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ESSAYS IN THE POLITICAL ECONOMY OF FISCAL POLICY

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PhD Thesis

Department of Economics, University of Copenhagen

August 2010

Summary

This thesis applies a political economy approach to the analysis of fiscal policy. It consists of an introduction followed by five self-contained chapters. The first two chapters focus on politicians' fiscal responses to cyclical output fluctuations. The last three chapters examine the government budget formation process and the associated causes and consequences. The first three chapters develop models of the political system and test the resulting empirical predictions. The last two chapters are purely empirical and test the political and economic consequences of having a late budget using the unique data set on budget enactments developed in Chapter 3.

Chapter 1, *"Fiscal Transparency and Procyclical Fiscal Policy"* (joint with Asger Lau Andersen), studies the effect of fiscal transparency on the cyclical response of fiscal policy. The empirical part of Chapter 1 reveals that government spending reacts in an asymmetric manner to output fluctuations by being acyclical in recessions and procyclical in booms. In the theoretical part of the chapter, we develop a model that can explain this asymmetric response by highlighting the role of fiscal transparency. The model builds on the political agency model of Alesina, Campante and Tabellini (2008)[1]. In their retrospective voting model, procyclicality arises from voters' attempt to "starve the Leviathan". When income increases, voters demand more government consumption and tax cuts, fearing that the extra revenue that the economic upturn generates would otherwise go to wasteful spending. The key assumption behind this result is a complete lack of fiscal transparency: politicians are assumed to be able to hide the true size of the government deficit to voters, who are therefore also unable to observe the level of political rents. By allowing for a positive degree of transparency, such that voters may detect an excessive deficit with some probability, our model generates two new predictions. First, fiscal policy becomes asymmetric: departing from a low initial level, an increase in income will not lead to increased consumption demands. When initial income is high on the other hand, a further increase implies a rise in government spending. Second, the higher the degree of fiscal transparency, the stronger the boom must be before fiscal policy becomes procyclical.

The empirical part of the chapter tests these prediction in detail. The empirical evidence strongly confirms the asymmetry of fiscal policy in OECD countries, where government spending is much more procyclical in good times than in bad times. We do not find a similar asymmetry in non-OECD countries. Our results indicate that fiscal transparency reduces the procyclical bias in good times in OECD countries. For a broad sample of countries, we find encouraging results in favour of our hypothesis that fiscal policy is less procyclical in good

[1] Alesina, A., Campante, F. and Tabellini, G., 2008. Why is fiscal policy often procyclical? *Journal of the European Economic Association*, Vol. 6, No.5: 1006–1036.

times in countries where voters are better informed.

Chapter 2, *"Political Polarization and Procyclical Fiscal Policy"*, studies the effect of political polarization on the cyclical response of fiscal policy. We add political polarization to the framework of political agency and fiscal transparency from Chapter 1, by introducing heterogeneity into the politicians' preferences. Specifically, we allow politicians to differ in their preferences for government consumption relative to private consumption. Our model predicts that a higher degree of political polarization lowers the procyclical bias in booms. Political polarization works in similar way as transparency by affecting the incentive of the politician to run an excessive hidden deficit. When the degree of political polarization is high, losing the election, by getting caught running an excessive hidden deficit, is associated with a large utility loss, since the opponent's future policies will be far from the incumbent's optimal policies. The politician's incentive to run an excessive deficit is therefore smaller and voters will be able to trust the incumbent with a higher surplus than otherwise. As a result, the higher the degree of political polarization, the higher is the required level of income before fiscal policy becomes procyclical.

The empirical part of this chapter shows that government spending in the US states reacts to fluctuations in output in the same asymmetric manner as OECD countries, thus being procyclical in good times and acyclical in recessions. Further, our empirical analysis reveals that the degree of political polarization affects this asymmetric reaction: the higher the degree of political polarization, the smaller is the procyclical bias in booms. Thus, from both a theoretical and empirical perspective, this chapter highlights that increased political polarization can actually bring about better policy outcomes, in contrast to the usual finding of most other studies.

Chapter 3, *"Late Budgets"* (joint with Asger Lau Andersen and David Dreyer Lassen), studies the causes of late budgets in the US states. The budget forms the legal basis of government spending. If a budget is not in place at the beginning of the fiscal year, planning as well as current spending are jeopardized and government shutdown may result. In Chapter 3, we develop a continuous-time war-of-attrition model of budgeting in a presidential style-democracy to explain the duration of budget negotiations. We build our model around budget baselines as reference points for loss averse negotiators. In our model, the two bargaining parties suffer costs from not being able to reach a deal. These costs may be political in nature, because the public dislikes budget delays, or they may be personal, since legislators must spend time and effort to keep battling over the budget. When a party finds that it can no longer bear the costs of continued bargaining, it concedes, and the opposing party is free to implement its preferred policy. We derive the unique symmetric equilibrium of the bargaining game and show that it implies a number of testable hypotheses. The three main predictions are: One, changes in fiscal circumstances, regardless of direction, increase the expected duration of budget

stalemates; Two, the expected duration is higher in fiscal downturns than in upswings of similar magnitudes; And three, divided government increases the expected duration.

We apply the model to data on the US states government budget processes. Using state and local newspaper sources as well as responses to a survey of state budget offices administered for this purpose, we collect data on dates of final budget enactment and compare these to the beginning of the state governments' fiscal years. Carrying out this comparison for all states from 1988 to 2007 yields a unique data set on budget lateness.

Our main empirical conclusions support the model's predictions: increasing unemployment leads to a longer budget negotiation process, it increases the risk of exceeding budget deadlines and it prolongs periods with no budget in place. Falling unemployment also weakly increases the risk of seeing a late budget, in accordance with our model's predictions, but in contrast to widely held beliefs that more funds automatically make agreeing on a budget easier. Divided government makes late budgets more likely in all cases. In addition, higher political costs, present in election years, shorten the duration of late budgets, while higher personal costs for non-professional legislators lower both the risk of late budgets as well as their duration. Soft or hard deadlines that require the legislature to end its regular session before the end of the fiscal year limit the occurrence of late budgets.

Chapter 4, *"Fiscal Governance and Electoral Accountability: Evidence from Late Budgets"* (joint with Asger Lau Andersen and David Dreyer Lassen), studies the electoral consequences of late budgets for governors and state legislators in the US states. We use our measure of late budgets, developed in Chapter 3, as an indicator for bad governance. Using this data on late budgets, we investigate whether voters react to bad fiscal governance by penalizing political actors involved in the budgetary process at election day. We find that legislatures face significant negative electoral consequences of not finishing a budget on time, while governors are penalized only under unified governments. In general, electoral penalties are larger where clarity of responsibility, affected by divided government, supermajority requirements and seat share margins, is higher, consistent with models of retrospective voting.

Chapter 5, *"The Consequences of Late Budgets for State Borrowing Costs"* (joint with Asger Lau Andersen and David Dreyer Lassen), studies the impact of late budgets on government bond spreads in the US states. Using the data set on late budgets developed in Chapter 3, we find robust evidence that late budgets are significantly associated with higher state government borrowing costs. Borrowing costs are measured with data on bond yield spreads on 20-year general obligation debt from the "Chubb Relative Value Survey", which is available for 36 US states in the period 1988 to 1997. We estimate that a budget delay of 30 days has a long run impact on the yield spread in the order of 2 basis point. States with sufficient liquidity, in the form of either large reserves or a budget surplus, face small or no costs from late budgets. On the other hand, states running an average deficit face an impact of about 9 basis points

from a 30-day budget delay. During election years, the impact of late budgets on yield spreads increases by an order of 4.

Resumé

Denne afhandling anvender en politisk-økonomi tilgang i analysen af finanspolitik. Afhandlingen består af en introduktion samt fem selvstændige kapitler. De to første kapitler fokuserer på, hvordan politikeres finanspolitiske beslutninger påvirkes af cykliske udsving i nationalindkomsten. De tre sidste kapitler analyserer den offentlige budgetproces, og særligt underliggende årsager til og konsekvenser af forsinkelser i denne. I de tre første kapitler udvikles der teoretiske modeller af det politiske system, hvis empiriske forudsigelser testes. De sidste to kapitler er empiriske og benytter et unik indsamlet datasæt fra kapitel 3 til at teste de politiske og økonomiske konsekvenser af forsinkede budgetter.

Kapitel 1, *"Finanspolitisk Transparens og Procyklisk Finanspolitik"* (skrevet sammen med Asger Lau Andersen), analyserer effekten af finanspolitisk transparens på cyklikaliteten af finanspolitik. Den empiriske del af Kapitel 1 viser, at offentlige udgifter reagerer asymmetrisk på fluktuationer i indkomst ved at være acyklisk i recessioner og procyklisk i opgangstider. I den teoretiske del af kapitlet udvikler vi en model, der kan forklare denne asymmetriske reaktion ved understrege betydningen af finanspolitisk transparens. Modellen bygger på den politiske agency model af Alesina, Campante og Tabellini (2008)[2]. I deres retrospektive vælgermodel opstår procyklikalitet ud fra vælgernes forsøg på at "starve the Leviathan". Når indkomsten stiger, kræver vælgerne højere offentlige udgifter og lavere skatter i frygt for at ekstraindtægterne fra det økonomiske opsving ellers ville blive formøblet af politikerne. Nøgleantagelsen bag dette resultat er en komplet mangel på finanspolitisk transparens: Det er antaget, at politikerne har mulighed for at skjule den sande størrelse af det offentlige budgetunderskud for vælgerne, der derfor ikke er i stand til observere størrelsen af poliske "rents". Ved at tillade at vælgere kan observere den sande størrelse af det offentlige budgetunderskud med en positiv sandsynlig, frembringer vores model to testbare hypoteser. Første hypotese er, at finanspolitikken reagerer asymmetrisk: For et lavt initialt indkomstniveau vil en stigning i indkomsten ikke lede til ændringer i det offentlige forbrug. Er det initiale indkomst niveau derimod højt, vil en yderligere stigning i indkomsten medføre stigninger i det offentlige forbrug. Den anden hypotese er, at jo højere graden af finanspolitisk transparens er, jo større skal det økonomiske opsving være, før finanspolitikken bliver procyklisk.

Den empiriske del af kapitlet tester disse hypoteser. Den empiriske analyse bekræfter klart, at finanspolitikken er asymmetrisk i OECD-lande, hvor det offentlige forbrug er mere procyklisk i opgangstider end i nedgangstider. Vi finder ikke samme asymmetri i ikke-OECD lande. Vores resultater indikerer, at finanspolitisk transparens reducerer den procykliske skævvrid-

[2] Alesina, A., Campante, F. and Tabellini, G., 2008. Why is fiscal policy often procyclical? *Journal of the European Economic Association*, Vol. 6, No.5: 1006–1036.

ning i opgangtider i OECD-lande. Vores hypotese om at finanspolitik er mindre procyklisk i opgangstider i lande, hvor vælgere er bedre informeret, bliver understøttet af vores empiriske resultater for et bredt udsnit af lande.

Kapitel 2, *"Politisk Polarisering og Procyklisk Finanspolitik"*, undersøger effekten af politisk polarisering på cyklikaliteten af finanspolitik. Vi tilføjer politisk polarisering til modelstrukturen fra Kapitel 1 ved at introducere heterogenitet i politikernes præferencer. Nærmere bestemt tillader vi, at politikernes præferencer for offentlig og privat forbrug kan være forskellig. Modellens hypotese er, at en højere grad af politisk polarisering mindsker den procykliske skævvridning i opgangstider. Politisk polarisering har en effekt, der ligner den fra finanspolitisk transparens, ved at påvirke politikernes incitamenter til optage skjulte underskud. Hvis magten mistes som følge af, af et skjult underskud opdages, er det tilhørende tab af nytte større, hvis der er en højere grad af politisk polarisering. Dette skyldes, at politikeren nu må se modstanderens mere afvigende politik blive implementeret. Politikernes incitament til at optage skjulte underskud er derfor mindre, og vælgerne kan derfor tiltro politikerne med et større overskud. Resultatet bliver dermed, at jo højere graden af politisk polarisering er, jo større skal det økonomiske opsving være, før finanspolitikken bliver procyklisk.

Den empiriske del af kapitlet viser, at de offentlige udgifter amerikanske delstater reagerer asymmetrisk på output-fluktuationer på samme måde som i OECD-lande, dvs. procyklisk i opsving og acyklisk i nedgangstider. Den empiriske analyse viser yderligere, at graden af polarisering påvirker denne asymmetri. Jo højere graden af politisk polarisering er, jo mindre er den procykliske skævvridning i opgangstider. Kapitlet understeger således, både teoretisk og empirisk, at øget politisk polarisering rent faktisk kan forbedre de politiske beslutninger.

Kapitel 3, *"Forsinkede Budgettet"* (skrevet sammen med Asger Lau Andersen og David Dreyer Lassen) undersøger konsekvensen af forsinkede budgetter i amerikanske delstater. Budgettet udgør det lovmæssige grundlag for delstatsregeringens udbetalinger. Hvis budgettet ikke er vedtaget ved det nye finansårs begyndelse, kan der opstå usikkerhed om nuværende og planlagte betalinger, og delstatsregeringen kan blive tvunget til at indstille sine aktiviteter midlertidigt. Vi udvikler en model i Kapitel 3 for at forklare længden af budgetforhandlinger. Modellen foregår i kontinuert tid og er en "war-of-attrition" type model for præsidentielle demokratier. Vi bruger sidste års budget som referencepunkt, og antager at budgetforhandlerne er tabs-averse. De to forhandlere i modellen har omkostninger ved ikke at kunne blive enige om et budget. Disse omkostninger kan være politiske af natur, idet vælgere ikke kan lide forsinkede budget, men de kan også være af personlig karakter i form af tid og kræfter spildt på budgetforhandlingerne. Når den ene forhandler ikke længere kan bære omkostningen ved at fortsætte forhandlingerne og giver op, kan den anden forhandler vælge sin foretrukne komposition af budgettet. Vi udleder den unikke symmetriske ligevægt i forhandlingsspillet og viser, at det implicerer en række testbare hypoteser. De tre hovedhypoteser er følgende: Et, ændringer

i økonomiske forhold, uanset retning, øger den forventede forhandlingstid. To, den forventede forhandlingstid er længere i nedgangstider end i opgangstider af tilsvarende størrelse. Tre, øget uenighed mellem forhandlerne øger den forventede forhandlingstid.

Vi tester modellen på et datasæt for amerikanske delstaters budgetproces. Vi benytter delstatslige og lokale aviskilder, såvel som svar til en spørgeskemaundersøgelse sendt til de statslige budgetkontorer, til at indsamle datoer for budgets endelige ikrafttrædelse, og sammenligner dette med starten af de enkelte staters finansår. Vi indsamler derved et unikt datasæt for budgetforsinkelser ved at foretage denne sammenligning for alle delstaterne i årene 1988 til 2007.

Hovedkonklusionerne fra vores empiriske undersøgelse understøtter modellens hypoteser. Forøgelse af arbejdsløsheden øger længden af budgetforhandlinger og sandsynligheden for, at skæringsdatoen for sidste rettidige vedtagelse overskrides. Stigninger i arbejdsløsheden øger tillige længden af de perioder, hvor der ikke er noget vedtaget budget på plads. Fald i arbejdsløsheden øger også svagt sandsynligheden for at få et forsinket budget, i overensstemmelse med vores model, men i modsætning til den udbredte opfattelse, at flere midler automatisk medfører et kortere og lettere forhandlingsforløb. Øget uenighed, i form af at forskellige partier kontrollerer guvernørposten og de to kamre i den lovgivende forsamling, gør budgetforsinkelser mere sandsynlig i alle tilfælde. Yderligere gælder det, at øgede politiske omkostninger, som ved at forhandle i et valgår, forkorter længden af forhandlingsprocessen, samt at øgede personlige omkostninger, som når ikke-professionelle politikere forhandler, mindsker sandsynligheden for forsinkede budgetter såvel som længden af forsinkelsen. Hårde og bløde skæringsdatoer for hvornår den lovgivende forsamling skal afslutte sit arbejdsår mindsker frekvensen af forsinkede budgetter.

Kapitel 4, *"Holder vælgere politikere ansvarlige for dårlig finanspolitisk styring? Studier af forsinkede budgetter",* (skrevet sammen med Asger Lau Andersen og David Dreyer Lassen) undersøger de valgmæssige konsekvenser for guvernører og lovgivere af forsinkede budgetter i amerikanske delstater. Vi bruger vores mål for forsinkede budgetter fra Kapitel 3 som en indikator for dårlig regeringsførelse. Vi undersøger, hvorvidt vælgere straffer dårlig regeringsførelse, målt som andelen af forsinkede budgetter, ved at fravælge de ansvarlige politikere på valgdagen. Vores analyse viser, at lovgivere straffes signifikant for forsinkede budgetter, mens guvernører kun straffes, hvis hans parti samtidig kontrollerer de to kamre i den lovgivende forsamling. Vi finder generelt, at jo klarere ansvaret kan placeres, jo større er vælgernes straf. Dette er i overensstemmelse med en antagelse om, at vælgere stemmer retrospektivt.

Kapitel 5, *"Konsekvenser af forsinkede budgetter på Statslige Låneomkostninger"*, (skrevet sammen med Asger Lau Andersen og David Dreyer Lassen), undersøger effekten af forsinkede budgetter på statsobligationsrenter i amerikanske delstater. Vi finder klare beviser for, at forsinkede budgetter er signifikant forbundet med forøgede statslige låneomkostninger. Vores

kilde for forsinkede budgetter er igen datasættet fra Kapitel 3. De statslige låneomkostninger er målt som obligationsrenteforskelle på hypotetiske 20-årige "general obligation bonds", rapporteret i "Chubb Relative Value Survey", for 36 amerikanske delstater i perioden 1988 til 1997. Vi estimerer, at et 30 dages forsinket budget har en samlet effekt på obligationsrenten på omkring 2 basispoint. Stater med likvide reserver i form af opsparede midler eller statslige budgetoverskud har lave eller ingen omkostninger ved forsinkede budgetter. Derimod er den tilsvarende effekt for en stat med et gennemsnitligt budgetunderskud i omegnen af 9 basispoint. I valgår bliver effekten af forsinkede budgetter forøget med en faktor 4.

Contents

Preface

This thesis was written from September 2007 to August 2010 while I was enrolled as a PhD student at the Department of Economics at the University of Copenhagen. From September 2008 to December 2009 I was visiting Harvard University and a substantial part of the thesis was developed during this time. I have benefitted greatly from comments and suggestions from my advisors at Copenhagen, David Dreyer Lassen, and at Harvard, Jim Alt. I am very grateful for all their help, effort and support. I am very thankful to Jim Alt for all the hospitality he has shown me while at Harvard, making my stay truly enjoyable, enriching and productive. I am thankful to the Institute of Quantitative Social Science (IQSS) at Harvard for providing me with a daily work space while I was visiting Harvard. I am thankful for experiencing a stimulating environment as a PhD student at Copenhagen and Harvard, whether it being in daily discussions with professors and fellow students, at seminars or in classes. I have learned tremendously from all these experiences.

Chapter 1 is written jointly with Asger Lau Andersen. Chapters 3 to 5 are written jointly with Asger Lau Andersen and David Dreyer Lassen. I have benefitted immensely from writing these chapters with Asger and David. I am thankful for their insight and our daily fruitful discussions. Working together with Asger and David has made the process much more enjoyable, and the outcome of my thesis has been significantly improved through our cooperation.

