values for Replica (9) versus Replica (6). For that year, the correlation value was 0.71, which means that something more than the difference between the three items must be at play here. While there are similarities (Utah is the state with the highest score in both cases) there are also great differences, such as Wyoming which has one of the lowest scores in my sample while having one of the highest scores in ALR's. Remarkably, this difference is apparently of 5 points in absolute values, in spite of the fact the largest discrepancy should not exceed 3 points.

We have seen the difference between the two data sets is significant. The question of how the results presented in the previous section would be affected by using the ALR set will necessarily remain unanswered. Unfortunately the authors limited themselves to finding what are the determinants of their own measure of Fiscal transparency, and fail to report what are the effects of fiscal transparency on fiscal outcomes, which would have given a natural extension to ALS (2003). Once again, the option is to look at the flip side and analyze how the ALR results on the determinants of fiscal transparency may be altered using the index presented in this chapter. However, this lies beyond the scope of this thesis, and will remain something to be looked at in the future.

4.5 What is the connection between the results of Chapter 3 and Chapter 4?

As mentioned above, the hypothesis that greater government size can be associated with greater transparency depends on two assumptions: under-provision of public goods and a direct benefit resulting from government spending. In fact, low transparency ought to be the cause of sub-optimal levels of public goods, because voters are unaware of what the money will be spent on. As transparency increases, voters will be willing to yield greater resources if they know the money will be spent in areas where they agree the level of public goods is sub-optimal. This agreement implies a direct benefit of public goods. The extra dollar of spending is more likely to bring direct benefits the smaller is the government jurisdiction. In this sense, it's likely an increase in transparency at a national level won't necessarily lead to an increase in government size because the benefits are diluted among the entire population.

On the other hand, the hypothesis of the impact of transparency at a local level has no relevance to deficit, which is expected to be null or perhaps even negative. The results of chapter 3 are much more about public debt and deficit than they are about government size (although a few results in that regard are obtained through levels of expenditure). Table 4.8 shows the results obtained from the model making use of total deficit and general deficit as the measures of fiscal outcomes. It can be seen from the table that no relation exists between deficit and any of the three representations of transparency presented above. A positive relation with total

deficit is obtained only when the model is estimated using OLS that, once again, gives sense of the bias that results when the fixed effects of each state are not taken into account.

4.6 Concluding Remarks

In this chapter, I generally corroborate the result reported by Alt, Lassen and Skilling (2003) that greater fiscal transparency among the American states is associated with greater levels of government spending. However, this effect seems to be less robust and economically relevant than these authors claim. On the one hand, there exists fixed effects that can't be adequately controlled for in a cross-sectional setting. When these fixed effects are properly taken into account, the economic effect of fiscal transparency on government size is reduced to approximately a third of the ALS prediction. On the other hand, transparency seems to have asymmetric effects on expense and revenue, and this effect is more notable on the former, rather than the latter. This is striking given that the theoretical foundation of the result stems from the revenue side. This asymmetry multiplies when the effect is measured over real variables, casting further doubt on the true importance of fiscal transparency on the size of government.

Table 4.4: Fiscal Transparency and Budgetary Outcomes 1985-2002.