My visit at Harvard was made possible through the financial support from various grants and foundations. I am deeply grateful for the support I received from The Denmark-America Foundation & Fullbright Commission through the Danske Bank grant, The Euroclear grant from the Department of Economics, University of Copenhagen as well as grants from the Augustinus Foundation, the Knud Højgaard Foundation and the Oticon Foundation. I am also grateful for funding from the program on Economic Policy in the Welfare State (West) at the University of Copenhagen, enabling me to conduct research on late budgets in the US states.

Finally, I would also like to thank everyone close to me for providing endless support and encouragement as well as for broadening my perspectives beyond economics. I am deeply grateful to all of you.

Lasse Holbøll Westh Nielsen
Copenhagen, August 2010

Introduction

The unifying theme of my thesis is the political economy approach to the study of fiscal policy issues. I use the economic methodology to answer questions that lie in the cross field between economics and politics. In particular, I focus on fiscal policy outcomes as well as the foundation for fiscal policy, the government budget. The five chapters of the thesis are self-contained and can be read independently. However, they complement each other and read together they provide a broader understanding of the political economy of fiscal policy.

The first two chapters model the interaction between voters and politicians when faced with cyclical fluctuations in income. Voters and politicians are assumed to have divergent interests. Politicians set policy and voters try to obtain the best possible outcomes, however, they are limited in their ability to monitor all actions of the politicians. Voters use elections retrospectively to punish ill performing politicians. Voters set certain requirements for fiscal policy that must be meet in order for the politician in power to obtain re-election. These requirements are set in such a way that voters maximize their utility subject to the constraint of the political system. The model shows that for certain conditions, demanding procyclical policies are in fact the optimal response by voters. As such, seemingly suboptimal procyclical policies do not arise due to myopic thinking, but rather as the direct outcome of rational voter demands. We (my coauthors and myself) use this insight to formulate predictions about the effect of key variables on the outcome of fiscal policy. Specifically, we are able to explain why countries characterized by a high degree of fiscal transparency (Chapter 1) or political polarization (Chapter 2), would less often engage in procyclical policies during cyclical upswings.

A common feature of all chapters in the thesis is the empirical testing of economic and political hypothesis. The empirical predictions from the models of the two first chapters are confirmed by the data. However, an alternative explanation to the empirical finding in Chapter 2, could be that polarization also leads to political gridlock, thus making the state's politicians unlikely to agree to any major policy changes, including changes in fiscal policy. In this case, political polarization would lead to a status quo bias and fiscal policy would become acyclical. Thus controlling for political gridlock is important in order to verify the empirical results from Chapter 2. One effect of having political gridlock would be that all legislative negotiation would take longer, including the budget deliberations. Since the budget is a comparable piece of legislation across states and time, controlling for the budget negotiation duration is a way of isolating the empirical effect of gridlock from the effect of political polarization.

Chapter 3 is inspired by the need to control for political gridlock in Chapter 2. We construct a unique data set on budget negotiation durations. Using this data, I am able to show that the model prediction from Chapter 2 is also confirmed by the data when controlling for political

gridlock. Chapter 3 also includes an empirical investigation of the causes of budget lateness. In order to develop a better understanding of the factors that causes budgets to be late, we build a war-of-attrition type model of the budget adoption process. Voters are not an active part of this model, but politicians are assumed to have costs of delaying budgets adoption partly due to opportunity costs, but also because voters are likely to disapprove of a long budget negotiations. As such, voters play an implicit role. Politicians are assumed to maximize their expected utility. The outcome of this model leads to a set of explanations to why budget negotiation would drag on for a considerable amount of time. These predictions are in well accordance with the data.

Chapter 4 and Chapter 5 are empirical and investigate the consequences of having late budgets. We employ the data on budget lateness developed in chapter 3, and test the effect of late budgets on political and economic outcome variables. Chapter 4 investigates to which degree voters punish the politicians responsible for late budgets by not re-electing them. We find clear evidence that responsible legislators do receive fewer votes in an election following a streak of late budgets. This seems to suggest that voters dislike late budgets, as assumed in Chapter 3, and that they convey this through retrospective voting. This lends support the retrospective modelling assumptions in Chapter 1 and Chapter 2. Chapter 5 finds that late budgets also have economic consequences. Specifically, government borrowing costs rise with late budgets. This provides at least one reason for why voters would dislike late budgets and voter against responsible politicians as documented in Chapter 4: it raises taxes or lowers government expenditures.

Chapter 1

Fiscal Transparency and Procyclical Fiscal Policy

Fiscal Transparency and Procyclical Fiscal Policy*

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July 2010

Abstract

This paper examines why fiscal policy is often procyclical. We introduce the concept of fiscal transparency into a model of retrospective voting, in which a political agency problem between voters and politicians generates a procyclical bias in government spending. The introduction of fiscal transparency generates two new predictions: *1)* the procyclical bias in fiscal policy arises only in good times; and *2)* a higher degree of fiscal transparency reduces the bias in good times. We find solid empirical support for both predictions using data on both OECD countries and a broader set of countries.

Keywords: Fiscal Transparency; Fiscal Policy; Procyclicality; the Business Cycle; Political Economy

JEL Classification: D72; E32; E62

1 Introduction

Fiscal policy is often procyclical: cyclical increases in real income are often accompanied by increases in government spending and/or tax cuts.[1] Such a policy may amplify fluctuations in real

* We thank David Dreyer Lassen and Jim Alt for valuable comments and for sharing their data on fiscal transparency with us. We also thank Jacob Svensson, Torsten Persson and Mark Hallerberg for sharing their data. Finally, we thank seminar participants at the University of Copenhagen, the EEA Milan 2008 conference and the Harvard University Political Economy and Macro lunch seminars.

[1] Following Kaminsky, Reinhart and Végh (2004), we define a procyclical fiscal policy as a policy where increases in real output lead to discretionary increases in spending and/or tax cuts.

output, thereby leading to prolonged recessions in bad times and inflationary pressures in good times. Moreover, a procyclical fiscal policy is in conflict with the tax smoothing principle (Barro [1979]), which prescribes that tax rates should be unrelated to business cycle fluctuations. Finally, a procyclical fiscal policy may lead to excessive volatility in private- and public consumption, thus violating the principle of consumption smoothing. Therefore, most economists would agree with the view that a procyclical fiscal policy is a harmful policy that adds to macroeconomic instability. Nevertheless, procyclical fiscal policies occur frequently in reality.

The early empirical literature on the cyclicality of fiscal policy found that fiscal policy is typically procyclical in developing countries, and especially Latin America, but acyclical in developed countries.[2] However, a number of studies have also found evidence of procyclicality in subcomponents of government spending and in overall discretionary government spending in developed countries (see for instance Hallerberg and Strauch (2002), Gali and Perotti (2003) and Lane (2003)), suggesting that the problem is not strictly confined to the developing world.

Several theories have been proposed to explain the occurrence of procyclical fiscal policies. Gavin and Perotti (1997) suggest that procyclical fiscal policies in these countries arise because of binding borrowing constraints. According to their hypothesis, governments in developing countries are likely to become credit constrained in times of economic slowdown, which may force them to run a procyclical fiscal policy. Other authors, such as Tornell and Lane (1999), Talvi and Végh (2005) and Alesina, Campante and Tabellini (2008), have proposed political theories to explain procyclical fiscal policies in developing countries. Battaglini and Coate (2008) present a real business cycle model in which elected representatives attempt to target public spending to their own home districts. Their model predicts that government spending increases in booms and decreases in recessions, while tax rates fall in booms and increase in recessions.

A particularly robust finding in the empirical literature is an asymmetry in the reaction of fiscal policy to changes in economic activity: fiscal policy is generally more procyclical in good times than in bad times.[3] None of the above-mentioned theories are able to explain this empirical regularity. It is particularly problematic for the borrowing constraints hypothesis, according to which we should expect fiscal policy to be procyclical in bad times when the credit constraints are most likely to become binding.

This paper offers a new explanation of the procyclical nature of fiscal policy, highlighting the role of fiscal transparency. Our theory departs from the political agency model developed in Alesina, Campante and Tabellini (2008) (henceforth ACT). In their retrospective voting model, procyclicality arises from voters' attempt to "starve the Leviathan". When income increases, voters

[2] See for instance Gavin and Perotti (1997), Catão and Sutton (2002) or Talvi and Végh (2005).

[3] See for example Gavin and Perotti (1997), Persson and Tabellini (2003), Hercowitz and Strawczynski (2004) or Manasse (2006).

demand more government consumption or tax cuts, fearing that the extra revenue that the economic upturn generates would otherwise go to wasteful spending. The key assumption behind this result is a complete lack of fiscal transparency: politicians are assumed to be able to hide the true size of the government deficit to voters, who are therefore also unable to observe the level of political rents.

It is this restrictive assumption that we relax in our model. Specifically, we allow a positive degree of fiscal transparency, such that voters may detect an excessive deficit with some positive probability. This generates two new predictions. First, fiscal policy becomes asymmetric: departing from a low initial level, an increase in income will not lead to increased consumption demands. When initial income is high on the other hand, a further increase implies a rise in government spending. The intuition behind this result is that transparency works as a disciplining device that reduces the incentive for politicians to cheat. But when the economy is strong, and the potential gain from cheating is high, this may not be sufficient to keep the incumbent from running an excessive deficit. Voters know this, and the procyclical pattern of fiscal policy driven by voters' attempt to "starve the Leviathan" re-emerges. Thus, the model can explain the stylized fact from the empirical literature that fiscal policy is more procyclical in good times than in bad times. This is in contrast to ATC, who argue that the observed asymmetry between good and bad times speaks against Gavin and Perotti's borrowing constraints hypothesis, and in favour of their own theory. But their model, unlike ours, is in fact unable to account for the asymmetric pattern in fiscal policy.

The second main prediction from the model is that the higher the degree of fiscal transparency, the stronger the boom must be before fiscal policy becomes procyclical. Thus, we expect fiscal policy to be less procyclical in high-transparent countries. ATC note that the procyclicality of fiscal policy is driven by politicians' ability to collect rents so fiscal policy should be more procyclical in more corrupt countries. However, their model does not explain which institutional factors influence the scope for corruption and, hence, the procyclicality of fiscal policy. The model in this paper suggests one such candidate, namely the degree of fiscal transparency. It is exactly through a reduced incentive to collect rents that fiscal transparency diminishes the procyclicality of fiscal policy.

Fiscal transparency is the extent to which the general public can access truthful information about government budget matters. This issue has received increasing attention in recent years. Both the OECD and the IMF have implemented *Codes of Best Practice for Fiscal Transparency*, and The IMF and the World Bank publish Reports on Observation of Standards and Codes (ROSC) for the *Code of Best Practice for Fiscal Transparency* on a regular basis for a broad range of countries. We are not the first to introduce fiscal transparency into a model of fiscal policy. Milesi-Ferretti (2004) analyses the interaction of fiscal transparency and fiscal rules in the determination of fiscal policy. Shi and Svensson (2006) and Alt and Lassen (2006a, 2006b) have highlighted the role of fiscal transparency in the occurrence of political budget cycles. Fiscal transparency, so the

argument goes, reduces the scope for manipulating the budget around election time, since the risk that such manipulations are detected is higher. The link described above between fiscal transparency and the cyclical behaviour of fiscal policy is something that we have not come across in the existing literature, however.

We then turn to the empirical evidence and test our model's predictions on two panel data sets: a sample of OECD countries and a sample of a broader range of countries. The evidence strongly confirms the asymmetry of fiscal policy in OECD countries, where government spending is much more procyclical in good times than in bad times. We do not find a similar asymmetry in non-OECD countries. Our results indicate that fiscal transparency reduces the procyclical bias in good times in OECD countries, although the data also suggest a puzzling adverse effect in bad times. For the broad sample of countries, we find encouraging results in favour of our hypothesis that fiscal policy is less procyclical in good times in countries where voters are better informed.

2 The Model

We start out by presenting a simplified version of the framework developed in ACT. We then go on to present an extended version that incorporates fiscal transparency.

2.1 The ACT framework

We consider an economy populated by a rent-seeking incumbent politician in charge of fiscal policy and a number of identical voters. For simplicity, we assume that there is only two time periods. The utility function of the representative voter is given by

$$U = \sum_{t=1}^{2} \beta^{t-1} \left(\frac{c_t^{1-\theta}}{1-\theta} + \frac{g_t^{1-\theta}}{1-\theta} \right), \ \theta < 1 \qquad (1)$$

where c_t and g_t are the per capita levels of private and government consumption in period *t*, respectively, and β is a discount factor. Private consumption is given by $c_t = (1-\tau_t) y_t$, where y_t is income per capita in period *t* and τ_t is the period *t* tax rate. We ignore uncertainty about future income, so that y_2 is known at the beginning of period 1.

The government can issue debt in period 1, with full repayment, including interest, in period 2. Government revenue from tax- and debt financing may be spent in two different ways. First, the government can provide public consumption from which voters derive utility. Second, resources may be spent on political rents. Political rents should be thought of as any kind of activity that benefits the incumbent, but not voters. They could represent outright corruption or nepotism, but

also for example spending meant to satisfy campaign contributors or interest groups, or opportunity costs related to the incumbent spending her time on campaigning, networking or leisure. In this broad sense, a low level of rents should be interpreted as "good government".

The government budget constraints for the two periods (assuming no initial debt) are

$$\begin{aligned} \tau_t \cdot y_1 &= g_1 - d_1 + r_1 \\ \tau_t \cdot y_2 &= g_2 + (1+\rho)d_1 + r_2 \end{aligned} \tag{2}$$

where d_1 is the budget deficit in period 1, r_t is political rents in period t, and ρ is the (constant and exogenous) interest rate, which is assumed to satisfy $(1+\rho)^{-1} = \beta$. In addition, there is an upper limit to the size of the deficit, $\bar{d} > 0$, that cannot be exceeded. Up to that point, government debt is always repaid in full.

The political process is modelled as follows: In the first period the incumbent chooses fiscal policy and the voters decide whether or not to re-elect her for period 2. After period 2, the incumbent has no possibility of re-election. Voters are backward-looking and condition their voting strategy on already observed outcomes only. Further, all politicians are assumed to be identical (no adverse selection), so elections serve the sole purpose of allowing voters to reward or punish the incumbent.

The incumbent politician is assumed to be purely rent-seeking. In particular, we assume that she seeks to maximise the expected present discounted value of political rents in period 1 and period 2. Naturally, the incumbent can only collect rents in period 2 if she is re-elected.

Voters observe the levels of income, taxes, private consumption and government consumption before the election. Political rents and the size of the deficit are unobservable until after the election, however. This is a key feature of the ACT model. It assumes a complete lack of transparency in the budget process; the government can hide information about its borrowing needs from the public through various creative accounting techniques, and the voters have no chance of observing the true size of the deficit.

After observing the levels of income in period 1 and period 2, voters formulate demands for the observable components of period 1 fiscal policy (government consumption and the tax rate) and promise to re-elect the incumbent if these demands are satisfied. The incumbent then has two options: She can satisfy voter demands and secure re-election, or she can ignore the demands and forego re-election. In the latter case, there is a maximum level of rents, $\bar{r} > 0$, that the incumbent can extract without being caught and immediately exempt from office. The maximum level $\bar{r}$ is sufficiently small relative to income, such that $y_t - (1+\rho)\bar{d} \geq \bar{r}$ for all $t = 1, 2$. This assumption ensures that the incumbent always has the option of extracting maximum rents without driving private- or public consumption below zero.

The set-up described here simplifies the model in ACT in the following ways: First, ACT consider an infinite horizon model in which future income levels are uncertain. Second, they consider a more general separable voter utility function than the CRRA specification assumed in equation (1). Third, ACT assume that the incumbent government maximises the expected discounted *utility* of rents, where utility in each period is an increasing, strictly concave function of rents. Our simplifications make the model more tractable, but the intuition behind the results, described below, is essentially unchanged. Fourth and finally, ACT allow the maximum level of rents to depend positively on the level of income, so that the restriction is $r_t \leq \bar{r} + \gamma y_t$. Setting $\gamma = 0$ only has minor implications for our results, so we stick with this simpler version. We solve the model with $\gamma > 0$ in the appendix.

2.2 Incorporating fiscal transparency

The innovation we make is to soften the strict assumption that transparency is completely absent in the government budget. We assume that a deviation between the true deficit and the officially reported deficit is detected with a positive probability *p*, which is known to everyone. This is an important difference compared to ACT who implicitly assume $p = 0$. Following Alt and Lassen (2006b), we interpret *p* as a measure of the degree of fiscal transparency.

The introduction of a positive degree of fiscal transparency allows voters to choose reservation levels for government consumption, the tax rate, as well as the deficit. Let these reservation levels be denoted by g^*, τ^* and d^*, respectively. The voters' re-election strategy can then be described as

$$\begin{cases} re-elect & if\ g_1 \geq g^*, \tau_1 \geq \tau^*\ and\ no\ detection\ of\ d_1 > d^* \\ don't\ re-elect & otherwise \end{cases} \tag{3}$$

Note that not detecting $d_1 > d^*$ can either mean that the incumbent did actually obey voter demands (so that $d_1 \leq d^*$), or that an excessive deficit ($d_1 > d^*$) went undiscovered, which happens with probability 1-*p*. The key point is that voters cannot distinguish these situations from each other.[4] In comparison with ACT, the inclusion of a reservation level for the government deficit is new. The reason is that in their model there is no chance of detecting an excessive deficit, since *p*

[4] This strategy differs from a traditional voting strategy in the literature of retrospective voting models, in which voters usually formulate their re-election rule in terms of a reservation *utility* level. Here, voters instead condition re-election directly on fiscal policy variables. Persson and Tabellini (2000, ch. 4) consistently formulate the voters´ strategy in terms of utility. However, in a footnote they note that voters could actually do better if they formulate their strategy in terms of policy variables. The same is true in our model. By conditioning re-election on the size of the deficit, voters are implicitly choosing a reservation level for utility in period 2 also, since the deficit has direct consequences for the level of consumption in period 2.

= *0*; setting a reservation level for the deficit is therefore pointless. Thus, allowing a positive value of *p* opens up for a more sophisticated voter strategy.

The incumbent observes voter demands and sets fiscal policy to maximise the expected PDV of political rents, subject to (3), the government budget constraint and the restriction $d_t \leq \bar{d}$. The incumbent now has three options: she can (i) satisfy the voters' demands for government consumption and the tax rate as well as the size of the deficit and secure herself re-election, (ii) satisfy the demand for government consumption and the tax rate only, run an excessive deficit and hope that this will go undetected, or (iii) satisfy none of the demands and forego re-election with certainty, in which case the restriction $r_1 \leq \bar{r}$ applies.

The timing of the model is as follows: (I) At the start of period 1 voters observe y_1 and y_2. They then select the reservation values g^*, τ^* and d^* and the strategy in (3) is known by everyone hereafter. (II) The incumbent chooses fiscal policy for period 1. (III) Voters observe the size of g_1 and τ_1. If the incumbent has set $d_1 > d^*$ this becomes known to everyone with probability *p*. (IV) Elections are held and the voters now vote according to their declared strategy in (3). In period 2 the elected politician chooses fiscal policy and the model ends.

The question we want to answer is the following: For a given present discounted value of income, how does fiscal policy depend on the distribution of income across time periods? To answer this question, we assume the following relationship between output in period 1 and period 2:

$$\begin{aligned} y_1 &= \bar{y} + \varepsilon \\ y_2 &= \bar{y} - (1+\rho)\varepsilon \end{aligned} \tag{4}$$

where $\bar{y}$ is a natural output level (or trend level) and ε is a short term fluctuation. This specification allows a comparison between a flat time profile of income ($\varepsilon = 0$) against a fluctuating time profile ($\varepsilon \neq 0$), holding constant the present discounted value of life-time income.[5]

Before we go on to consider the outcome in the political equilibrium, it is instructive to consider how a benevolent social planner would choose fiscal policy in this set-up. Obviously, the optimal policy would include zero political rents, $r_1 = r_2 = 0$. Maximising voter utility with respect to g_1, g_2, c_1 and c_2, subject to (2), (4) and $c_t = (1-\tau_t)y_t$ gives $c_1 = c_2 = g_1 = g_2 = \bar{y}/2$. The important point to note here is that the shock variable ε is nowhere present in the solution. The optimal consumption profile depends only on the present discounted value of income, not on the

[5] All results of the model still hold qualitatively if we assume no relation between y_1 and y_2. But then we get an additional effect of an increase in y_1 on fiscal policy, namely a wealth effect of higher total discounted income. Since this is not what we are interested in, we prefer the specification in (4).

distribution across time periods. In this sense, the optimal fiscal policy is acyclical: because of voters' desire for consumption smoothing, private- and government consumption should not vary over the business cycle. Instead, the optimal policy implies $d_1 = -\varepsilon$, so that all fluctuations in output are fully absorbed by the deficit.

2.3 Equilibrium Strategies

We start by looking at the optimal strategy for the incumbent, given the voters' reservation levels g^*, τ^* and d^*, using backwards induction. After the election the victorious politician has no re-election motive, so she will ignore any voter demands set political rents at the maximum value, $r_2 = \bar{r}$. We assume that once the incumbent has secured maximum rents, she ensures an optimal balance between public and private consumption with the remaining resources in period 2. This implies equality between the marginal utilities of public and private consumption, which in our case means $g_2 = c_2$. Coupled with the government budget constraint, this implies that $g_2 = c_2 = \left(\bar{y} - (1+\rho)(d_1 + \varepsilon) - \bar{r}\right)/2$.

We now look at each of the incumbent's three options in period 1: in option (i) the incumbent satisfies all voter demands and sets $g_1 = g^*$, $\tau_1 = \tau^*$ and $d_1 = d^*$. Using the government budget constraint in (2), this gives us that political rents are $r_1 = \tau^*(\bar{y} + \varepsilon) - g^* + d^*$. In option (i) the incumbent is re-elected with certainty, which has a present value of $\bar{r}/(1+\rho)$. Thus, defining V_1 as the expected discounted value of political rents in option (i), we get:

$$V_1 = \tau^*(\bar{y} + \varepsilon) - g^* + d^* + \frac{\bar{r}}{1+\rho} \qquad (5)$$

In option (ii) the incumbent does not satisfy the voters' demand for the size of the deficit. The incumbent will in this case set the deficit at its maximum value, $\bar{d}$, since this allows more rents to be extracted. Re-election now only occurs if the excessive deficit is undiscovered, which happens with probability $1-p$. Defining V_2 as the expected discounted value of political rents in option (ii) we have

$$V_2 = \tau^*(\bar{y} + \varepsilon) - g^* + \bar{d} + (1-p)\frac{\bar{r}}{1+\rho} \qquad (6)$$

Finally, the incumbent always has the option of completely disregarding the voters' demands. In this case she will set rents and the deficit at their maximum values in period 1 and forego re-election. Defining V_3 in the same way as V_1 and V_2:

$$V_3 = \bar{r} \tag{7}$$

Voters must now choose optimal values of g^*, τ^* and d^* such that the incumbent chooses option (i).[6] We can then state the problem of the voters as:

$$\underset{g^*,\tau^*,d^*}{Max} \; \frac{\left((1-\tau^*)(\bar{y}+\varepsilon)\right)^{1-\theta}}{1-\theta} + \frac{g^{*1-\theta}}{1-\theta} + 2\beta \cdot \frac{\left(\left(\bar{y}-(1+\rho)(d^*+\varepsilon)-\bar{r}\right)/2\right)^{1-\theta}}{1-\theta} \tag{8}$$

$$s.t.\ V_1 \geq V_2 \ \ and \ \ V_1 \geq V_3$$

where we have inserted the expressions for c_2 and g_2 found above. Using equations (5) - (7) and $(1+\rho)^{-1} = \beta$ we can write the two constraints in this problem as

$$\begin{aligned} V_1 \geq V_2 &: \ \tau^*(\bar{y}+\varepsilon) - g^* + d^* + \frac{1}{1+\rho}\bar{r} \geq \tau^*(\bar{y}+\varepsilon) - g^* + \bar{d} - p\frac{1}{1+\rho}\bar{r} \Leftrightarrow p\beta\bar{r} \geq \bar{d} - d^* \\ V_1 \geq V_3 &: \ \tau^*(\bar{y}+\varepsilon) - g^* + d^* + \frac{1}{1+\rho}\bar{r} \geq \bar{r} \Leftrightarrow \tau^*(\bar{y}+\varepsilon) - g^* + d^* \geq (1-\beta)\bar{r} \end{aligned} \tag{9}$$

It is fairly easy to see that the constraint $V_1 \geq V_3$ must be binding in equilibrium. If this constraint were satisfied with strict inequality the voters could raise g^* or lower τ^* without violating either of the constraints and we must therefore have $V_1 = V_3$ in equilibrium. In contrast, it is of great importance to the equilibrium outcome whether the constraint $V_1 \geq V_2$ becomes binding or not.

In the appendix we show that the values of the deficit, consumption and tax rates that solve the problem in (8) are given by

$$\begin{aligned} &c_1 = c_2 = g_1 = g_2 = \left(\bar{y} - (1+\beta)^{-1}\bar{r}\right)/2 \\ &d_1 = -\varepsilon - \beta^2(1+\beta)^{-1}\bar{r} \\ &\tau_1 = 1 - \left(\bar{y} - (1+\beta)^{-1}\bar{r}\right)\left(2(\bar{y}+\varepsilon)\right)^{-1} \\ &\tau_2 = 1 - \left(\bar{y} - (1+\beta)^{-1}\bar{r}\right)\left(2(\bar{y}-\beta^{-1}\varepsilon)\right)^{-1} \end{aligned} \qquad if \quad \varepsilon < \left(p - \frac{\beta}{1+\beta}\right)\beta\bar{r} - \bar{d} \qquad (I)$$

[6] It is never optimal for the voters to choose reservation values such that the incumbent chooses option (ii) or option (iii). A proof of this claim can be obtained upon request.

and

$$
\begin{aligned}
c_1 &= g_1 = \left(\bar{y} + \varepsilon + \bar{d} - (1-(1-p)\beta)\bar{r}\right)/2 \\
c_2 &= g_2 = \left(\bar{y} - \beta^{-1}(\varepsilon + \bar{d}) - (1-p)\bar{r}\right)/2 \\
d_1 &= \bar{d} - p\beta\bar{r} \qquad \text{if} \quad \varepsilon \geq \left(p - \frac{\beta}{1+\beta}\right)\beta\bar{r} - \bar{d} \qquad \textit{(II)} \\
\tau_1 &= 1 - \left(\bar{y} + \varepsilon + \bar{d} - (1-(1-p)\beta)\bar{r}\right)\left(2(\bar{y} + \varepsilon)\right)^{-1} \\
\tau_2 &= 1 - \left(\bar{y} - \beta^{-1}(\varepsilon + \bar{d}) - (1-p)\bar{r}\right)\left(2(\bar{y} - \beta^{-1}\varepsilon)\right)^{-1}
\end{aligned}
$$

Using the government budget constraint, we then find that political rents are in both of the above solutions given by $r_1 = (1-\beta)\bar{r}$. If the shock to output in period 1 is sufficiently small, such that relative to period 2 the economy is in a recession or a modest boom, the solution in *(I)* applies. This solution is similar to the solution of the social planner: fluctuations in output are transmitted directly into the budget surplus, with no effect on the time profile of government consumption. Tax rates increase with output in order to smooth private consumption. Thus, fiscal policy is acyclical. Compared to the solution of the social planner, the only difference is the lower level of government consumption, which is due to a positive level of political rents. This is necessary to keep the incumbent from choosing option (iii) above.

The solution in *(II)*, which applies in case of a high value of ε, is very much different from the social planner's solution, however. Fluctuations in output are not smoothed at all. The tax rate in period 1 may go up or down as output increases, depending on the initial level, but private consumption increases unambiguously. Government consumption also rises in period 1 as ε increases. The lower level of revenue in period 2 then implies that private- and government consumption in period 2 falls. The timing of output now matters for the time profile of consumption and fiscal policy becomes procyclical.

So when does which solution apply? Technically, the difference between solution *(I)* and solution *(II)* is that the constraint $V_1 \geq V_2$ is binding in solution *(II)*, whereas it is satisfied with strict inequality in solution *(I)*. On a more intuitive level, the decisive condition on ε reveals an interesting prediction: fiscal policy becomes procyclical only when the economy is in a boom. Consider a shift in output from period 2 to period 1, i.e. an increase in the shock variable ε. Ideally, this should have no effect on the time profile of consumption, since such a shift does not affect the intertemporal government budget constraint. To smooth consumption, voters would therefore prefer a smaller deficit in period 1 when ε increases. This is exactly what happens when the economy is in a recession: departing from a low value, a small increase in ε makes voters require a smaller budget deficit and unchanged levels of private- and government consumption in exchange for their

vote. To secure herself re-election, the incumbent willingly satisfies the voters' demands and fiscal policy becomes acyclical.

If the economy is in a boom things are different: ideally, voters would now like to run a budget surplus in order to smooth consumption over the two time periods. But the high level of revenue during a boom provides the incumbent with an alternative that is too tempting to resist: since there is a chance an excessive deficit will go undetected, the incumbent will be tempted to drive the deficit to its maximum and pocket the bulk of the extraordinarily high revenue. In technical terms, the temptation to choose option (ii) instead of option (i) is too big. The constraint $V_1 \geq V_2$ now becomes binding. Realising this, voters will adjust their demands in such a situation. So when output increases further, voters now demand higher levels of consumption instead of a deficit reduction. The result is that fiscal policy now reacts strongly to output fluctuations in a procyclical manner. In sum, the model predicts that there is an asymmetry in the cyclical behaviour of fiscal policy: during recessions fiscal policy is acyclical. During booms, however, the political agency problem becomes more severe and fiscal policy becomes procyclical.

We now focus on the transparency variable *p*. The condition on ε for the solution in *(I)* to apply can be rewritten as $p \geq (\bar{d} - d_1)\beta\bar{r}$, where $d_1 = -\varepsilon - (1+\beta)^{-1}\beta^2\bar{r}$ is the solution for the deficit given in *(I)*. First, as a benchmark, consider the case $p = 0$, which reduces the model to the ACT framework described in section 2.1. Since d_1 is by definition smaller than $\bar{d}$, the inequality above is never satisfied for $p = 0$. Thus, we conclude that fiscal policy is always procyclical when fiscal transparency is completely absent. However, with a positive value of *p* the inequality may be satisfied. Let $\tilde{\varepsilon} \equiv (p - \beta(1+\beta)^{-1})\beta\bar{r} - \bar{d}$ be the maximum value of the shock ε that is consistent with solution *(I)*. A higher value of *p* increases this critical value, such that for any distribution of ε, a higher *p* increases the probability that solution (I) applies. A higher degree of transparency makes procyclical fiscal policy occur less frequently, as illustrated in Figure 1 below. To understand this result, remember that fiscal policy becomes procyclical in good times because voters rationally adjust their consumption demands upwards, fearing that the incumbent would otherwise waste the high level of revenue on political rents and run an excessive deficit. But a higher degree of transparency makes it less attractive to run an excessive deficit for the incumbent, since it increases the risk of being exposed. Thus, the higher the degree of transparency, the stronger must the boom be before the incumbent falls into temptation and runs a maximum deficit. This implies that voters will be willing to trust the incumbent with a larger amount of resources before they alter their consumption demands. In countries with a high degree of fiscal transparency we should therefore expect to see a procyclical reaction of fiscal policy in strong booms only. In countries with a low

degree of transparency, on the other hand, procyclical fiscal policy could occur at a much higher frequency.

[Figure 1 about here]

2.4 Discussion

The reason that fiscal policy is only procyclical in good times according to our model is that the temptation to cheat voters is stronger in booms. This is due to the fact that the amount of available resources is higher in booms than in recessions. For this to be a convincing story for developed countries we must emphasise the broad interpretation of political rents: when the level of income rises the incumbent can deliver the same levels of consumption with less effort, requiring a less careful conduct of fiscal policy, and with more room for superfluous spending on "ego-boosting" projects etc. Moreover, the model captures a general mechanism, which we believe is important in developed countries, namely that the pressure on the government from outside watchdogs such as the media, the opposition, international organisations and various interest groups is plausibly much stronger in recessions than in booms. Thus, the major benefit to the incumbent of a strong economy is the quiet life: with attention removed from budgetary issues it becomes easier to engage in all the activities that we have previously labelled as "extracting rents". The result, just as in our model, is that the temptation to increase rent extraction at the expense of a deficit reduction is higher in booms than in recessions. This is exactly what drives the asymmetric cyclical response of fiscal policy, since rational voters will then only demand a procyclical pattern in good times, when the temptation to cheat would otherwise dominate the fear of not earning re-election.

3 Empirical Methodology

We next turn to the data to test the implications of the model presented in the previous section. We do this on two different panel data sets: the first data set consists of annual observations for 21 OECD countries in the period 1989-2003.[7] The second data set broadens the sample of countries and the time period considered, covering 59 countries in the years 1980-1998. The sample of countries corresponds to Persson and Tabellini's (2003) data set.[8]

[7] The countries are: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland Ireland, Italy, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom and USA.

[8] The sample period for OECD countries (1989 – 2003) is chosen such that it fits the timing of our fiscal transparency measure (we use the transparency index from Alt and Lassen (2006b), see details below), which originates from an OECD survey in 1999. In order to lessen any problems of parameter non-constancy, we avoid using observations from the Persson –Tabellini dataset from before 1980.

To uncover the causal effect from business cycle fluctuations to fiscal policy we regress a fiscal indicator variable on a cyclical indicator interacted with variables of interest and a range of control variables. Moreover, we include a lag of the dependent variable to take into account any lags in the political decision process. We also include time- and country fixed effects. Thus, the baseline specification of the fiscal policy equation that we estimate is

$$F_{i,t} = \alpha_0 + \alpha_1 \cdot F_{i,t-1} + \boldsymbol{\beta}' \boldsymbol{Y}_{i,t} + \boldsymbol{\gamma}' \boldsymbol{X}_{i,t} + \eta_i + \lambda_t + v_{i,t} \quad , \quad i = 1, 2, ..., N \, , \, t = 2, ...T \tag{10}$$

where $F_{i,t}$ is our indicator of fiscal policy. $\boldsymbol{Y}_{i,t}$ denotes a vector containing one or more interaction terms between the cyclical indicator and some variable of interest. The vector $\boldsymbol{X}_{i,t}$ denotes a set of control variables. We estimate equation (10) using OLS and Within. However, it is well known that both these estimators are biased in the presence of a fixed effect and a lagged dependent variable. To account for this we also use the GMM system estimator developed in Arellano and Bond (1991), Arellano and Bover (1995) and Blundell and Bond (1998). In addition, to account for the possible reverse causality running from fiscal policy to macroeconomic conditions we always instrument the cyclical indicator with its own lags.[9]

4 Data

Indicator of Fiscal Policy: As our measures of fiscal policy we focus on government expenditure.[10] We consider both cyclically adjusted (excluding interest) as well as unadjusted, current disbursements as our fiscal indicator for the OECD sample.[11] To allow for comparisons across countries we express our fiscal variables relative to trend GDP. We use trend GDP instead of actual GDP to avoid ambiguities with the interpretation of the $\boldsymbol{\beta}$ coefficients, which occurs when dividing the fiscal indicator with a variable that fluctuates over the business cycle.[12] For the broader sample of countries only unadjusted fiscal data is available and so we use government spending relative to GDP from the Persson and Tabellini data set.

[9] All estimations are performed using OxMetrics 5.0.

[10] Corresponding results for government surplus and revenue are not reported but are available upon request.

[11] All fiscal variables used in the OECD sample are general government budget variables from the OECD Economic Outlook (EO) database.

[12] We define a fiscal policy as procyclical if an increase in economic activity leads to a higher level of government spending. If expenditure increases with economic activity the expenditure to GDP ratio may increase, decrease or stay unchanged when income rises. Thus, any sign of β could be consistent with a procyclical policy when expenditure is expressed relative to actual GDP. Dividing with trend GDP solves this problem, since trend GDP does not vary over the business cycle. For trend GDP we use OECD's calculation of potential GDP (using the production function method) available in the OECD EO database. For the Persson and Tabellini sample potential GDP is not available and so we divide with actual GDP, keeping in mind the caveats that arise from doing so.

Cyclical Indicator: For the OECD sample we use the output gap (OECD EO database) as our cyclical indicator. For the broader sample of countries we use the output gap from the Persson and Tabellini data set (based on HP filtering). Our model predicts that the response of fiscal policy to economic fluctuations during good times differs from the response in bad times. We therefore interact the output gap with dummy variables for good times (positive output gap) and bad times (negative output gap). We also include the dummy for positive output gap (d^{pos}) in the regression to control for any level differences in government spending.[13]

Fiscal transparency: In addition we also include a measure of fiscal transparency interacted with the output gap (in both good and bad times). For our OECD sample we use the fiscal transparency index developed in Alt and Lassen (2006b). This index ranges from 0 to 11 where each point represents an affirmative answer to a question concerning fiscal transparency sent to all budget directors of OECD member countries. The questions are presented in Table 2.[14] For the broader sample of countries no explicit index for fiscal transparency is available. However, our theoretical prior is that a higher degree of fiscal transparency reduces the procyclicality of fiscal policy through an improvement of the voters' ability to monitor the actions of the incumbent. Such an improvement of the monitoring technology may come about through other channels than direct reforms of the budget procedure. First of all, we expect the media to play a key role in this respect. Greater popular access to independent media is likely to enhance the general public's insight into fiscal affairs. Shi and Svensson (2006) develop an indicator to proxy for the share of informed voters in the population. The indicator is the product of the number of radios per capita and a dummy variable equal to one if the country is classified as having freedom of broadcasting (based on information from Freedom House). We use this indicator, which is available for 54 countries in our sample in the years 1980-1995.

Exogenous control variables: The vector $\boldsymbol{X}_{i,t}$ contains the control variables used in our benchmark specification, of which many have become standard in cross-sectional and panel data studies of fiscal policy. We use the following benchmark control variables: the demographic dependency ratio, the sum of exports and imports as a ratio to GDP, the inflation rate, a dummy for election year, a measure of trend or structural unemployment, the government debt to GDP ratio in the previous year, a dummy for majoritarian electoral system and the natural log of trend real GDP per capita. In the broad sample we also include a dummy for democracy and a dummy for presidential form of government. By default we include time dummies to control for sample-wide

[13] A similar approach is used in Hercowitz and Strawczynski (2004) and Persson and Tabellini (2003). However, these authors do not include the level dummy for positive output gap.