	Nominal pc General Spending		Nominal pc Total Spending	
	OLS	FE	OLS	FE
Transparency	23.74	17.28	28.44	18.95
	(11.33)**	(7.15)**	(12.82)**	(8.06)**
Real pc Income	0.13	0.52	0.28	0.61
	(0.05)***	(0.10)***	(0.05)***	(0.11)***
Unemployment	53.20	33.75	98.19	57.76
	(9.40)***	(5.41)***	(11.11)***	(6.08)***
Ideology Index	4.73	-0.02	5.00	-.63
	(0.65)***	(0.34)	(0.74)***	(0.38)*
South	-414.76	—	-488.49	—
	(28.12)***	—	(33.14)***	—
Revenue Limitation	-63.92	3.65	-30.76	12.03
	(33.26)**	(29.20)	(39.45)	(32.86)
Constant	786.63	167.34	331.33	6.70
	(130.62)***	(202.10)	(154.30)**	(227.49)
R^2	0.75	0.96	0.76	0.96
F for $u_i = 0$, *Prob* $>$ *F*=	—	0.000	—	0.000
	Nominal pc General Revenue		Nominal pc Total Revenue	
	OLS	FE	OLS	FE
Transparency	18.80	15.64	6.39	20.54
	(13.40)	(7.24)**	(15.63)	(10.45)**
Real pc Income	0.16	0.52	0.29	0.73
	(0.06)***	(0.01)***	(0.06)***	(0.14)***
Unemployment	50.08	17.46	91.24	28.30
	(10.54)***	(5.47)***	(12.80)***	(7.89)***
Ideology Index	4.87	-0.07	4.75	-1.00
	(0.76)***	(0.34)	(0.89)***	(0.50)**
South	-444.38	—	-577.60	—
	(31.21)***	—	(37.39)***	—
Revenue Limitation	-106.67	-6.65	-88.18	-8.46
	(36.14)***	(29.53)	(43.31)**	(42.63)
Constant	843.03	371.08	754.85	206.92
	(143.82)***	(204.42)	(166.28)***	(295.09)
R^2	0.71	0.96	0.75	0.95
F for $u_i = 0$, *Prob* $>$ *F*=	—	0.000	—	0.000

Robust standard errors in parenthesis.*** significant at 1%, ** significant at 5% and, * significant at 10%.

Table 4.5: Fiscal Transparency2 and Budgetary Outcomes 1985-2002.

	Nominal pc General Spending		Nominal pc Total Spending	
	OLS	FE	OLS	FE
Transparency2	23.17	16.97	26.42	20.16
	(8.90)***	(5.95)***	(9.98)***	(6.70)**
Real pc Income	0.14	0.51	0.30	0061
	(0.049)***	(0.10)***	(0.06)***	(0.11)***
Unemployment	53.82	34.15	98.96	58.32
	(9.37)***	(5.40)***	(11.11)***	(6.08)***
Ideology Index	4.69	-0.04	4.95	-0.66
	(0.65)***	(0.34)	().73)***	(0.38)*
South	-412.60	—	-485.93	—
	(28.51)***	—	(33.48)***	—
Revenue Limitation	-62.81	3.38	-29.30	12.68
	(33.47)*	(29.04)	(39.73)	(32.66)
Constant	731.70	146.21	269.38	-21.91
	(136.03)***	(202.21)	(160.86)*	(227.40)
R^2	0.75	0.96	0.76	0.96
F for $u_i = 0$, *Prob* $>$ *F*=	—	0.000	—	0.000
	Nominal pc General Revenue		Nominal pc Total Revenue	
	OLS	FE	OLS	FE
Transparency2	24.89	14.51	18.58	20.20
	(10.63)**	(6.03)**	(12.30)	(8.70)**
Real pc Income	0.16	0.52	0.28	0.73
	(0.05)***	(0.10)***	(0.06)***	(0.14)***
Unemployment	50.41	17.76	91.12	28.79
	(10.48)***	(5.47)***	(12.81)***	(7.89)***
Ideology Index	4.85	-0.09	4.76	-1.04
	(0.74)***	(0.34)	(0.88)***	(0.50)**
South	-442.52	—	-576.74	—
	(31.70)***	—	(37.89)***	—
Revenue Limitation	-106.47	-7.42	-89.17	-8.76
	(36.36)***	(29.40)	(43.67)**	(42.43)
Constant	780.59	354.94	704.33	181.68
	(149.58)***	(204.71)	(173.86)***	(295.41)
R^2	0.71	0.85	0.75	0.95
F for $u_i = 0$, *Prob* $>$ *F*=	—	0.000	—	0.000

Robust standard errors in parenthesis.*** significant at 1%, ** significant at 5% and, * significant at 10%.

Table 4.6: Fiscal Transparency3 and Budgetary Outcomes 1985-2002.