[14] Compared to Alt and Lassens's index we drop the question shown in column (6) in Table 2 due to missing observations for Greece, Portugal and Spain. Further, we also include the question in column (11). Note that the index is constant over time.

exogenous shocks. However, we sometime remove these dummies to restore degrees of freedom. For the OECD sample the data for inflation, NAIRU and government debt are from the OECD EO database, the dummies for election year and majoritarian systems are taken from the Persson and Tabellini data set and the IEFS election guide[15]. The data for trend income, openness to trade and the dependency ratio are from WDI (2005). For the broader sample we use the Persson and Tabellini data set as the source except for inflation and trend income, which is taken from WDI (2005). Due to lack of data availability trend unemployment and debt are omitted from the regressions based on this sample.

5 Empirical Evidence from OECD Countries

5.1 Fiscal Policy and Asymmetric Responses to Economic Activity

Columns (1) to (6) in Table 1 show estimation results for cyclically adjusted government spending for the OECD countries. Columns (1)-(3) report the results using a specification where the output gap is included without any interaction terms. The coefficient on *gap* is statistically insignificant in all three columns, indicating that government spending is acyclical. This is in line with what previous studies have found for the OECD countries (e.g. Talvi and Végh (2005) and Alesina, Campante and Tabellini (2008))[16]. However, this result comes about from mixing up two regimes. Columns (4)-(6) split the output gap into good and bad times and include a dummy for positive output gap. The result from doing so is striking. The coefficient on the output gap interacted with a dummy for good times ($gap \cdot d^{pos}$) is clearly positive and highly significant for all estimators considered. The corresponding coefficient for bad times is insignificant and very close to zero. Thus, government spending seems to be procyclical in good times and acyclical in bad times, which is in line with our model's predictions.[17] Our estimates suggest that, during good times, the increase in government spending in reaction to a one percentage point increase in the output gap could be as large as one percent of potential GDP. The lowest estimate (GMMSYS) suggests an increase of about 0.25 percent of potential GDP. The level dummy d^{pos} is negative,

[Table 1 about here]

[15] Data for elections after 1998 are taken from the IEFS Election guide.

[16] Previous studies obtaining this result often use cyclically unadjusted variables as well as using dependent variables relative to GDP, rather than trend or potential GDP.

[17] Looking at government revenue we do not find the same clear asymmetric response, in fact, revenue seems acyclical or counter cyclical in good times. The results for the government surplus are similar to the spending results, only weaker, and we therefore conclude that this procyclical result comes from the spending side of the government budget.

indicating that spending drops a little in level when the output gap becomes positive, however, the coefficient is not significant. [18]

In Column (7) we consider the unadjusted current disbursements as the dependent variable. The result is the same clear profile as with the adjusted data: government spending is significantly more procyclical in good times than in bad times. In columns (8) to (10) we look at subcomponents of (unadjusted) government spending. Government consumption is procyclical in good times, and more so than in bad times, although the difference is less pronounced than for overall spending. Even Social Security Benefits, which we would expect to be heavily influenced by automatic stabilisers, display a procyclical behaviour in good times (and countercyclical behaviour in bad times).

5.2 Fiscal Transparency

The next step of our analysis is to include a measure of fiscal transparency in our econometric specification. We start by interacting the output gap in good and bad times with each of the dummies used to construct the transparency index in Alt and Lassen (2006b), using one dummy at a time.[19] The results are summarised in Table 2 below: using the GMMSYS estimator we find that most of the fiscal transparency dummies reduce the procyclicality of cyclically adjusted spending in good times. Some questions have a very clear significant effect: a legal requirement of an ex post comparison between projected and actual expenditures (question [5]) reduces the procyclicality of spending in good times, and this effect is significant at the 1% level. The same strong effect appears if the government is required to produce actuarial estimates for social security spending (question [11]). The first of these results fits particularly nicely with our theoretical priors: large discrepancies between projected and actual spending seem like a strong warning sign that the government may be trying to hide a large deficit. Thus, a legal requirement of an ex post comparison makes it quite likely that "cheating" governments will be exposed. We therefore believe that this question picks up the idea behind our model parameter of fiscal transparency, *p*, quite accurately and the accordance with our theoretical priors is encouraging.

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[18] To test whether our results are affected by the introduction of the EMU, we experimented with including an interaction term between a dummy for EMU participation (equal to 1 after 1994) and the output gap in good and bad times. The results suggested that the procyclical response in good times is halved from EMU membership, but the coefficient on $gap \cdot d^{pos}$ was in all cases still positive and significant. The effect of EMU participation in bad times was insignificant for OLS and Within, however, GMMSYS suggested that spending policies are more countercyclical in bad times in EMU countries.

[19] We present the results for 12 questions on transparency (the dummies are equal to 1 in case of transparency). The index used in Alt and Lassen (2006b) includes 11 of these questions, since the question in column 11 in

Table 2 is not included in their original index.

Next we move on to consider the aggregation of the dummies in Table 2 into a full index ($transp^{11}$).[20] Column (1) in Table 3 show the results for cyclically adjusted government spending, while columns (2) use unadjusted spending. In columns (3) through (5) we look at the subcomponents of (unadjusted) spending. The coefficient on $transp^{11}$ interacted with the output gap in good times is negative and significant at a 10% level using adjusted government spending, while it is negative and significant at the 1% level for unadjusted spending. This is in nice accordance with our theory: a back-of-the- envelope calculation (using the results from column (1)) suggests that in a country scoring zero on the transparency index, government spending increases by 0.32 percent of potential GDP in reaction to an increase of 1 percentage point in the output gap during good times. The corresponding reaction in a country at the other end of the transparency scale is an increase of $0.32 - 11 \cdot 0.029 = 0.00$. Thus, going from a complete lack of transparency to full disclosure eliminates the procyclical reaction of government spending in good times.[21]

We find similar effects of fiscal transparency in the subcomponents of spending as in aggregate spending, although the effect seems to be somewhat weaker for social security benefits (insignificant but with the correct sign). In results not reported here (available upon request), we also tried to include interaction terms between the output gap and the number of veto players (Polcon5 from Henisz (2000) as well as and the degree of "delegation" of powers and "contracts" using the variables from Hallerberg *et al* (2009), in addition to the interactions with our fiscal transparency measure. Our above conclusions are overall robust to the inclusion of these additional controls.

[Table 2 and Table 3 about here]

So far we have avoided the results for transparency in bad times. The story is not quite as we expected: in most estimations we find that the coefficient on the interaction between the output gap in bad times and the transparency indices are positive and significant (on a 1% level). This suggests that fiscal policy in bad times becomes more procyclical when transparency increases. This does not square with our theory. Taken at face value, our results indicate that the countries that have a high degree of fiscal transparency are also the countries that have been most prone to running procyclical policies during bad times. However, it is likely that the high degree of fiscal transparency is caused by the exact same procyclical policies, rather than the other way around. In other words, we suspect that the counterintuitive sign arises due to a problem of reverse causality. Procyclical fiscal policies during recessions can be extremely damaging and may trigger reforms that increase the degree of fiscal transparency. If this is indeed the case, and we estimate an equation like (10) with a time invariant measure of fiscal transparency, we may falsely conclude

[20] We drop question 6 in all cases due to missing observations.

[21] Our GMMSYS estimations results are robust to using various combinations of lags of the dependent variable as instruments.

that the causation runs in the opposite direction, that is, that a higher degree of fiscal transparency leads to a procyclical fiscal policy during periods of low economic activity. In the lack of obvious candidates for instrumental variables we do not attempt to correct this problem. Rather, we advice that the potential endogeneity of fiscal transparency should be kept in mind when interpreting our results. Note however, that the main driver behind this result seems to be question 3 in Table 2, whereas the effect seems much weaker for the other questions. Also note that this type of bias is also likely to affect our results for good times. This cannot explain the obtained results, however. On the contrary, the presence of such reverse causality in good times would work against our theoretical priors and pull the coefficient on $transp^{11} \cdot gap \cdot d^{pos}$ in a positive direction. On this background, the obtained negative coefficients are even more noteworthy.

6 Evidence from a Broader Sample of Countries

We next move on to consider the evidence of asymmetric spending policies and the effect of voter information in a broad sample of countries. Having a sample of both developed and developing countries enables us examine whether fiscal policy is inherently less procyclical in developed countries than in developing countries, as claimed in some studies.[22]

6.1 Asymmetries in Fiscal Policy

In Table 4 we look at the cyclical response for government expenditure. The coefficients on the output gap in columns (1)-(3) are all positive, albeit only mildly statistically significant in column (2).

Splitting the output gap variable into positive and negative values as in columns (4)-(7) only provides very weak evidence of an asymmetry in the spending pattern – unlike in the OECD sample. The coefficient on the output gap in good times is in all columns except (7) higher than the coefficient on the output gap in bad times, but in all cases a t-test fails to reject the hypothesis that they are in fact equal.

6.2 OECD Countries versus Non-OECD Countries

Judging from the results in the previous section, it seems that the results that we obtained for the OECD countries do not apply to a more heterogeneous group of countries. We now explore this issue in further detail, explicitly distinguishing OECD countries from non-OECD countries. In Table 5 columns (1)-(3) we find indications of a procyclical pattern in OECD countries which does

[22] See e.g. Gavin and Perotti (1997) and Talvi and Végh (2005).

not seem to be present in non-OECD countries. This is in contrast to earlier results in the literature, e.g. the results in Talvi and Végh (2005). Note however, that the hypothesis of equal output gap coefficients in the spending equation for the two groups of countries is only rejected in column (1).[23] In columns (4)-(8) we dig deeper into the spending policy differences between OECD and non-OECD countries. In addition to separating OECD countries from non-OECD countries we now also distinguish good times from bad times. Since the Within estimates in column (5) are very large and imprecisely determined, we report results from a Within estimation where the level dummies for positive output gaps have been removed in column (6). The GMMSYS estimates in column (7) have high standard errors and we therefore also report GMMSYS estimates omitting time dummies in column (8). The coefficient on $gap \cdot d^{pos} \cdot OECD$ is positive in all cases and statistically significant in all other columns than (5) and (7). The coefficient on $gap \cdot (1 - d^{pos}) \cdot OECD$, on the other

[Table 4 about here]

hand, has an alternating sign and is never statistically significant. We are able to reject a null hypothesis that the two coefficients are equal against a one-sided alternative (again, with the exception of columns (5) and (7)). Hence, the data suggest that government spending policies are procyclical in good times in OECD countries. There is no solid evidence of the same procyclical pattern in bad times. This confirms the results from the OECD sample. A similar asymmetry does not seem to be present in non-OECD countries. The coefficients on $gap \cdot d^{pos} \cdot nonOECD$ and $gap \cdot (1 - d^{pos}) \cdot nonOECD$ are never statistically significant and we fail to reject the hypothesis that they are equal in all cases.[24]

[23] Looking at the surplus we find that in OECD countries, the budget surplus in percent of GDP seems to be unrelated to the output gap, whereas there is a clear negative relationship between these variables in non-OECD countries, despite the presence of automatic stabilisers in the dependent variable (note, this difference might be due to differences in the size of automatic stabilisers for the two groups, since we expect automatic stabilisers to have a stronger effect on overall fiscal policy in the OECD countries). Looking at revenue, we find solid evidence of a more procyclical pattern of government revenue in non-OECD countries than in OECD countries. Hence the procyclical pattern for the surplus in non-OECD countries stems from the revenue side.

[24] The results for the budget surplus are very similar to the ones for spending. We do not find any solid evidence of an asymmetric cyclical pattern in government revenue, neither among OECD countries, nor among non-OECD countries. It is worth noting, however, that there are weak signs of a negative relationship between government revenue and the output gap in bad times in non-OECD countries. Thus, the negative relationship between the surplus to GDP ratio and the output gap in this group of countries (see note 23) seems to work through the revenue side of the government budget in bad times, rather than the expenditure side in good times.

6.3 Fiscal Policy and Voter Information

In Table 5 columns (9) and (10) we interact the Shi and Svensson (2006) indicator, *INFO,* with the output gap in good and bad times to explore the effect of voter information on the cyclicality of government spending. *INFO* is highly correlated with the dummy variable for OECD countries, with a correlation coefficient of 0.54. Thus, to obtain reliable estimates of the effect of increased media access we must control for OECD membership, since we have seen that the cyclical pattern of fiscal pattern is very different in OECD countries than in non-OECD countries.[25] This involves a great number of interaction terms with the output gap. At the same time, the inclusion of *INFO* means that the number of observations available for analysis falls. Combining these two things, we fear that we may be stretching the data too far and we therefore choose to omit time dummies in order to restore degrees of freedom. The OLS estimates in column (9) and the GMMSYS estimates in column (10) both suggest that high-information countries run less procyclical spending policies in good times. The effect of a higher value of *INFO* is quite large and statistically significant at the five percent level in both cases. There does not seem to be a similar effect in bad times, at least not of the same

[Table 5 about here]

magnitude. Further, the positive coefficients on $gap \cdot d^{pos} \cdot nonOECD$ indicate that low-information countries among the non-OECD members also run procyclical spending policies in good times.[26]

A final note concerns the role of voter information versus the role of corruption. Alesina, Campante and Tabellini (2008) find evidence that fiscal policy is more procyclical in countries with widespread corruption. In column (11) of Table 5 we confirm this finding, using the same control of corruption measure as Alesina, Campante and Tabellini.[27] However, the results in column (12) show that the significant sign on the control of corruption measure vanishes when we also control for voter information. The effect of *INFO* is largely unaffected by the inclusion of control of corruption and still significant in good times. These observations are consistent with the argument of this paper: a higher degree of voter information reduces the scope for corruption and thereby also reduces the degree of procyclicality.

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[25] We have also tried running estimations with *INFO* included without controlling for OECD membership. The results were similar to the results in section 6.2, with *INFO* playing the same role as *OECD* did in section 6.2. We suspect that this merely reflects the strong correlation between *INFO* and *OECD*, rather than a true causal effect of *INFO*.

[26] As a robustness check we included terms of trade as exogenous variable as done in e.g. Gavin and Perotti (1997). All our main results were roughly unaffected.

[27] See Kaufmann, Kraay and Mastruzzi (2006) for details on the World Bank corruption measure.

7 Interpreting the Results

Panel A in Figure 2 illustrates the impact of output fluctuations on the level of government spending in a typical OECD country, based on the coefficients reported in Table 1. The figure is constructed such that an output gap equal to zero corresponds to a neutral effect on government spending. The picture drawn here is in many ways reminiscent of Figure 1, which illustrated the profile of government spending according to the model that we presented in section 2: fiscal policy is more or less acyclical when the output gap is negative, but reacts procyclically to changes in income when the output gap is positive. Panel A shows a level drop in government spending at a zero output gap in OECD countries, which we do not model theoretically, but this is quite small and statistically insignificant.[28] We interpret the similarity between the two figures as evidence in favour of our theory of fiscal policy.

The asymmetric spending pattern found for the group of OECD member states does not apply directly to a broader sample of countries. The econometric analyses in section 6 shed some light on the differences between the highly developed group of OECD countries versus the heterogeneous group of non-OECD countries. The results are illustrated in panel B in Figure 2. For the OECD countries, we confirm the results from section 5: fiscal policy is procyclical in good times but not in bad times. The picture is slightly more blurred in the group of non-OECD countries, where government spending does not appear to react to fluctuations in output. However, in results not reported we find some evidence on the revenue
side of the government budget, which indicate that fiscal policy is more procyclical in bad times in this group of countries.

[Figure 2 about here]

These differences lead us to believe that we need two different explanations for the occurrence of procyclical fiscal policies, depending on which group of countries we consider. For the middle- and low income countries in the group of non-OECD members, our results are consistent with Gavin and Perotti's (1997) explanation of procyclical fiscal policy: when the economy hits a slump, falling government revenue may necessitate a procyclical fiscal contraction due to binding credit constraints. Fiscal policy is therefore likely to become procyclical in bad times. In the high income OECD member states, on the other hand, governments are (usually) not credit constrained, and the above-mentioned explanation cannot account for the occurrence of procyclical fiscal policies among these countries. Instead, the model presented in this paper can explain the observed pattern of government spending in OECD countries.

[28] In estimations not reported, we tested out the level difference between good and bad times. Doing so pulls the positive coefficient in good times closer to zero. However, the coefficients are still large, positive and clearly significant.

An interesting question is then, why the same spending pattern appears to be absent (or at least not very strong) among the non-OECD countries in good times. A natural point to make here is that the average quality of democracy among the OECD countries is higher than in the remainder of countries in the broad country sample. Unless the populations in less democratic countries have some alternative means of holding the incumbent accountable (such as revolts or strikes), we expect spending *pressures* to have limited impact on actual spending *policies* in countries where the political accountability mechanism imposed by the electoral process is not as strong as in mature democracies.

8 Conclusions

Procyclical fiscal policies occur in OECD countries as well as in less advanced economies. However, the exact way in which the procyclical patterns occur differs between these groups of countries. In OECD countries we find a strong asymmetry between good and bad times. A procyclical fiscal policy is a phenomenon that is typically associated with times of economic prosperity in these advanced economies. During times of economic slowdown, on the other hand, fiscal policy is typically acyclical or countercyclical. Matters are different in less advanced economies where procyclicality is a phenomenon that is more likely to occur in bad times.

This paper offers a novel explanation of these observations by highlighting the role of fiscal transparency: a lack of fiscal transparency gives scope for rent seeking behaviour in fiscal policymaking. In times of economic slowdown or moderate economic activity, voters can restrain such rent seeking behaviour by conditioning re-election of the politicians holding office on observed performance. However, when the economy is booming it becomes easier for politicians to extract rents. The abundance of resources provides the incumbent with a temptation that is too great to resist. Fully aware of this change in circumstances, voters increase their consumption demands in good times. Voters not only tolerate, but actually demand a seemingly suboptimal procyclical fiscal policy in good times. These demands are not a result of irrational or myopic thinking. Rather, the strategy of the voters ensures a second-best solution to the fiscal policy problem. This argument can explain why fiscal policy is more procyclical in good times than in bad times in advanced economies.

Our model of fiscal policy also generates an original auxiliary prediction: the procyclical bias in good times should be less severe in countries where fiscal transparency is high, since a transparent budget practice alleviates the moral hazard problem between voters and politicians by improving voters' ability to monitor the actions of their elected representatives. We find empirical evidence in support of this prediction in OECD countries as well as in a broader sample of countries: better access to information about government policies, either via a high degree of fiscal transparency or

through a free an active press, does reduce the procyclical bias in government spending in good times.

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10 Appendix

In this appendix we present the solution to the voters' problem. We allow for the possibility that the maximum level of rents in option (iii) depends positively on the level of income, so that $r_t \le \bar{r} + \gamma y_t$, where $\gamma \ge 0$. Rent collection in period 2 now becomes $r_2 = \bar{r} + \gamma y_2$, and consumption in period 2 is given by $g_2 = c_2 = \tfrac{1}{2}\left((1-\gamma)y_2 - (1+\rho)d_1 - \bar{r}\right)$.