	Nominal pc General Spending		Nominal pc Total Spending	
	OLS	FE	OLS	FE
Transparency3	30.54	19.57	31.59	24.75
	(11.72)***	(7.01)***	(13.19)**	(7.87)***
Real pc Income	0.16	0.52	0.32	0.61
	(0.05)***	(0.10)***	(0.06)***	(0.11)***
Unemployment	52.40	34.06	97.56	58.31
	(9.46)***	(5.40)**	(11.15)***	(6.07)***
Ideology Index	4.76	0.04	5.02	-0.55
	(0.64)***	(0.34)	(0.73)**	(0.38)
South	-407.19	—	-480.40	—
	(28.73)***	—	(33.57)***	—
Revenue Limitation	-68.89	-1.87	-35.33	6.83
	(33.64)**	(28.88)	(39.97)	(32.45)
Constant	705.12	139.80	249.01	-34.58
	(138.21)***	(202.55)	(163.10)	(227.59)
R^2	0.75	0.96	0.76	0.96
F for $u_i = 0$, *Prob* $>$ *F*=	—	0.000	—	0.000
	Nominal pc General Revenue		Nominal pc Total Revenue	
	OLS	FE	OLS	FE
Transparency3	34.91	14.33	27.32	15.62
	(13.87)**	(7.10)**	(15.97)*	(10.26)
Real pc Income	0.18	0.52	0.29	0.74
	(0.05)***	(0.10)***	(0.06)***	(0.14)***
Unemployment	48.76	17.54	89.81	28.22
	(10.60)***	(5.47)***	(12.86)***	(7.91)**
Ideology Index	4.93	-0.03	4.83	-0.965
	(0.74)***	(.35)	(0.88)***	(0.50)*
South	-436.31	—	-571.86	—
	(31.91)***	—	(38.16)***	—
Revenue Limitation	-113.59	-12.53	-94.82	-17.00
	(37.03)***	(29.27)	(44.02)**	(42.28)
Constant	745.62	357.57	674.39	199.92
	(152.76)***	(205.28)*	(177.00)***	(296.54)
R^2	0.71	0.96	0.75	0.95
F for $u_i = 0$, *Prob* $>$ *F*=	—	0.000	—	0.000

Robust standard errors in parenthesis.*** significant at 1%, ** significant at 5% and, * significant at 10%.

Table 4.7: Fiscal Transparency and Real Budgetary Outcomes 1985-2002.

	Real pc General Spending		Real pc Total Spending	
	OLS	FE	OLS	FE
Transparency	21.64	7.78	27.15	9.95
	(12.77)*	(7.20)	(14.44)*	(7.89)
Transparency2	22.49	10.52	26.12	13.79
	(9.76)**	(5.99)*	(10.96)**	(6.56)**
Transparency3	31.14	14.36	32.07	19.12
	(12.85)**	(7.04)**	(14.44)**	(7.71)**
	Real pc General Revenue		Real pc Total Revenue	
	OLS	FE	OLS	FE
Transparency	16.52	7.40	3.19	13.44
	(15.17)	(6.96)	(17.58)	(10.08)
Transparency2	24.33	9.05	17.24	14.87
	(11.62)**	(5.80)	(13.41)	(8.38)*
Transparency3	35.78	9.31	27.71	9.23
	(15.22)**	(6.83)	(17.41)	(9.88)

Robust standard errors in parenthesis.*** significant at 1%, ** significant at 5% and, * significant at 10%.

Table 4.8: Fiscal Transparency and Deficits 1985-2002.