Turning to period 1, the expected discounted values of political rents in the three options become $V_1 = \tau^* y_1 - g^* + d^* + (1+\rho)^{-1}(\bar{r} + \gamma y_2)$, $V_2 = \tau^* y_1 - g^* + \bar{d} + (1-p)(1+\rho)^{-1}(\bar{r} + \gamma y_2)$ and $V_3 = \bar{r} + \gamma y_1$, respectively. The voters' problem is then to choose values of g^*, τ^* and d^* so as to maximize their utility given in (1), subject to the constraints $V_1 \ge V_2$, $V_1 \ge V_3$, $d^* \le \bar{d}$ and the expressions for c_2 and g_2 given above. Rearranging the two incentive constraints and using $\beta(1+\rho) = 1$, we can write the Lagrangian for this problem as

$$L = \frac{\left((1-\tau^*)y_1\right)^{1-\theta}}{1-\theta} + \frac{g^{*1-\theta}}{1-\theta} + 2\beta \cdot \frac{\left(\tfrac{1}{2}((1-\gamma)y_2 - \beta^{-1}d^* - \bar{r})\right)^{1-\theta}}{1-\theta}$$
$$-\lambda_1\left(\bar{d} - d^* - \beta p(\bar{r} + \gamma y_2)\right) - \lambda_2\left(g^* - d^* - \tau^* y_1 + (1-\beta)\bar{r} + \gamma(y_1 - \beta y_2)\right) - \lambda_3(d^* - \bar{d})$$

The Kuhn-Tucker first-order conditions are then given by

$$\frac{\partial L}{\partial \tau^*} = 0 \Leftrightarrow \left((1-\tau^*)y_1\right)^{-\theta} = \lambda_2$$
$$\frac{\partial L}{\partial g^*} = 0 \Leftrightarrow \left(g^*\right)^{-\theta} = \lambda_2$$
$$\frac{\partial L}{\partial d^*} = 0 \Leftrightarrow c_2^{-\theta} = \lambda_1 + \lambda_2 + \lambda_3$$

and the complementary slackness conditions are

$$\lambda_1\left[\bar{d} - d^* - p\beta(\bar{r} + \gamma y_2)\right] = 0\ ,\ \lambda_1 \ge 0$$
$$\lambda_2\left[g^* - d^* - \tau^* y_1 + \bar{r}(1-\beta) + \gamma(y_1 - \beta y_2)\right] = 0\ ,\ \lambda_2 \ge 0$$
$$\lambda_3\left[d^* - \bar{d}\right] = 0,\ \lambda_3 \ge 0$$

We are mainly interested in situations where the constraint $d^* \leq \bar{d}$ is unbinding. A binding borrowing constraint would give rise to a procyclical fiscal policy as originally described by Gavin and Perotti (1997). Since that is not our focus in this paper, we assume for now that $d^* < \bar{d}$ in optimum and that λ_3 is zero. We shall later derive a condition on the time profile of output that ensures that this is satisfied.

As explained in the text, the constraint $V_1 \geq V_3$ must be satisfied with equality in optimum, so that $g^* - d^* - \tau^* y_1 + \bar{r}(1-\beta) + \gamma(y_1 - \beta y_2) = 0$. Thus, we are left with two possible cases:

Case 1): $\lambda_1 = 0$ (the constraint $V_1 \geq V_2$ is unbinding). Combining the Kuhn-Tucker first-order conditions with the complementary slackness conditions then gives $(1-\tau^*)y_1 = g^* = c_2$. Using $c_t = (1-\tau_t)y_t$, $V_1 = V_3$ and the expressions for c_2 and g_2 given above, we then get the solution candidate

$$\begin{aligned} d^* &= \beta(1+\beta)^{-1}\left((1-\gamma)(y_2 - y_1) - \beta(\bar{r} + \gamma y_2)\right) \\ g^* &= (1+\beta)^{-1}\left((1-\gamma)y_1 + \beta y_2 - \bar{r}\right)/2 \\ \tau^* &= 1 - \frac{(1-\gamma)y_1 + \beta y_2 - \bar{r}}{2(1+\beta)y_1} \end{aligned} \qquad \text{(A.1)}$$

The solution candidates for political rents and consumption in period 2 can then be found by substituting these expressions into the government budget constraint and $g_2 = c_2 = \tfrac{1}{2}\left((1-\gamma)y_2 - (1+\rho)d_1 - \bar{r}\right)$. For (A.1) to be a solution candidate, we must at the same time ensure that the constraint $V_1 \geq V_2$ is indeed satisfied. This implies that (A.1) is only a solution candidate if

$$d^* \geq \bar{d} - p\beta(\bar{r} + \gamma y_2) \Leftrightarrow y_1 \leq y_2 + \frac{1}{1-\gamma}\left(\left(p(1+\beta) - \beta\right)(\bar{r} + \gamma y_2) - \frac{1+\beta}{\beta}\bar{d}\right) \qquad \text{(A.2)}$$

Case 2): $\lambda_1 > 0$ (the constraint $V_1 \geq V_2$ is binding). We now have $V_1 = V_2$, $V_1 = V_3$ and $(1-\tau^*)y_1 = g^*$, where the latter equation follows from the first-order conditions. This is three equations in the three unknowns, g^*, τ^* and d^*. Solving these three equations yields the solution candidate

$$
\begin{aligned}
d^* &= \bar{d} - p\beta(\bar{r} + \gamma y_2) \\
g^* &= \left((1-\gamma)y_1 + \bar{d} - (1-(1-p)\beta)\bar{r} + \gamma(1-p)\beta y_2\right)/2 \\
\tau^* &= 1 - \frac{(1-\gamma)y_1 + \bar{d} - (1-(1-p)\beta)\bar{r} + \gamma(1-p)\beta y_2}{2y_1}
\end{aligned}
\tag{A.3}
$$

Political rents and period 2 consumption levels can again be found from the government budget constraint and the expression $g_2 = c_2 = \left((1-\gamma)y_2 - (1+\rho)d_1 - \bar{r}\right)/2$.

We must now determine which of the two candidates is the actual solution. First, note that if the condition in (A.2) is not satisfied *case 1)* does not deliver any solution candidate. Hence, in this situation *case 2)* gives a unique solution candidate and, given the concavity of the objective function, this must then be the solution. On the other hand, if (A.2) is in fact satisfied, then the solution candidate in case 1) is the actual solution. This can be seen by noting that government consumption in *case 1)* is in each period a weighted average of the *case 2)* levels of government consumption in period 1 and period 2. The same is true for private consumption. The concavity of the utility function then implies that the *case 1)* candidate yields higher utility than the *case 2)* candidate.

To sum up, whenever the condition in (A.2) is satisfied, the solution to the voters' problem is given by the expressions in (A.1). Whenever (A.2) is not satisfied, the solution is given by the expressions in (A.3). Setting $\gamma = 0$ and using the formulations for y_1 and y_2 given in (4), we then get the solution presented in the text. The main difference between the solution with $\gamma = 0$ and the more general case presented here is that a change in the time profile of output that leaves the present discounted value of total output unchanged is no longer neutral for consumption in *case 1)* when $\gamma > 0$. A PDV-neutral shift of output towards period 1 now lowers both types of consumption in both periods. The reason is that such a shift makes option (iii) more attractive to the incumbent, because more rents could now be collected in period 1. At the same time, fewer rents can be collected in period 2, which lowers the value of re-election to the incumbent. To keep the incumbent from choosing option (iii) voters must therefore moderate their demands for consumption. This effect vanishes when $\gamma = 0$.

The main results of the model still hold with $\gamma > 0$, however: When output is low there is full consumption smoothing and marginal increases in period 1 output are spread out equally over the two periods via a lower budget deficit. When period 1 output becomes sufficiently high, however, further increases are transmitted into higher consumption in period 1 only, consumption smoothing breaks down and fiscal policy becomes procyclical. A higher degree of fiscal transparency allows

a higher level of period 1 output before consumption smoothing breaks down, and thus reduces the procyclical bias in good times.

It remains to make sure that the upper bound on the deficit is not violated in equilibrium. It is clear from (A.3) that $d^* \leq \bar{d}$ is always satisfied in case 2). From (A.1) we can find the appropriate condition in *case 1)* as $y_1 \geq (1-\gamma)^{-1}\left((1-\gamma(1+\beta))y_2 - \beta\bar{r} - \beta^{-1}(1+\beta)\bar{d}\right)$.

Note that this cut-off is always below the cut-off value given in (A.2) as long as $p > 0$. We implicitly assume that the condition here is always satisfied. A violation of this condition would imply a binding credit constraint in period 1. Fiscal policy would be procyclical, but for reasons that are entirely different than the ones that we focus on in this paper.

Figure 1. The reaction of government consumption to a positive output shock

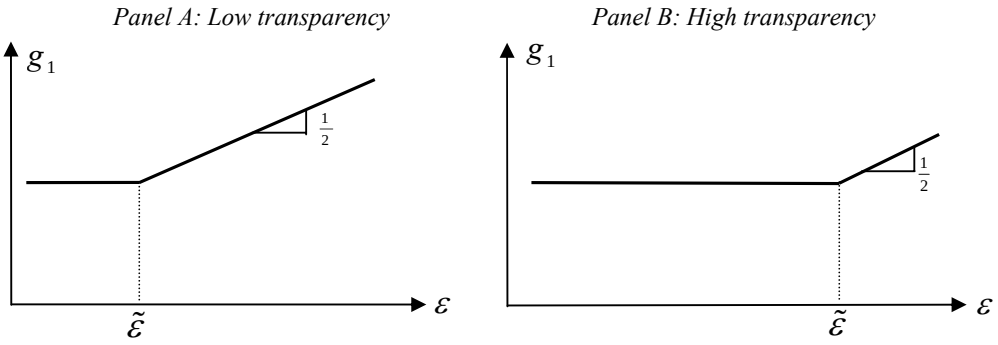
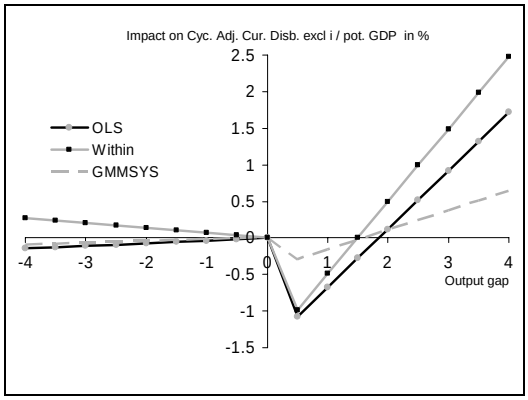
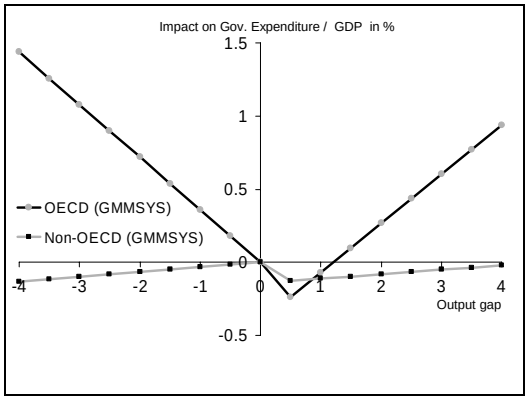


Figure 2: The impact of output fluctuations on government spending

A: OECD sample - Profile of Gov. Spending



B: Broad Sample- Profile of Gov. Spending



Notes:

(1) The graphs in Panel A are based on estimation results from Table 1, columns(4)-(6)

(2) The graphs in Panel B are based on estimation results from Table 5, column (8)

Table 1: Asymmetric Response of the Spending Side of the Government Budget, OECD countries 1989-2003

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dependent Variable:	----- Cyc. Adj. Current Disbursements excl. interest as percentage of potential GDP -----						Cur. Dis. / pot GDP	Cons / pot. GDP	Wage Cons. / pot GDP	Soc.Sec. / pot GDP
Estimation method:	*OLS-IV*	*Within-IV*	*GMMSYS*	*OLS-IV*	*Within-IV*	*GMMSYS*	*GMMSYS*	*GMMSYS*	*GMMSYS*	*GMMSYS*
$gap_{i,t}$	0.053	0.018	0.019	-	-	-	-	-	-	-
	(0.05)	(0.05)	(0.05)							
$gap \cdot d_{i,t}^{pos}$	-	-	-	0.799***	0.990***	0.2678***	0.200***	0.135***	0.125***	0.078*
				(0.25)	(0.38)	(0.08)	(0.07)	(0.05)	(0.03)	(0.04)
$gap \cdot (1 - d_{i,t}^{pos})$	-	-	-	0.036	-0.069	0.023	-0.021	0.082***	0.067***	-0.092***
				(0.06)	(0.08)	(0.04)	(0.05)	(0.02)	(0.02)	(0.03)
$d_{i,t}^{pos}$	-	-	-	-1.478	-1.48	-0.428	-0.241	-0.255	-0.156**	-0.220**
				(0.73)	(0.93)	(0.22)	(0.19)	(0.12)	(0.06)	(0.11)
Time dummies:	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control variables included	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No of observations	257	257	257	257	257	257	257	257	244	257

Notes:

*(1) *, **, and *** indicate significance on a 10%, 5% and 1% level, respectively.*

(2) The following control variables are included in all columns: lagged dependent variable, inflation rate, NAIRU, public debt in previous year, election year dummy, log of trend income, sum of exports and imports as a share of GDP and demographic dependency ratio. A time invariant dummy for majoritarian electoral system is included in columns (1) and (4).

(3) For OLS and Within estimations all output gap variables are instrumented with their one time lagged level value.

(4) GMMSYS uses level lags from 2 to 12 of the lagged dependent variable in its differenced equation. In this equation the output gap variables are instrumented using their own two times lagged level values. For the level equation of GMMSYS the lagged dependent variable as well as the output gap variables are instrumented by their own one time lagged differenced values.

(5) In no case, except for Social Security Benefits, did the m2 test for no second order autocorrelation in the differenced equation reject. Since the m3 test for no third order autocorrelation did not reject we used the level lags 3 to 12 as instruments of the lagged dependent variable for Social Security Benefits.

(6) Columns (7) to (10) only show results using the GMMSYS estimator, however, the results using OSL and Within are roughly the same and are thus omitted.

Table 2: Interacting the output gap with single fiscal transparency dummies, OECD countries 1989-2003

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Dependent Variable:	---------- *Cyc. Adj. Cur. Dis. excl. interests / pot. GDP* ----------											
Estimation method: GMMSYS	Accrual accounting (yes = transparent)	Whether the government generally presents more than one supplementary budget to the legislature in each fiscal year (no = transparent)	Whether non-financial performance data is routinely included in the budget documentation presented to the legislature (yes = transparent)	Whether there is a legal requirement that the budget documentation contain a projection of expenditure beyond the next fiscal year (yes = transparent)	Whether it is a legal requirement that the budget include an ex post comparison between projected expenditure in future years and the actual expenditures in those years (yes = transparent)	Whether the in-year financial reports are audited (yes = transparent)	Whether special reports on the fiscal outlook are released prior to an election (yes = transparent)	Whether the economic assumptions used in the budget are subject to independent review (yes = transparent)	Whether the budget discusses the impact that variations in the key economic assumptions would have on the budget outturn (yes = transparent)	Whether the government regularly produces a report on the long term (10-40 years) outlook for public finances as a whole (yes = transparent)	Whether the government is required to make regular actuarial estimates for social security programs (yes = transparent)	Whether the government is required to report contingent liabilities on a regular basis (yes = transparent)
Sign on transparency dummy interacted with positive output gap	-	-	-	+	-	-	+	-	+	+	-	-
			**		***				***		***	*
Sign on transparency dummy interacted with negative output gap	+	+	+	+	+	-	+	+	+	-	+	+
	*		***	*	*							
Time dummies:	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Controls	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
No of observations	*257*	*257*	*257*	*257*	*257*	*223*	*257*	*257*	*257*	*257*	*257*	*257*

Notes:

*(1) *, **, and *** indicate significance on a 10%, 5% and 1% level, respectively.*

(2) GMMSYS uses level lags from 2 to 12 of the lagged dependent variable in its differenced equation. In the difference equation the output gap variables are instrumented using their own two times lagged level values. For the level equation of GMMSYS the lagged dependent variable as well as the output gap variables are instrumented by their own one time lagged differenced values.

(3) The m2 test was performed for all estimations and in no case was the validity of the instruments rejected.

Table 3: Interacting the output gap with transparency, OECD countries 1989-2003

	(1)	(2)	(3)	(4)	(5)
Dependent Variable:	*Cyc Adj Cur Disb / pot. GDP*	*Cur Disb / pot. GDP*	*Cons / pot. GDP*	*Wage cons / pot. GDP*	*Soc Sec / pot. GDP*
Estimation method:	*GMMSYS*	*GMMSYS*	*GMMSYS*	*GMMSYS*	*GMMSYS*
$gap_{i,t} \cdot d_{i,t}^{pos}$	*0.322***	*0.373***	*0.248***	*0.196***	*0.157**
	(0.08)	*(0.09)*	*(0.09)*	*(0.04)*	*(0.08)*
$gap_{i,t} \cdot (1 - d_{i,t}^{pos})$	*-0.289***	*-0.325***	*-0.163***	*-0.079***	*-0.114**
	(0.10)	*(0.10)*	*(0.03)*	*(0.02)*	*(0.06)*
$transp_i^{11} \cdot gap_{i,t} \cdot d_{i,t}^{pos}$	*-0.029**	*-0.055***	*-0.030***	*-0.021***	*-0.019*
	(0.02)	*(0.02)*	*(0.01)*	*(0.01)*	*(0.02)*
$transp_i^{11} \cdot gap_{i,t} \cdot (1 - d_{i,t}^{pos})$	*0.066***	*0.065***	*0.050***	*0.031***	*0.006*
	(0.02)	*(0.02)*	*(0.01)*	*(0.01)*	*(0.01)*
$d_{i,t}^{pos}$	*-0.219*	*-0.081*	*-0.172*	*-0.158***	*-0.197**
	(0.16)	*(0.16)*	*(0.12)*	*(0.05)*	*(0.04)*
Time dummies:	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Control variables included	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
No of observations	*257*	*257*	*257*	*257*	*257*

Notes:

(1) See notes (1) to (5) in Table 2.
(2) $transp^{11}$ is the aggregation of the dummies in Table 2 (except for question 6).

Table 4: Central government expenditure and the output gap, Persson and Tabellini country sample, 1980-98

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent variable	---------- *Central government expenditure in percent of GDP* ----------						
Estimation method	*OLS-IV*	*Within-IV*	*GMMSYS*	*OLS-IV*	*OLS-IV*	*Within-IV*	*GMMSYS*
$gap_{i,t}$	*0.275*	*0.284**	*0.050*	-	-	-	-
	(0.170)	*(0.156)*	*(0.057)*				
$gap_{i,t} \cdot d_{i,t}^{pos}$	-	-	-	*0.574*	*0.558**	*0.902*	*0.013*
				(0.455)	*(0.292)*	*(0.673)*	*(0.113)*
$gap_{i,t} \cdot (1 - d_{i,t}^{pos})$	-	-	-	*0.318*	*0.064*	*0.164*	*0.135*
				(0.382)	*(0.190)*	*(0.629)*	*(0.141)*
$d_{i,t}^{pos}$	-	-	-	*-1.377*	-	*-2.103*	*-0.156*
				(2.188)		*(3.225)*	*(0.374)*
Time dummies	*Yes*	*Yes*	*Yes*	*Yes*	*No*	*Yes*	*Yes*
Control variables included	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
No. of observations	*934*	*939*	*939*	*934*	*934*	*939*	*939*

Notes:

*(1) *, **, and *** indicate significance on a 10%, 5% and 1% level, respectively.*

(2) The following control variables are included in all columns: lagged dependent variable, inflation rate, election year dummy, log of trend income, sum of exports and imports as a share of GDP and demographic dependency ratio. The OLS estimations include time invariant dummy variables for the electoral system and democracy which limits the sample size.