Fiscal Transparency and Deficits 1985-2002

	General pc Deficit		Total pc Deficit	
	OLS	FE	OLS	FE
Transparency	4.93	1.64	22.05	-1.59
	(4.41)	(5.30)	(6.71)***	(8.66)
Real pc Income	-0.02	-0.01	0.002	-0.12
	(0.02)	(0.07)	(0.028)	(0.12)
Unemployment	3.12	16.28	6.96	29.46
	(3.03)	(4.01)***	(4.72)	(6.54)***
Ideology Index	-0.14	0.05	0.25	0.37
	(0.25)	(0.25)	(0.40)	(0.41)
South	29.61	—	89.10	—
	(9.84)***	—	(15.30)***	—
Revenue Limitation	42.75	10.31	57.41	20.49
	(11.24)***	(21.64)	(17.33)***	(35.32)
Constant	-56.40	-203.74	-423.51	-200.21
	(50.01)	(149.81)	(71.48)***	(244.47)
R^2	0.12	0.16	0.38	0.50
F for $u_i = 0$, *Prob* $>$ *F*=	—	0.000	—	0.000
	General pc Deficit		Total pc Deficit	
	OLS	FE	OLS	FE
Transparency2	-1.72	2.46	7.84	-0.05
	(3.50)	(4.42)	(5.18)	(7.21)
Transparency3	-4.37	5.24	4.28	9.12
	(4.20)	(5.20)	(6.30)	(8.48)

Robust standard errors in parenthesis.*** significant at 1%, ** significant at 5% and, * significant at 10%.

Chapter 5

Conclusions

In a simple model in which voters can coordinate perfectly to demand results from the policymaker in charge of the government (who typically will enjoy an informational advantage about the true actions taken in the production of public goods), the model shows the best way to curtail his unproductive activities and curb a tendency to incur in greater debt is by reducing the informational advantage directly. That is, by increasing the level of transparency of the whole budgetary process. On the contrary, if voter's strategy is to impose numeric constraints over imperfectly observed fiscal outcomes, these will have the desired effect only if the level of transparency is sufficiently high. When transparency is non-existent, the imposition of a numeric constraint will in fact carry the contrary effect, that is, higher average debt and lower expected welfare.

I use a new survey on budgetary practices, with the broadest country coverage so far, to construct several measures of the different budgetary institutions recognized in the literature: numerical constraints, procedural rules, and transparency.

The results for the whole sample of countries indicate that not all budgetary institutions affect fiscal outcomes in the same manner. In particular, only the level of transparency shows a significant and economically important effect on Central and General Deficits, as well as on General Debt. On the contrary, numerical constraints

and procedural rules fail to show any significant effect on fiscal outcomes. These results, however, are not independent of the country's level of economic development. In particular, the results hold for the richest countries but none of the budgetary institutions enters significantly for less developed economies.

To the question of perfect substitutability between different components of the budgetary process, I provide evidence that the constructed indexes are very sensitive to the information included. This suggests that the results obtained here and elsewhere should be taken as preliminary until we have a better way to define these institutions.

Finally, contrary to what was postulated in the previous chapter, for this sample of countries it does not seem to exist an interaction effect between transparency and numerical constraints.

Lastly, I generally corroborate the result reported by Alt, Lassen and Skilling (2003) that greater fiscal transparency among the American states is associated with greater levels of government spending. However, this effect seems to be less robust and sizable than these authors claim. On the one hand, there exists fixed effects that can't be adequately controlled for in a cross-sectional setting. When these fixed effects are properly taken into account, the economic effect of fiscal transparency on government size is reduced to approximately a third of the ALS estimation. On the other hand, transparency seems to have asymmetric effects on expense and revenue, and this effect is more notable on the former, rather than the latter. This is striking given that the theoretical foundation of the result stems from the revenue side. This asymmetry multiplies when the effect is measured over real variables, casting further

doubt on the true importance of fiscal transparency on the size of government.

Appendix A

Probabilities of Shock on Signal for Different Transparency

Figure A.1: Co-movement of θ and $\tilde{\theta}$ conditional on ϵ.

Full Trasnparency $\varepsilon = 0.0$

		Signal					Pr. of
		0.8	0.9	1.0	1.1	1.2	Shock
Shock	0.8	1.000	0.000	0.000	0.000	0.000	0.200
	0.9	0.000	1.000	0.000	0.000	0.000	0.200
	1.0	0.000	0.000	1.000	0.000	0.000	0.200
	1.1	0.000	0.000	0.000	1.000	0.000	0.200
	1.2	0.000	0.000	0.000	0.000	1.000	0.200
Pr. of seen Signal		0.200	0.200	0.200	0.200	0.200	

High Trasnparency $\varepsilon = 0.1$

		Signal					Pr. of
		0.8	0.9	1.0	1.1	1.2	Shock
Shock	0.8	0.500	0.500	0.000	0.000	0.000	0.200
	0.9	0.333	0.333	0.333	0.000	0.000	0.200
	1.0	0.000	0.333	0.333	0.333	0.000	0.200
	1.1	0.000	0.000	0.333	0.333	0.333	0.200
	1.2	0.000	0.000	0.000	0.500	0.500	0.200
Pr. of seen Signal		0.167	0.233	0.200	0.233	0.167	

Low Transparency $\varepsilon = 0.2$

		Signal					Pr. of
		0.8	0.9	1.0	1.1	1.2	Shock
Shock	0.8	0.333	0.333	0.333	0.000	0.000	0.200
	0.9	0.250	0.250	0.250	0.250	0.000	0.200
	1.0	0.200	0.200	0.200	0.200	0.200	0.200
	1.1	0.000	0.250	0.250	0.250	0.250	0.200
	1.2	0.000	0.000	0.333	0.333	0.333	0.200
Pr. of seen Signal		0.157	0.207	0.273	0.207	0.157	

High Opacity $\varepsilon = 0.3$

		Signal					Pr. of
		0.8	0.9	1.0	1.1	1.2	Shock
Shock	0.8	0.250	0.250	0.250	0.250	0.000	0.200
	0.9	0.200	0.200	0.200	0.200	0.200	0.200
	1.0	0.200	0.200	0.200	0.200	0.200	0.200
	1.1	0.200	0.200	0.200	0.200	0.200	0.200
	1.2	0.000	0.250	0.250	0.250	0.250	0.200
Pr. of seen Signal		0.170	0.220	0.220	0.220	0.170	

Full Opacity $\varepsilon = 0.4$

		Signal					Pr. of
		0.8	0.9	1.0	1.1	1.2	Shock
Shock	0.8	0.200	0.200	0.200	0.200	0.200	0.200
	0.9	0.200	0.200	0.200	0.200	0.200	0.200
	1.0	0.200	0.200	0.200	0.200	0.200	0.200
	1.1	0.200	0.200	0.200	0.200	0.200	0.200
	1.2	0.200	0.200	0.200	0.200	0.200	0.200
Pr. of seen Signal		0.200	0.200	0.200	0.200	0.200	

Appendix B

Index Substitutability for Numerical and Procedural Rules

Table B.1: Different Numerical Constraint Indexes on Gross Debt.

Number of Questions	2	3	4	5	6	7	8	9	10	11
Combinations	55	165	330	462	462	330	165	55	11	1
% cases (-) sig.	00	00	00	00	00	00	00	00	00	00
% cases (+)	91	98	100	100	100	100	100	100	100	100
% cases (+) sig.	9	4	6	6	5	3	2	00	00	00

Table B.2: Different Hierarchical Indexes on Gross Debt.

Number of Questions	2	3	4	5	6	7	8	9	10
Combinations	45	120	210	252	210	120	45	10	1
% cases (-) sig.	0	2	2	1	0	0	0	0	0
% cases (+)	64	62	67	67	71	76	81	100	100
% cases (+) sig.	5	3	1	0	0	0	0	0	0

Table B.3: Different Numerical Constraint Indexes on General Balance.

Number of Questions	2	3	4	5	6	7	8	9	10	11
Combinations	55	165	330	462	462	330	165	55	11	1
% cases (+) sig.	7	8	6	4	2	0	0	0	0	0
% cases (-)	17	10	5	2	0	0	0	0	0	0
% cases (-) sig.	0	0	0	0	0	0	0	0	0	0

Table B.4: Different Hierarchical Indexes on General Balance.