(3) For OLS and Within estimations all output gap variables are instrumented with their one time lagged level value.

(4) GMMSYS uses level lags from 2 to 12 of the lagged dependent variable in its differenced equation. In this equation the output gap variables are instrumented using their own two times lagged level values. For the level equation of GMMSYS the lagged dependent variable as well as the output gap variables are instrumented by their own one time lagged differenced values.

(5) The m2 test was performed in each of the GMM estimations and in no case was the validity of the instruments rejected.

Table 5: Expenditure reactions in OECD versus non-OECD countries and effect of voter information, Persson and Tabellini country sample 1980-98

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Dependent variable	---------- Central gov. expenditure in % of GDP ----------											
Estimation method	*OLS-IV*	*Within-IV*	*GMMSYS*	*OLS-IV*	*Within-IV*	*Within-IV*	*GMMSYS*	*GMMSYS*	*OLS-IV*	*GMMSYS*	*GMMSYS*	*GMMSYS*
$gap_{i,t}\ OECD_i$	*0.689**** *(0.194)*	*0.429*** *(0.219)*	*0.009* *(0.118)*	-	-	-	-	-	-	-	-	-
$gap_{i,t}\ nonOECD_i$	*0.139* *(0.192)*	*0.235* *(0.185)*	*0.028* *(0.059)*	-	-	-	-	-	-	-	-	-
$gap_{i,t} \cdot d_{i,t}^{pos} \cdot OECD_i$	-	-	-	*2.724**** *(0.93)*	*5.582* *(5.11)*	*1.797**** *(0.65)*	*0.231* *(0.18)*	*0.337*** *(0.17)*	*2.835**** *(1.06)*	*0.685** *(0.37)*	*0.507**** *(0.16)*	*0.718** *(0.38)*
$gap_{i,t} \cdot (1 - d_{i,t}^{pos}) \cdot OECD_i$	-	-	-	*1.005* *(0.76)*	*4.206* *(6.82)*	*-1.424* *(0.91)*	*-0.03* *(0.20)*	*-0.359* *(0.23)*	*0.965* *(1.28)*	*-0.376* *(0.31)*	*-0.185* *(0.20)*	*-0.413* *(0.28)*
$d_{i,t}^{pos} \cdot OECD_i$	-	-	-	*-5.571** *(2.98)*	*-18.98* *(22.66)*	-	*-0.547* *(0.61)*	*-0.407* *(0.54)*	*-4.038* *(3.65)*	*-0.066* *(0.55)*	*-0.291* *(0.48)*	*0.3963* *(0.51)*
$gap_{i,t} \cdot d_{i,t}^{pos} \cdot nonOECD_i$	-	-	-	*0.252* *(0.44)*	*0.639* *(0.75)*	*0.514* *(0.54)*	*-0.014* *(0.17)*	*0.030* *(0.15)*	*0.504* *(0.50)*	*0.251** *(0.14)*	*-0.018* *(0.14)*	*0.150* *(0.14)*
$gap_{i,t} \cdot (1 - d_{i,t}^{pos}) \cdot nonOECD_i$	-	-	-	*0.402* *(0.39)*	*-0.416* *(0.96)*	*-0.111* *(0.51)*	*-0.014* *(0.15)*	*0.032* *(0.16)*	*0.266* *(0.49)*	*0.099* *(0.13)*	*0.075* *(0.14)*	*0.083* *(0.13)*
$d_{i,t}^{pos} \cdot nonOECD_i$	-	-	-	*-1.427* *(2.56)*	*0.562* *(4.89)*	-	*0.392* *(0.80)*	*-0.142* *(0.78)*	*-1.180* *(3.23)*	*-0.028* *(0.71)*	*0.022* *(0.62)*	*0.268* *(0.62)*
$gap_{i,t} \cdot d_{i,t}^{pos} \cdot INFO_{i,t}$	-	-	-	-	-	-	-	-	*-0.937*** *(0.48)*	*-0.597*** *(0.25)*	-	*-0.558*** *(0.26)*
$gap_{i,t} \cdot (1 - d_{i,t}^{pos}) \cdot INFO_{i,t}$	-	-	-	-	-	-	-	-	*-0.197* *(0.65)*	*-0.170* *(0.24)*	-	*-0.077* *(0.23)*
$gap_{i,t} \cdot Corruption_i$	-	-	-	-	-	-	-	-	-	-	*-0.141*** *(0.07)*	*-0.094* *(0.07)*
Time dummies	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*No*	*No*	*No*	*No*	*No*
Control variables included	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
No. of observations	*934*	*939*	*939*	*934*	*939*	*939*	*939*	*939*	*768*	*768*	*891*	*743*
$OECD_i = nonOECD_i$	*2.052* *[0.020]***	*0.693* *[0.244]*	*-0.148* *[0.559]*	-	-	-	-	-	-	-	-	-
$OECD: gap_{i,t} \cdot d_{i,t}^{pos} = gap_{i,t} \cdot (1 - d_{i,t}^{pos})$	-	-	-	*2.605* *[0.00]****	*0.486* *[0.31]*	*2.175* *[0.01]***	*1.152* *[0.12]*	*2.637* *[0.00]****	-	-	-	-
$nonOECD: gap_{i,t} \cdot d_{i,t}^{pos} = gap_{i,t} \cdot (1 - d_{i,t}^{pos})$	-	-	-	*-0.354* *[0.64]*	*1.004* *[0.16]*	*0.631* *[0.26]*	*-0.003* *[0.50]*	*0.009* *[0.50]*	-	-	-	-

Notes:

(1) See Table 4.

(2) Test for nonOECD vs. OECD and gap·d^{pos} vs. gap·(1-d^{pos}) are all one-sided t-tests.

Chapter 2

Political Polarization and Procyclical Fiscal Policy

Political Polarization and Procyclical Fiscal Policy*

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Abstract

This paper studies the effect of political polarization on the cyclical properties of fiscal policy. We introduce political polarization into a model of retrospective voting and fiscal transparency, where a political agency problem between voters and politicians generate a procyclical bias in government spending when the economy is booming. Our model predicts that a higher degree of political polarization diminishes this procyclical bias by decreasing the incentive of the incumbent to cheat voters since losing office now becomes more costly, as this implies implementation of policies that differ greatly from incumbent's preferred policies. We find robust empirical support for this prediction using a sample of US states in the period 1978 to 2007.

Keywords: Political Polarization; Fiscal Policy; Procyclicality; the Business Cycle; US states; Political Economy
JEL codes: D72; E32; E62; H7

1 Introduction

In many countries, procyclical fiscal policy occurs frequently:[1] This has been shown for developing countries (see e.g. Gavin and Perotti, 1997), as well as for subcomponents of government spending and in overall discretionary spending in developed countries (see for instance Hallerberg and Strauch, 2002, Gali and Perotti, 2003 and Lane, 2003). Further, several studies have

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[1] Following Andersen and Nielsen (2010) and Kaminsky, Reinhart and Végh (2004), we define a procyclical policy as a policy where increases in real output lead to discretionary increases in government spending and/or tax cuts.

shown that fiscal policy reacts asymmetrically to fluctuations in output: fiscal policy is more procyclical when the economy is booming than when it is in recession.[2] In particular, Andersen and Nielsen (2010) (henceforth A-N) show that government spending in OECD countries is procyclical in good times and acyclical in bad times.[3] Procyclical fiscal policies are problematic since they can prolong recessions in bad times and add to inflationary pressures in good times. In addition, procyclical policies may lead to increased volatility in consumption, thus violating the principle of consumption smoothing. Further, procyclical policies in good times can lead to a lack of consolidation of public finances, rendering the government vulnerable to deep recessions, where it may be forced to tighten fiscal policy because of binding credit constraints.

This paper makes two contributions to the literature on fiscal policy: *1)* an empirical study of the impact of political polarization on cyclicality of fiscal policy in the US states and *2)* a model that rationalizes these empirical findings. The empirical part of this paper shows that government spending in the US states reacts to fluctuations in output in the same asymmetric manner as OECD countries, thus being procyclical in good times and acyclical in bad times.[4] Further, our empirical analysis reveals that the degree of political polarization affects this asymmetric reaction: the higher the degree of political polarization, the smaller is the procyclical bias in booms.[5] Several papers have tried to explain the occurrence of procyclical fiscal policies.[6] However, the only model, to our knowledge, that is able to explain the observed asymmetry of fiscal policy in the OECD countries and, as shown in this paper; the US states, is the A-N model of fiscal transparency. The model in A-N builds on the retrospective voting model in Alesina, Campante and Tabellini (2008) (henceforth ACT), but adds the concept of fiscal transparency to the model setup. We add political polarization to this framework of political agency and fiscal transparency by introducing heterogeneity into the politicians' preferences. Specifically, we allow politicians to differ in their preferences for government consumption relative to private consumption. Our model predicts, in line with our empirical finding for the US states, that a higher degree of political polarization lowers the procyclical bias in booms. Thus increased political polarization actually brings about better policy outcomes in this model in contrast to the usual finding of most other studies (e.g. Alesina

[2] See for example Gavin and Perotti (1997), Persson and Tabellini (2003), Hercowitz and Strawczynski (2004) or Manase (2006).

[3] A-N uses the level of the output gap to characterize booms from recessions. Periods with a positive output gap are labelled "*good times*", whereas periods with a negative output gap are labelled "*bad times*".

[4] Few of the empirical studies of fiscal policy in the US states examines cyclical responses and instead focuses on fiscal responses to e.g. deficit shocks (Poterba,1994), balanced budget rules (Bohn and Imman, 1996, Fatas and Mihov, 2006 or divided government (Alt and Lowry, 1994). One exception is Sørensen, Wu and Yosha (2001), who in line with our results find evidence of an asymmetric response in the government surplus to output fluctuations in election years.

[5] This results is robust to the inclusing a range of controls such as political factors, fiscal institutions and political gridlock. See the empirical secton for more detials.

[6] See for instance Tornell and Lane (1999), Talvi and Végh (2005) and Battigiani and Coate (2008).

and Tabellini (1990), see discussion below).

The basic intuition of our model follows that of ACT and A-N. In the ACT model, voters' attempt to "starve the Leviathan" leads to procyclical policies: when income increases, voters demand higher public consumption and lower taxes fearing that the generated income otherwise will be wasted on political rents. These procyclical policies occur since politicians are able to hide the true government deficit from the voters. This assumption is relaxed in the A-N model of fiscal transparency. For a positive degree of fiscal transparency, an excess deficit is detected by the voters with some positive probability. This implies that fiscal policy now reacts to output fluctuations in an asymmetric manner: at an initial low level of income, an increase in income will not lead to increased consumption demands by voters, however, at a sufficiently high level of income, an increase in income implies a rise in government spending. As explained in A-N, the intuition behind this results is that transparency works as a disciplining device on the politicians rent seeking behaviour. For low levels of income, cheating the voters and running an excessive deficit is not very attractive since the collected rents from doing so are relatively modest. Fiscal policy is acyclical and increases in income are absorbed in the government surplus. For high levels of income, on the other hand, tax revenues are large and thus the government surplus required for consumption smoothing becomes large as well. Thus cheating the voters and running a hidden excess deficit becomes attractive for the politicians. Voters realize this and fiscal policy becomes procyclical as voters once again attempt to "starve the Leviathan". The higher the degree of fiscal transparency, the greater the chance of exposing a excessive deficit, and thus the higher is the required level of income before fiscal policy becomes procyclical. Political polarization works in similar way as transparency by affecting the incentive of the politician to run an excessive deficit. When the degree of political polarization is high, losing the election, by getting caught running an excessive hidden deficit, is associated with a large utility loss, since future policies of the opponent will be far from the incumbent's optimal policies. The incentive of the politicians to run an excessive deficit is therefore smaller and voters will be able to trust the incumbent with a higher surplus than otherwise. As a result, the higher the degree of political polarization, the higher is the required level of income before fiscal policy becomes procyclical.

The political environment in this paper combines that of ACT and A-N with the citizen candidate model in Besley and Coate (1997). Voters may to choose to run for political office in the election after the first period of the model by paying some fixed cost. Voters and politicians vary only in their preference for public consumption relative to private consumption and they will vote for the equilibrium candidate they prefer to set policy in the second and last period of the model. However, if voters are indifferent between two candidates, they will adopt a retrospective voting strategy and punish ill-performing incumbents. We consider the Besley-Case two-candidate equilibria and derive the conditions under which such an equilibrium

exists. In such an equilibrium the electorate is split into three groups, with two groups of equal size strictly favouring one of the candidates, and a middle group, that includes the median voter, being indifferent between the two candidates. We focus on the equilibrium, among many possible, where the incumbent politician from the first period is running against the equilibrium opponent. In order to win such an election, the incumbent must win the support of the middle group of voters, enabling these voters to set requirements for fiscal policy variables.

Several studies have looked at the effect of polarization on fiscal policy, and, as mentioned above, most of these studies find adverse effects of increased polarization. Alesina and Tabellini (1990) and Alt and Lassen (2006) have models in which increased political polarization leads to higher deficit and debt levels, but these models do not consider the impact of polarization on the cyclicality of fiscal policy.[7] Ilzetzki (2008), however, does exactly this by adding cyclical fluctuations to a model similar to that of Alesina and Tabellini (1990). Ilzetzki (2008) obtains a different conclusion than this paper, namely that a higher degree of polarization leads to *more* procyclical polices. In Ilzetzki (2008), two politicians with partly overlapping constituencies alternate with an exogenous probability between being in power and deciding over transfers. If polarization and the chance of losing power is sufficiently high, then transfers become procyclical, since passing over a large surplus is likely not to benefit the current government's constituency, and so the incumbent prefers to spend current resources while in power. Our approach differ by focusing on electoral accountability as well as government consumption rather than transfers. We refrain from making any predictions regarding the cyclicality of transfers. Woo (2009) also study the impact polarization on the cyclicality of fiscal policy. In a cross country regression, Woo finds that greater social polarization, measured by the Gini-coefficient and educational inequality, is associated with *greater* procyclicality.[8] This is in contrast with the results of our empirical section, where we find that a higher degree of political polarization makes fiscal policy less procyclical in good times.[9] One important difference between this paper and Woo (2009) is the choice of sample: we use a panel of US states from 1978 to 2007 whereas Woo exploits cross sectional variation in the Gini-coefficient from 68 developing as well

[7] In the Alt and Lassen model increased polarization leads to a stronger desire to win elections in order to avoid having very adverse policies implemented. This leads to an increased incentive to fink competence by raising the deficit even further during election years. The mechanism in our model is similar, yet the outcome is different. Increased polarization also leads to a stronger desire to win elections (or not to lose them) and therefore the incumbent needs a higher gain before she risks losing office by engaging in excessive deficit behaviour. The incumbent can therefore be trusted to deliver good policies more frequently because the consequence of losing in office is greater.

[8] Woo (2009) also presents a model that rationalizes the link between increased polarization and higher procyclicality. However, in this model government spending is unaffected by the timing of income shocks and depends only on total discounted income in the economy. It is exactly the timing of income shocks that we study, while keeping the total discounted income constant.

[9] We also try to use the Gini-coeffcient as a measure of polarization as a robustness check to our baseline measure for political polarization (see emprical section for details on this measure). We obtain the same conclusion using either of these two measures.

as developed countries. Another important difference is in the method applied in this paper compared to Woo (2009). In contrast to Woo, we focus on dynamic panel data models and carefully distinguish between recessions and booms, when estimating the impact of polarization on the cyclical reaction of fiscal policy.

This paper proceeds in the following way: Section 2 setup the details of the model, section 3 solves the model and section 4 derives some comparative statics with respect to political polarization. Section 5 presents the empirical evidence, while section 6 concludes.

2 Model Setup

2.1 Economic Environment

We consider a model with two time periods. The economy is populated by a group of citizens, who are both voters and potential politicians, that differ only in their preference towards public versus private consumption. For simplicity we assume separable log-utility of public and private consumption and linear utility of rents. Utility of voters (and potential politicians) therefore take the following from :

$$U_t = \lambda_i \log(g_t) + (1 - \lambda_i) \log(c_t) + I\eta r_t \tag{1}$$

where g_t and c_t denote period t per capita levels of public consumption and private consumption, respectively, and r_t denotes political rents. λ_i denotes the relative weight that a voter with type i preferences gets from public consumption relative to private consumption. We assume that there are N voters and $M < N$ types of preferences with type $i = 1, ..., M$ having preferences $\lambda_i \in (0, 1)$. For simplicity we assume that the types are (discretely) distributed symmetrically around $1/2$, and that at least one voter has $\lambda = 1/2$. Because of the symmetry assumption it must be the case that the median voter has preferences $\lambda_m = 1/2$, where we use the subscript m to denote the median voter's type. $I = 1\,[incumbent]$ is an indicator function that takes the value of one if the given voter is also the incumbent politician, and zero otherwise. Political rents, r_t, are collected by the incumbent in period t and are unobservable to everyone except the incumbent. Unlike ACT, who assume that politicians only derive utility from rents, the politicians in this model also derive utility from consumption and the parameter, $\eta > 0$, denotes the value of rents relative to public and private consumption. However, we assume that rents are more valuable to politicians than consumption (η is high), such that marginal utility of additional rents in equilibrium always exceeds that of public and private consumption.[10]

The government budget constraint for the two periods is given as the following:

[10] See A-N for a broad interpretation of rents.

$$g_1 + r_1 = \tau_1 y_1 + d_1$$

$$g_2 + r_2 = \tau_2 y_2 - (1+\rho) d_1$$

where τ_t, y_t, d_t denotes the tax rate, per capita income and the deficit in period t, respectively. We assume that initial debt is zero and all outstanding debt must be repaid by the end of period two. As in ACT, we assume that $c_t = (1-\tau_t)y_t$. ρ is the interest rate and we assume for simplicity that $(1+\rho)^{-1} = \beta$, where β is the discount factor of utility of citizens. Following ACT, it is assumed that the deficit can never exceed a maximum level, $\overline{d}$. Income fluctuates over time and follows the specification from A-N such that a shock leaves the discounted value of income unchanged:

$$y_1 = \overline{y} + \varepsilon$$

$$y_2 = \overline{y} - (1+\rho)\varepsilon$$

We assume that the income shock falls within the interval $[\underline{\varepsilon}; \overline{\varepsilon}]$ where:

$$\begin{aligned} \underline{\varepsilon} &> -(\overline{y} - \beta^{-1}\overline{d} - \overline{r}) \\ \overline{\varepsilon} &< \beta\left(\overline{y} - \beta^{-1}\overline{d} - \overline{r}\right) \end{aligned}$$

which ensures that the government can always obtain maximum rent without breaching the maximum debt ceiling in period 1 and always repay any outstanding debt at the end of period 2 while never driving either type of consumption too close to zero.[11] .