Number of Questions	2	3	4	5	6	7	8	9	10
Combinations	45	120	210	252	210	120	45	10	1
% cases (+) sig.	0	0	0	0	0	0	0	0	0
% cases (-)	30	32	32	29	24	14	7	0	0
% cases (-) sig.	0	0	0	0	0	0	0	0	0

Bibliography

[1] Alesina, A., R. Hausmann, R. Hommes, and E. Stein. 1999. "Budget Institutions and Fiscal Performance in Latin America." *Journal of Development Economics*, August 1999, vol. 59 (2).

[2] Alesina, Alberto, and Roberto Perotti. 1999. "Budget Deficits and Budget Institutions." in J.M. Poterba and J. von Hagen (eds.) Fiscal Institutions and Fiscal Performance, University of Chicago Press.

[3] Alesina, Alberto, and Roberto Perotti. 1996. "Fiscal Discipline and the Budget Process." *American Economic Review* 86, 401-407.

[4] Alt, James and David Lassen. 2006. "Fiscal Transparency, Political Parties and Debt in OECD Countries." *European Economic Review*, forthcomming.

[5] Alt, James and David Lassen. 2003. "Fiscal Transparency and Fiscal Policy Outcomes in OECD Countries." Economic Policy Research Unit. Mimeo.

[6] Alt, James, David Lassen, and Shanna Rose. 2006. "The Causes of Fiscal Transparency: Evidence from the American States" *IMF Staff Papers*, forthcomming.

[7] Alt, James, David Lassen, and David Skilling. 2002. "Fiscal Transparency, Gubernatorial Popularity, and the Scale of Government: Evidence from the States." *State Politics and Policy Quarterly* 2, 230-250.

[8] Beck, Thorsten, George Clarke, Alberto Groff, Philip Keefer, and Patrick Walsh. 2001. "New Tools in Comparative Political Economy: The Database of Political Institutions" *The World Bank Economic Review*, 15, 1, 165-176.

[9] Berry, William, Evan Ringquist, Richard Fording, and Russell Hanson. 1998. "Measuring Citizen and Covernment Ideology in the American States, 1960-93." *American Journal of Political Science* 42, 327-48.

[10] Drazen, Allan. 2000. *Political Economy in Macroeconomics*. Princeton University Press.

[11] Cuckierman, Alex, and Allan Meltzer. 1989. "A Political Theory of Government Debt and Deficits in a neo-Ricardian Framework." *American Economic Review*, 79, 713-32.

[12] Ferejohn, J. 1986, "Incumbent Performance and Electoral Control." *Public Chice* 50, 5-26.

[13] Ferejohn, J. 1999, "Accountability and Authority: Toward a Theory of Political Accountability," in Adam Przeworski et al, eds., Democracy, Accountability, and Representation, Cambridge University Press.

[14] Feld, Lars, and Gebhard Kirchgassner. 1999. "Public Debt and Budgetary Procedures: Top Down or Bottom Up? Some Evidence from Swiss Municipalities." in J.M. Poterba and J. von Hagen (eds.) Fiscal Institutions and Fiscal Performance, University of Chicago Press.

[15] Filc, Gabriel, and Carlos Scartascini. 2004. "Budget Institutions and Fiscal Outcomes: Ten Years of Inquiry on Fiscal Matters at the Research Department." Inter-American Development Bank Working Paper.

[16] de Haan, Jakob, Wim Moessen, and Bjorn Volerink. 1999. "Budgetary Procedures -Aspects and Changes: New Evidence for Some European Countries." in J.M. Poterba and J. von Hagen (eds.) Fiscal Institutions and Fiscal Performance, University of Chicago Press.

[17] Hallerberg, Mark, and Jrgen von Hagen. 1999. "Electoral Institutions, Cabinet Negotiations, and Budget Deficits in the European Union." in J.M. Poterba and J. von Hagen (eds.) Fiscal Institutions and Fiscal Performance, University of Chicago Press.

[18] International Monetary Fund. World Economic Outlook. 2005-2006.

[19] Keefer, Philip. 2005. "Database of Political Institutions: Changes and Variable Definitions". The World Bank.

[20] Kontopoulos, Yianos, and Roberto Perotti. 1999. "Government Fragmentation and Fiscal Policy Outcomes." in J.M. Poterba and J. von Hagen (eds.) Fiscal Institutions and Fiscal Performance, University of Chicago Press.

[21] Kopits, George, and John Craig. 1998. "Transparency in Government Operations," IMF Occasional Paper 158.

[22] Laakso, Markku, and Rein Taagepera. 1979. "Effective Number of Parties: A Measure with Application to Western Europe." *Comparative Political Studies*, 13, 3-27.

[23] Milesi-Ferreti, Gian Maria, 2004. "Good, Bad or Ugly? On the Effects of Fiscal Rules with Creative Accounting." Journal of Public Economics, Elsevier, vol.88(1-2), pages 377-394, January.

[24] National Association of State Budget Officers (NASBO). 1987, 1989, 1992, 1995, 1997, 1999 and 2002. "Budget Processes in the States."

[25] National Conference of State Legislatures (NCOSL). 1998. "Legislative Budget Procedures."

[26] Oates, W. E. 1988. "On the Nature and Measurement of Fiscal Illusion: A Survey," in G. Brennan et al. (eds.) Taxation and Fiscal Federalism, Australian National University Press.

[27] OECD/World Bank, 2003. Survey on Budget Practices and Procedures. http://ocde.dyndns.org/

[28] Persson, T., G. Roland, G. Tabellini. 1997. "Separation of Powers and Political Accountability." Quarterly Journal of Economics, November 1997.

[29] Poterba, J. M. 1996. "Do Budget Rules Work?" NBER Working Paper no. 5550. Cambridge, Mass.: National Bureau of Economic Research.

[30] Poterba, James, and Kim Rueben. 1999. "State Fiscal Institutions and the U.S. Municipal Bond Market," in J.M. Poterba and J. von Hagen (eds.) Fiscal Institutions and Fiscal Performance, University of Chicago Press.

[31] Poterba, James, and Jrgen von Hagen. 1999. "Intruduction," in J.M. Poterba and J. von Hagen (eds.) Fiscal Institutions and Fiscal Performance, University of Chicago Press.

[32] Rodrik, D. 1998. "Why Do More Open Economies Have Bigger Governments?," Journal of Political Economy, University of Chicago Press, vol. 106(5), pages 997-1032, October.

[33] Rogoff, Kenneth and Anne Siebert, 1988, "Elections and Macroeconomic Policy Cycles." *Review of Economic Studies* 55, 1-16.

[34] Rogoff, K., 1990, "Equilibrium Political Budget Cycles." *Amercan Economic Review* 80, 21-36.

[35] Shi, Min and Jakob Svensson, 2001, "Conditional Political Budget Cycles." Mimeo.

[36] Stein, Ernesto, Ernesto Talvi, and Alejandro Grisanti. 1999. "Institutional Arrangements and Fiscal Performance: The Latin American Experience" in

J.M. Poterba and J. von Hagen (eds.) Fiscal Institutions and Fiscal Performance, University of Chicago Press.

[37] Tabellini, Guido. 1991. "The Politics of Intergenerational Redistribution." *Journal of Political Economy*, 99, 335-57.

[38] von Hagen, Jrgen. 1992. "Budgeting Procedures and Fiscal Performance in the European Community." EEC Economic Papers 96.

[39] von Hagen, Jrgen, and Ian Harden. 1994. "Budget Processes and Commitment to Fiscal Discipline." *European Economic Review*, 39, 771-79.

[40] von Hagen, Jrgen, and Ian Harden. 1996. "Budget Processes and Commitment to Fiscal Discipline." IMF Working Paper.

[41] Wagner, A 1883. "Three Extracts on Public Finance", in R.A. Musgrave and A.T. Peacock (eds) (1958), Classics in the Theory of Public Finance. London: Macmillian.

[42] World Bank. World Development Indicators (WDI). 2003-2005.

[43] World Bank, Development Research Group. Database of Political Institutions (DPI2004). 2004.