2.2 Political Environment

In the first period a politician with preferences λ_A is in power and sets policy. There is an election at the end of period 1 and competition for political office is open to all voters by paying some fixed cost. We focus on the two-candidate equilibrium.[12] As in Besley and Coate (1997) the relative position of the two candidates is indeterminate and many possible two-candidate equilibria exists. The equilibrium where the incumbent runs against an opposite candidate, can

[11] Note that if a very large shock occur such that the required debt taking exceeds the maximum debt level, i.e. $-\varepsilon > \overline{d}$, the policy will become procyclical both for the social planner and in our political equilibrium. This corresponds to a situation of binding credit constraints as described in Gavin and Perotti (1997).

[12] Depending on the condtions, a single candidate or multi-candidate equilibria may also exists. We chose the two candidate equilibria as a focal point given the empirical application to the US states.

be considered a focal equilibrium, and we focus on this equilibrium in the following analysis and derive the necessary conditions for its existence. If for some reason the incumbent is not running, we will use the equilibrium (among many possible equilibria) where a candidate with identical preferences as the incumbent is running as a replacement.[13] In case the incumbent is running we will denote her candidate A. The equilibrium opponent, with preferences λ_B, is denoted candidate B. The initial preference of the incumbent in the model is exogenous and we will analyse the effect of varying the distance in preferences between the incumbent and the median voter. The winner of the election sets policy in period 2 after which the model ends. Voters are rational and vote for the candidate they prefer to set policy in period 2 and are unable to make binding commitments to any candidate in advance. Voters will vote retrospectively if indifferent between the two candidates, and not re-elect the incumbent if certain demands for fiscal policy variables are not satisfied. By adopting a retrospective voting strategy and condition re-election on past performance, indifferent voters can increase their overall utility compared to a strategy of voting for a random candidate or simply abstaining from voting.

The details of the model is provided below, however, the overall timing of the model can be summarized as the following: at the start of period 1 citizens observe y_1 and y_2. They then announce their required levels for government consumption, private consumption and the deficit, $g^*$and c^* and d^*, respectively, and announce their retrospective voting strategy. The incumbent observes this and set policy in period 1. Then all citizens observe g_1 and c_1 and decide whether or not to run as a candidate. An adverse signal about the incumbent is revealed with probability π and if $d_1 > d^*$ the true deficit is now revealed with probability p. The election is then held and voters vote according to their strategy. In period 2 the winner of the election sets policy.

We follow the general literature and assume that output, taxes, private consumption and public consumption are observed before the election. We also assume that these variables are known when voters decide whether or not to run for political office, which happens immediately before the election. As in Alt and Lassen (2006) we assume that the deficit is not necessarily observable to the voters at election time. Thus there is a lack of transparency in the budget enabling the politician to make the deficit appear smaller by manipulating the different budget items. If the politician chooses to engage in such creative accounting endeavours the true deficit is revealed to all voters with probability p. Following Alt and Lassen (2006), we interpret p as the degree of fiscal transparency. We further assume that there is some exogenous noise to the election process that is unrelated to fiscal policy. We do this to capture in a simple way that

[13] This should resemble a case where if the incumbent steps down and another candidate with similar preferences runs in the coming election (one could think if the candidate coming from the same party as the incumbent, although we ignore parties in this model). We believe that this is also the most obvious equilibrium to focus on among all other possible equilibria. This assumption also reduces the required amount of algebra considerably.

even if the incumbent satisfy all fiscal demands, re-election is not certain. This uncertainty creates an incentive for opposing candidates to run since running entails some cost. Specifically, we assume that an adverse signal about the incumbent is revealed with probability $\pi \in (0,1)$. This adverse signal is just enough to make indifferent voters support the opposing candidate over the incumbent, but not enough to change the preferred choice of candidate for any of the other voters. The introduction of this adverse signal should merely be seen as a simple way to introduce some uncertainty in the electoral outcome in a retrospective voting model.

The individual citizen is free to run for political office by paying the running cost δ. This decision is made simultaneously among citizens and before nature decides whether the true deficit is observed, and whether an adverse signal about the incumbent is sent. Let $U_{i,j}$ denote voter $i's$ utility in period 2 when j is in office and let ΔU_i denote voters $i's$ expected gain from running as candidate. Then using proposition 3 in Besley and Coate (1997), there exists an equilibrium where citizen i and j run against each other if and only if *(1)* $U_{m,i} = U_{m,j}$ and *(2)* $\Delta U_i \geq \delta$ and $\Delta U_j \geq \delta$. The first condition states that the median voters must be indifferent between the two candidates such that the electorate is split down the middle.[14] The second condition states that the expected gain from running for each of the candidates should be at least as great as the cost. Voters are assumed to vote strategically making it impossible for any third candidate (e.g. the median voter) to enter and win the election with positive probability. The exact conditions for the existence of an equilibrium where the incumbent is running are derived below.

Voters are rational and realize the incentive the incumbent has to hide large deficits and collect rents. Voters can therefore improve overall utility by voting retrospectively. Since voters cannot make binding commitments not to vote for an incumbent if she misbehaves, the retrospective voting strategy only becomes relevant for voters who are indifferent between the two candidates. For example, it is not credible for a voter with the same preferences as the incumbent to make threats about not voting for the incumbent unless certain consumption levels are provided: at election time, such a voter would be better off from having the incumbent in office in period 2 rather than the other equilibrium candidate. Hence such a voter would have strictly higher utility from voting for the incumbent regardless of period 1 policies, and so any strategy specifying otherwise would not be subgame perfect. However, for the voters who at election time are in fact indifferent between the two candidates it makes sense to condition their vote for the incumbent on her past performance. In particular, the incumbent will have no chance of getting their vote if any of these voters' required demands for public consumption, private consumption and the deficit, g^*, c^* and d^*, respectively, are violated. The probability that an indifferent voter will re-elect the incumbent is therefore given as:

[14] We assume that the two groups on each side of the median voter has a combined size of more than two thirds.

$$\gamma = \begin{cases} 1-\pi & if\ g_1 \geq g_i^*, c_1 \geq c_i^*\ and\ no\ detection\ of\ d_1 > d_i^* \\ 0 & otherwise \end{cases}$$

Note that not detecting $d_1 > d^*$ can either mean that the incumbent satisfied voter demands, such $d_1 \leq d^*$, or that the incumbent ran an excessive deficit, $d_1 > d^*$, but that this went undiscovered. However, which of these two cases is the truth is unknown to the voters.

3 Equilibrium Policies

Using the above setup the model can be solved by using backward induction. Hence first we solve for period 2 polices, taking period 1 outcomes as given and then we move on to solve the full model. When setting economic policy in period 1 and anticipating possibly being in an election facing an exact opposite opponent, the incumbent has three options: *1)* always satisfy median voters demands and earn re-election with probability $1-\pi$, *2)* satisfy demands for public and private consumption, run an excessive deficit (i.e. set d_1 higher than d^*) and obtain re-election with probability $(1-\pi)(1-p)$, and *3)* satisfy none of the demands, choose preferred consumption, grab maximum rents and forego re-election with certainty. Following ACT, we assume that when the politician completely disregards voter demand, as in *option 3,* collected rents can never exceed a certain level, $\overline{r}$. We can think of *option 3* as the "bad" policy outcome where the politician is acting completely against the will of the voters. The maximum rent level, $\overline{r}$, can be seen as some upper limit to "bad" behaviour since worse behaviour would be detected rendering the incumbent exempt from office immediately. Note that if the incumbent chooses *option 3* there is no chance of getting re-elected and collect rents in period 2, in which case the incumbent will not run for office in period 2, since it is not worth paying the running cost in this case.

3.1 Post-election Policies

We start by considering the policies chosen in period 2, given that any deficit from period 1 has to be paid off. The winning candidate, j, from the election is in power in period 2 and maximize utility by choosing her optimal policy. Since period 2 is the last period and there is no possibility of re-election, she will always choose the *option 3* policy in period 2. She thus solves the following problem:

$$\underset{r_2,g_2,\tau_2}{Max}\ \lambda_j \log(g_2) + (1-\lambda_j)\log(c_2) + \eta r_2$$
$$st\ \ r_2 \ \leq\ \overline{r},\ g_2 = \tau_2 y_2 - \beta^{-1} d_1 - r_2,\ c_t = (1-\tau_t) y_t$$

We have assumed that η is so high that the constraint, $r_2 \leq \overline{r}$ is always binding in equilibrium. In this case period 2 policy variables will be given as the following:[15]

$$r_2 = \overline{r}$$

$$g_2^j = \lambda_j \left(y_2 - \beta^{-1} d_1 - \overline{r}\right) \tag{2}$$

$$c_2^j = (1-\lambda_j) \left(y_2 - \beta^{-1} d_1 - \overline{r}\right) \tag{3}$$

3.2 Who might run for election

Next we move on to determine which pair of citizens would run for office in equilibrium. Note that one of the two necessary and sufficient conditions for existence of an equilibrium where candidates i and j run against each other, is that they split the votes evenly. In the Besley and Coate (1997), indifferent voters abstain from voting, however, in this setup things are slightly different since here indifferent voters will either vote for or against the incumbent in recognition of good or bad behaviour. We have to differentiate between the three different possible choices by the incumbent: *1)* satisfy all demands of the indifferent voter, *2)* satisfy only the consumption demands or *3)* satisfy none of the demands. As noted before, in all these cases there will in general exist many other equilibria in where the incumbent does not run. We will focus on the equilibria where the incumbent does run. In *option 3,* where the incumbent will not choose to run, we will, for simplicity, focus on the equilibrium where a candidate, A', that is identical to the incumbent in terms of preferences (i.e. $\lambda_A = \lambda_{A'}$) runs as a replacement.

The median voter has the utility function given by equation (1) with $\lambda_m = 1/2$ and will collect zero rents as a voter. Voters with such preferences will get the following utility in period 2 using the above derived expression for period 2 policies:

$$U_{m,j} = (1/2)\left\{\log(\lambda_j) + \log(1-\lambda_j)\right\} + \log\left(y_2 - \beta^{-1} d_1 - \overline{r}\right)$$

which is maximized for $\lambda_j = 1/2$. The condition *(1)*, that the candidates should split the

[15] See section 7.1 in the Appendix for derivations.

electorate, implies that $U_{m,j} = U_{m,i}$ must hold in any two-candidate equilibrium. This condition is satisfied for $\lambda_j = 1 - \lambda_i$.[16]

The second condition, (*2*), requires the expected gain from running as a candidate to outweigh the cost. If candidate j is running against i and wins, she gets the following period 2 utility:

$$U_{j,j} = \lambda_j \log(\lambda_j) + (1 - \lambda_j) \log(1 - \lambda_j) + \log\left(y_2 - \beta^{-1} d_1 - \ \overline{r}\right) + \eta \overline{r}$$

and if j loses the utility is:

$$U_{j,i} = \lambda_j \log(\lambda_i) + (1 - \lambda_j) \log(1 - \lambda_i) + \log\left(y_2 - \beta^{-1} d_1 - \ \overline{r}\right)$$

If j is the incumbent (i.e. $j = A$) and we are in *option 1*, then A will win the election against candidate B with probability $1 - \pi$. If A does not run she gets the same utility as if she lost the election but do not pay the running cost in that case. The expected gain from running for the incumbent in *option 1* is therefore the following:[17]

$$\Delta U_A = (1 - \pi) \left[\lambda_A \log\left(\frac{\lambda_A}{\lambda_B}\right) + (1 - \lambda_A) \log\left(\frac{1 - \lambda_A}{(1 - \lambda_B)}\right) + \eta \overline{r} \right]$$

Using the condition that $\lambda_B = 1 - \lambda_A$, condition (*2*) for A to be running in *option 1* becomes:

$$\Delta U_A \geq \delta \Leftrightarrow (1 - \pi)(1 - 2\lambda_A) \log\left(\frac{1 - \lambda_A}{\lambda_A}\right) + (1 - \pi)\, \eta \overline{r} \geq \delta \tag{4}$$

In order for this to be an equilibrium the opposite candidate B should also find it worthwhile to run. If A has chosen *option 1,* the condition for B to run becomes the following:

$$\Delta U_B \geq \delta \Leftrightarrow \pi(1 - 2\lambda_A) \log\left(\frac{1 - \lambda_A}{\lambda_A}\right) + \pi \eta \overline{r} \geq \delta$$

We can then write condition (*2*) as the following:

$$(1 - 2\lambda_A) \log\left(\frac{1 - \lambda_A}{\lambda_A}\right) + \eta \overline{r} \geq \max\left\{\frac{\delta}{1 - \pi}, \frac{\delta}{\pi}\right\}$$

Note that the gain from running, $\Delta U_j,\ j = A, B$, consists of two terms. The first term represent the gain for j from being able to chose policy in period 2 rather than having i choosing policy. The second term is the gain from being able to collect maximum rents in period 2 if in power. Since we assume that the value of maximum rents, $\eta \overline{r}$, is high relative to the running cost,

[16] The condition is also satisfied the two candidates have the same preferences, $\lambda_j = \lambda_i$, in which case the the electorate is only split if $\lambda_j = \lambda_i = \lambda_m$. So unless $\lambda_A = \lambda_m$ we will not focus on this possible equilibrium.

[17] See section 7.2 in the Appendix for derivations.

δ, the condition, $\Delta U_j \geq \delta,\ j = A, B$, will be satisfied if π is not too extreme (too close to one or zero). If this is the case, then there exists an equilibrium where A and B are running against each other (when A has chosen *option 1*) and where B is the voter who has a preference parameter $\lambda_B = 1 - \lambda_A$.

We also need to consider the equilibrium candidates running if the incumbent does not choose *option 1*. The incumbent is re-elected in *option 2* with probability $(1 - \pi)(1 - p)$. In this case condition (*2*) for A to be running becomes:

$$(1 - 2\lambda_A) \log \left(\frac{1 - \lambda_A}{\lambda_A} \right) + \eta \overline{r} \geq \frac{\delta}{(1 - \pi)(1 - p)}$$

and B will find it worthwhile to run if:

$$(1 - 2\lambda_A) \log \left(\frac{1 - \lambda_A}{\lambda_A} \right) + \eta \overline{r} \geq \frac{\delta}{\pi + p - \pi p}$$

Since A now is only re-elected if the true deficit is not revealed, the gain of running now has to be bigger for A. In case p becomes very close to one, then A will not choose to run in *option 2*. In this situation we assume that a candidate A' with $\lambda_{A'} = \lambda_A$ is running instead if $\Delta U_{A'} \geq \delta$. Let p^* denote the cut-off point for which A no longer will run for election, given she has chosen *option 2*. We focus on the interesting case where $p < p^*$.[18]

In *option 3* the incumbent is re-elected with probability zero and A will therefore never run for re-election. In this case we focus on the equilibria where a candidate A' with same preference parameter as A runs instead. A' will choose to run given that B is the opponent if $\Delta U_{A'} \geq \delta$. We assume $A^{'}$ wins with probability $1 - \pi$ such that $A^{'}$ has the same chance of getting an adverse signal as A has. Therefore the conditions for $A^{'}$ and B to be running are the same as for A and B.

Thus with condition (*1*) and (*2*) satisfied, we focus on the equilibria where A (the incumbent) is running against an equilibrium opposite candidate B. Although many other pairs of opposite candidates running against each other are also equilibria, we choose to focus on those that involve the incumbent (A) running (or an identical replacement, $A^{'}$) for election. We believe these equilibria are focal.

3.3 Incumbent options

As explained above, in period 1, the incumbent (A) has three options to choose between. Remembering that g^*, c^* and d^* denote the indifferent voters' demands (yet to be determined) for public consumption, private consumption and the deficit, respectively, each of these options yields the following utilities:

[18] Note that p^* is strictly greater than zero if condition (4) is satisfied.

Option 1:

$$\begin{aligned} V_1 &= \lambda_A \log(g^*) + (1-\lambda_A)\log(c^*) + \eta\left[y_1 - c^* - g^* + d^*\right] - \delta \\ &\quad +(1-\pi)\beta\left\{\lambda_A \log(g_2^A(d^*)) + (1-\lambda_A)\log(c_2^A(d^*)) + \eta\overline{r}\right\} \\ &\quad +\pi\beta\left\{\lambda_A \log(g_2^B(d^*)) + (1-\lambda_A)\log(c_2^B(d^*))\right\} \end{aligned}$$

where $r_1 = y_1 - c^* - g^* + d^*$.

Option 2:

$$\begin{aligned} V_2 &= \lambda_A \log(g^*) + (1-\lambda_A)\log(c^*) + \eta\left[y_1 - c^* - g^* + \overline{d}\right] - \delta \\ &\quad +\beta(1-p)(1-\pi)\left[\lambda_A \log(g_2^A(\overline{d})) + (1-\lambda_A)\log(c_2^A(\overline{d})) + \eta\overline{r}\right] \\ &\quad +\beta\left(\pi + p - \pi p\right)\left[\lambda_A \log(g_2^B(\overline{d})) + (1-\lambda_A)\log(c_2^B(\overline{d}))\right] \end{aligned}$$

where rents are given as $r_1 = y_1 - c^* - g^* + \overline{d}$ (note in case $d_1 > d^*$ the incumbent will not get re-elected if the true deficit is disclosed and so she might as well appropriate as many rents as possible by driving the deficit to its maximum, $\overline{d}$).

Option 3:

$$\begin{aligned} V_3 &= \lambda_A \log(\widetilde{g}) + (1-\lambda_A)\log(\widetilde{c}) + \eta\widetilde{r} \\ &\quad +(1-\pi)\beta\left\{\lambda_A \log(g_2^{A'}(\widetilde{d})) + (1-\lambda_A)\log(c_2^{A'}(\widetilde{d}))\right\} \\ &\quad +\pi\beta\left\{\lambda_A \log(g_2^B(\widetilde{d})) + (1-\lambda_A)\log(c_2^B(\widetilde{d}))\right\} \end{aligned}$$

where $\widetilde{g}, \widetilde{c}, \widetilde{d}$ and $\widetilde{r}$ are chosen optimally by the incumbent given that she will not be in office in period 2. The optimal choices by the incumbent of $\widetilde{g}, \widetilde{c}$ and $\widetilde{d}$ for $\widetilde{r} = \overline{r}$ are given as[19]:

$$\begin{aligned} \widetilde{g} &= \lambda_A\left[\overline{y} - \overline{r}\right] \\ \widetilde{c} &= (1-\lambda_A)\left[\overline{y} - \overline{r}\right] \\ \widetilde{d} &= -\varepsilon \end{aligned}$$

Note that in this case consumption is perfectly smooth, but at a very low level since maximum rents are extracted by politicians in each time period.

The voters will maximize utility by setting demands for g^*, c^* and d^* subject to the con-

[19] See section 7.3 in the Appendix for derivations.

straint that the incumbent finds it optimal to follow these demands, i.e. that $V_1 \geq V_2$ and $V_1 \geq V_3$.[20] The condition that makes the incumbent choose *option 1* over *option 3* is given as the following:[21]

$$\begin{aligned} V_1 \quad \geq \quad & V_3 : \widetilde{\Delta}(g^*, c^*) + \eta \left[y_1 - c^* - g^* + d^* \right] - \delta + \beta \log(y_2 - \beta^{-1} d^* - \overline{r}) \geq \\ & \beta \log(y_2 - \beta^{-1} \widetilde{d} - \overline{r}) + (1 - (1 - \pi)\beta)\eta \overline{r} \end{aligned}$$

where $\widetilde{\Delta}(g^*, c^*) \equiv \lambda_A \log(g^*) + (1 - \lambda_A) \log(c^*) \ - (\lambda_A \log(\widetilde{g}) + (1 - \lambda_A) \log(\widetilde{c}))$.

The condition that the incumbent prefers *option 1* over *option 2* is given as:

$$\begin{aligned} V_1 \quad \geq \quad & V_2 : \eta \left[d^* - \overline{d} \right] + \beta p (1 - \pi) \eta \overline{r} + \beta p (1 - \pi) \overline{\overline{\Delta}} \geq \\ & \beta \log(y_2 - \beta^{-1} \overline{d} - \overline{r}) - \beta \log(y_2 - \beta^{-1} d^* - \overline{r}) \end{aligned}$$

where $\overline{\overline{\Delta}} \equiv \lambda_A \log(g_2^A(\overline{d})) + (1 - \lambda_A) \log(c_2^A(\overline{d})) - \lambda_A \log(g_2^B(\overline{d})) - (1 - \lambda_A) \log(c_2^B(\overline{d})$.

3.4 Voter maximization problem

Voters must now set the criteria for re-electing the incumbent under the constraint that she chooses *option 1*. Hence voters must decide which minimum level of consumption, g^* and c^* and maximum deficit d^* to ask for. The optimal values can be derived by maximizing total discounted utility of the voters:

$$\begin{aligned} \underset{g^*, c^*, d^*}{Max} \quad & (1/2) \log(g^*) + (1/2) \log(c^*) + \beta/2(1 - \pi) \left\{ \log(g_2^A(d^*)) + \log(c_2^A(d^*) \right\} \\ & + \beta/2\pi \left\{ \log(g_2^B(d^*)) + \log(c_2^B(d^*) \right\} \\ & st. \ V_1 \geq V_3 \ V_1 \geq V_2 \end{aligned}$$

[20] It is never optimal for the voters to choose reservations values such that $V_2 \geq V_1$. Since income is perfectly smooth in *option 3*, it cannot be ruled out that it could be optimal for the voters to let the politicans choose *option 3* for very large shocks if $\overline{r}$ is sufficiently low. However, *option 3* should be thought of as a "bad" policy outcome and thus we shall assume that $\overline{r}$ is large enough and $\overline{\varepsilon}$ low enough such that it will never be optimal to have $V_3 \geq V_1$.

[21] See appendix 7.4 for derivations.

where g_2^j and c_2^j are given from (2) and (3). Note that any equilibrium will always have $V_1 = V_3$ since otherwise voters could raise demands for consumption in period 1 and increase overall utility without violating any constraints. On the other hand, whether $V_1 \geq V_2$ is binding or not is is the key to the understanding of the model.[22]

The solution can be split in to two cases depending on the size of ε, with **Case 1** being associated with a relatively small size of ε and with $V_1 \geq V_2$ not binding. **Case 2** is associated with a relatively large size of ε and with $V_1 \geq V_2$ binding. The **Case 1** solution is given by

$$
\begin{aligned}
& g_I^* = \tfrac{1}{2}\left[\overline{y} - \beta^{-1}B - \ \overline{r} + \tfrac{1-2\lambda_A}{\eta}\right] \\
(I) \qquad & c_I^* = \tfrac{1}{2}\left[\overline{y} - \beta^{-1}B - \ \overline{r} - \tfrac{1-2\lambda_A}{\eta}\right] \qquad\qquad if \ \ \varepsilon \leq \widetilde{\varepsilon} \\
& d_I^* = -\varepsilon + B
\end{aligned}
$$

where B does not depend on ε and is defined implicitly from the condition $V_1 = V_3$ (see condition (10) in the Appendix). The **Case 2** solution is given as

$$
\begin{aligned}
& g_{II}^* = g^*(\varepsilon) \\
(II) \qquad & c_{II}^* = c^*(\varepsilon) \qquad\qquad if \ \ \varepsilon > \widetilde{\varepsilon} \\
& d_{II}^* = a(\varepsilon) + D
\end{aligned}
$$

where, the partial derivatives with respect to the shock are given as[23]

$$
\begin{aligned}
\frac{dg_{II}^*}{d\varepsilon}, \frac{dc_{II}^*}{d\varepsilon} &> 0 \\
\frac{dg_{II}^*}{d\varepsilon} + \frac{dc_{II}^*}{d\varepsilon} &< 1 \\
\frac{dd_{II}^*}{d\varepsilon} &\in (-1; 0)
\end{aligned}
$$

The size of the shock determines which of the two cases applies depending on whether it exceeds the cut-off value $\widetilde{\varepsilon}$. The cut-off value is defined as the ε that makes the constraint $V_1 \geq V_2$ bind exactly. It generally depends on the degree of transparency and polarization and is implicitly defined as:

[22] See section 7.5 in the Appendix for derivations.
[23] See section 7.6 in the Appendix for derivations.

$$\widetilde{\varepsilon} + \beta\eta^{-1} \log\left(\frac{\overline{y} - \beta^{-1}\widetilde{\varepsilon} - \beta^{-1}\overline{d} - \ \overline{r}}{\overline{y} - \beta^{-1}B - \ \overline{r}}\right) = \beta p(1-\pi)\left(\overline{r} + \eta^{-1}\overline{\overline{\Delta}}\right) + B - \overline{d} \tag{5}$$

If the shock to the economy is modest (smaller than $\widetilde{\varepsilon}$) solution (I) applies and policy is acyclical, that is, consumption is independent of the size of the shock and the deficit absorbs the shock completely. When the shock is high (above $\widetilde{\varepsilon}$) the solution (II) applies and policy is now *procyclical*. That is, a further increase in income leads to an increase in both public and private consumption as in A-N. Consumption demands are raised in response to rising income since carrying a large surplus over to the next period would be infeasible, as this would pose too great a temptation for the incumbent to cheat the voters by running an excessive deficit. As a second best response, voters raise their demand for both public and private consumption. However, public and private consumption is not raised one-for-one with income. The reason is that the incumbent also have preferences for a smooth consumption profile and so she can be trusted with a slightly larger surplus. Therefore, the larger the shock, the flatter is the slope of g^*. The profile of g^* as a function of the shock is shown below.

[Figure 1 about here]

4 Comparative Statics

First we consider how the cut-off point from where policy becomes procyclical, $\widetilde{\varepsilon}$, moves with respect to the degree of transparency and second how it depends on the degree of political polarization. The cut-off point moves with transparency in the following way:[24]

$$\frac{d\widetilde{\varepsilon}}{dp} = \frac{\beta(1-\pi)\left(\overline{r} + \eta^{-1}\overline{\overline{\Delta}}\right)}{1 - \eta^{-1}u_g(g_2(\overline{d}))} > 0$$

that is, a higher degree of fiscal transparency moves the point from which fiscal policy becomes procyclical further out. Thus the income shock need to be bigger before a procyclical reaction is triggered. Hence, as in A-N, a higher degree of fiscal transparency is associated with less frequent occurrences of procyclical fiscal policy. A higher degree of fiscal transparency makes the expected gain of running an excessive deficit smaller (since the incumbent will be exposed more frequently) and so voters realize this and rationally trust the incumbent with larger surpluses before they start demanding procyclical policies.[25]

[24] See section 7.7.1 in the Appendix for derivations.

[25] Note that we have implicitly assumed that $p < p^*$. If $p > p^*$ then increasing transparency further will have no effect on the cut-off point for where fiscal policy becomes procyclical. This is so since if $p > p^*$, the incumbent is no longer running for office and so increasing transparency beyond this point does not change the incentives of the incumbent any further.

Next we consider the effect on $\widetilde{\varepsilon}$ from increasing the degree of political polarization. Increased polarization implies that λ_A decreases if $\lambda_A < 1/2$ or increases if $\lambda_A > 1/2$. Differentiating equation (5) with respect to $\widetilde{\varepsilon}$ and λ_A we obtain the following:[26]

$$\frac{d\widetilde{\varepsilon}}{d\lambda_A} = \frac{\partial B/\partial\lambda_A \left[1 - \eta^{-1}u_g(g_2(d_I^*))\right] + \beta p(1-\pi)\eta^{-1}\partial\overline{\overline{\Delta}}/\partial\lambda_A}{1 - \eta^{-1}u_g(g_2(\bar{d}))} \tag{6}$$

To determined the sign of this derivative we need to determine the sign of the two derivatives: $\partial\overline{\overline{\Delta}}/\partial\lambda_A$ and $\partial B/\partial\lambda_A$, since we already know that the denominator, $1 - \eta^{-1}u_g(g_2(d_1))$, is positive.

The sign of $\partial\overline{\overline{\Delta}}/\partial\lambda_A$ is given as the following:[27]

$$\frac{\partial\overline{\overline{\Delta}}}{\partial\lambda_A} = 2\log\left(\frac{\lambda_A}{1-\lambda_A}\right) - \left(\frac{1-2\lambda_A}{\lambda_A(1-\lambda_A)}\right) \begin{cases} < 0 & for\ \lambda_A < 1/2 \\ = 0 & for\ \lambda_A = 1/2 \\ > 0 & for\ \lambda_A > 1/2 \end{cases}$$

The sign of $\partial\overline{\overline{\Delta}}/\partial\lambda_A$ has the following intuition: $\overline{\overline{\Delta}}$ denotes the utility gain from consumption for the incumbent by being able to choose the period 2 policy rather than having the challenger choosing policy. The lower the degree of polarization, the smaller is the difference between the consumption choices of the two politicians and so the smaller is the gain. Therefore $\overline{\overline{\Delta}}$ must fall as the degree of political polarization decreases. As explained in detail below, this is the key channel driving the effect of polarization on the cyclical properties of our fiscal policy variables.

The second derivative we need to consider is $\partial B/\partial\lambda_A$. This is given by the following:[28]

$$\frac{dB}{d\lambda_A} \begin{cases} < 0 & for\ \lambda_A < 1/2 \\ = 0 & for\ \lambda_A = 1/2 \\ > 0 & for\ \lambda_A > 1/2 \end{cases}$$

Note that B is given from the deficit in **Case 1**, $d_I^* = -\varepsilon + B$, and so B can be interpreted as the structural deficit, i.e. the deficit needed in absence of shocks ($\varepsilon = 0$) in **Case 1**. This deficit is negative (i.e. there is a structural surplus) since $r_1 < r_2 = \overline{r}$ (such that in order to obtain consumption smoothing a surplus must be carried over pay for the higher period 2 rents) and depends in general of the degree of polarization.[29]

[26] See section 7.7.2 in the Appendix for derivations.
[27] See equation (8) in the Appendix.
[28] See section 7.7.2 in the Appendix for derivations.
[29] The sign of $\partial B/\partial\lambda_A$ is determined by the sign of $\partial\widetilde{\Delta}/\partial\lambda_A$ (see section 9.7.2 in the Appendix for details).

Thus we are now able to sign $d\widetilde{\varepsilon}/\lambda_A$ as the following:

$$\frac{d\widetilde{\varepsilon}}{d\lambda_A}\begin{cases} <0 & for\ \lambda_A < 1/2 \\ =0 & for\ \lambda_A = 1/2 \\ >0 & for\ \lambda_A > 1/2 \end{cases}$$

Hence higher polarization (lower λ_A when $\lambda_A < 1/2$, higher λ_A when $\lambda_A > 1/2$) moves the cut-off point, $\widetilde{\varepsilon}$, from where policy becomes procyclical, further out. Thus with a higher degree of polarization, the shocks to the economy needs to be bigger before a procyclical reaction is triggered. Thus fiscal policy becomes procyclical less frequently. Polarization thus has a similar effect as transparency, though the channel it works through is different. A higher degree of polarization means that the expected gain of running an excessive deficit is lower, since if the incumbent is caught running such an excessive deficit, and therefore not re-elected, the corresponding loss in utility from having the opposing candidate setting policy now becomes larger. Voters realize this and will now rationally trust the incumbent with a larger surplus. Hence transparency works via increasing the chance of getting caught if running an excessive deficit, while polarization works via lowering the incumbents utility if caught.[30] The effect of increasing polarization of the spending profile is shown in the figure below. From (6) we also see that a higher degree of fiscal transparency, p makes increasing polarization more effect-full in moving out the cut-off point ($\widetilde{\varepsilon}$) for when policy becomes procyclical. The reason is that polarization works via the loss of utility the incumbent suffers if she is caught running an excessive deficit. If the chance of exposure when running an excessive deficit is large then the utility obtained in this event becomes more important. Thus higher p amplifies the effect of polarization.

[Figure 2 about here]

$\widetilde{\Delta}$ denotes the incumbent's the utility gain from consumption in period 1 from being in *option 1* compared to *option 3*. Lowering the degree of polarization increase $\widetilde{\Delta}$ since the incumbent's preferences move closer to those of the median voter thereby making *option 1* more attractive than *option 3,* i.e. V_1 becomes larger than V_3. In equilibrium $V_1 = V_3$ must hold and so rents in *option 1* can be decreased until $V_1 = V_3$ holds again. With a smaller level of rents in period 1, the structural surplus must be bigger (the structural deficit must be smaller) and so B must fall. Note that the effect from polarization via B is somewhat artificial and relates to the two period structure of the model. The main intuition of the model regarding the effect of polarization comes from the derivative invoving $\overline{\overline{\Delta}}$ and does not rely on the effect from B. The effect from B works in the same direction and simply enhance the effect of polararization.

[30] As explained above, the effect via B comes from the fact that the model ends in period 2. We therefore do not consider this effect in the intuitive explanation of the effect of polarization but simply note that the effect from B goes in the same direction as the effect coming from $\overline{\overline{\Delta}}$.

5 Empirical Evidence

5.1 Empirical Prediction

As shown above, increasing the degree of political polarization increases the size of the income shock necessary to trigger a procyclical policy response. Thus for a given marginal policy response and distribution of shocks we would expect to observe procyclical policies less frequently and thus also observe a smaller average response in "good times", where "good times" are define as e.g. positive values of the output gap. In addition, as shown in section 7.8 in the Appendix, the slope of g^*, with respect to the shock, becomes less step in **Case 2** when increasing the degree of polarization. Thus whenever a procyclical response is triggered, the response is smaller the larger the degree of political polarization. Hence from an empirical point of view, we should unambiguously expect a higher degree of polarization to diminish the procyclical bias in good times by having both smaller and less frequent procyclical responses.

Our model predicts that spending should be procyclical when the economy is doing relatively well and acyclical otherwise. The actual cut-off point for when spending becomes procyclical is not clear from an empirical point of view. In our empirical analysis we use the output gap as our cyclical indicator and label positive output gaps "good times" and negative output gaps "bad times". However, the cut-off at zero is to some degree arbitrary and other values could have been chosen. The important thing, however, is whether it is possible to identify the "flat" and the upward "sloping" part of the spending profile, and that the "flat" part occurs for lower values of the output gap than the "sloping" part. As the next section will show, using a cut-off point of zero seems to work quite well in identifying the kink of the spending profile.

5.2 Data and Estimation

We next proceed to test the model hypothesis regarding the effect of political polarization: a high degree of political polarization should be associated with a smaller procyclical bias in good times. In order to estimate this we specify a dynamic panel data model for government spending using data for 48 of the US states for the period 1978 to 2007.[31] In order to estimate the effect running from the business cycle to fiscal policy and how political polarization affects this relationship, we regress government spending on the output gap interacted with a measure of political polarization, while controlling various other variables of interest. In order to account for lags in the political decision process, we also include lags of the dependent variable. In the model we consider we also include a state fixed effect as well as time dummies. Thus our equation of interest is the following:

[31] We exclude Alaska and Hawaii from our sample due to data availability. See data appendix for more details on data sources.

$$G_{i,t} = \alpha_0 + \alpha_1 G_{i,t-1} + \alpha_2 G_{i,t-2} + \beta' Y_{i,t} + \gamma' X_{i,t} + \eta_i + \mu_t + e_{i,t} \quad (7)$$

for $i = 1, 2, ..., N$ and $t = 2, 3, ..., T$, and where $G_{i,t}$ denotes our fiscal policy variable and $Y_{i,t}$ is a vector of terms involving the output gap and interactions with dummies for "good" and "bad" times as well as political polarization. $X_{i.t}$ is a vector of control variable and η_i denotes the state fixed effect, μ_t the time dummies and $e_{i,t}$ is an error term. Due to the dynamic nature of the panel and the presence of a fixed effect, we estimate (7) using the GMMSYS estimator developed in Arellano and Bond (1991), Arellano and Bover (1995) and Blundell and Bond (1998). For completeness we also consider the OLS and Within estimators. Since it is likely that fiscal policy might affect the condition of the business cycle we always instrument all terms in $Y_{i,t}$ using their own lags.[32]

Our primary choice of fiscal policy variable, $G_{i,t}$, is direct general government spending. Direct government spending excludes intergovernmental spending as well as the UIL accounts (utilities, insurance and liquor stores) and should therefore exclude most automatic transfers. We scale this variable relative to trend (nominal) GDP, which we obtain using a HP filter on state (nominal) GDP. The output gap variable is constructed as the percentage-wise deviation of state (real) GDP to trend (real) GDP. We interact the output gap with a dummy, $d_{i,t}^{pos}$, for good times, which we define as a positive output gap, and a dummy, $1 - d_{i,t}^{pos}$, for bad times. Further, we also interact these two variables with a measure of political polarization. As a measure of political polarization we follow Hanssen (2004) and Alt, Lassen and Rose (2006) and use the Poole and Rosenthal (1997) data on roll call votes in Congress, and calculate the degree of political polarization as the difference between the average position of the state delegation of Democrats and Republicans on the liberal-conservative axis.[33] As a robustness check, we proxy political polarization by income inequality, where we measure income inequality using the Galbraith-Hale Gini-index.[34]

One potential explanation for why highly polarized states might conduct less procyclical policies in good times could be that these states might also suffer from a high degree of political gridlock, thus making the state's politicians unlikely to agree to any major policy changes, including changes in fiscal policy. If a high degree of polarization leads to political gridlock, then it might not be possible to enact procyclical spending policies when entering a boom. Thus observing acyclical policies together with a high degree of polarization might merely reflect a non-functioning political system where policy changes are very difficult to enact such that a status quo bias arises. We therefore control for the degree of gridlock by using a measure for

[32] All estimations are performed using OxMetrics 5.0.

[33] We drop data for those years when a state does not have two-party representation in the house of the US congress.

[34] Galbraith and Hale (2006) estimates the Gini-coefficient for all US states up until 2004.

late budgets taken from Andersen, Lassen and Nielsen (2010), who define a late budget as a budget that is signed into law after the end of the fiscal year. A high degree of gridlock should lead to prolonged budget negotiations and thus controlling for whether the budget negotiations exceeded the fiscal year deadline should capture most of the gridlock effect in our estimations.[35] We control for this by including an interaction term between a dummy for late budget and the output gap in good and bad times simultaneously with our polarization terms.

As a robustness check we also control for various political and institutional variables such as the strictness of balanced budget rules, whether a deficit can be carried over to the next fiscal year, divided government, governor party affiliation, the size of the end-balance in the general fund and stabilization fund and whether the governor has line-item veto powers over the budget. As for the control variables included in the $X_{i,t}$ vector we use the inflation rate, lagged debt, a dummy for election and the trend unemployment rate.

Table 1 shows our baseline results. Columns (1)-(4) show the estimated response of direct government spending (relative to trend GDP) from a marginal increase in the output gap when allowing the effect to differ depending on whether we are in good or bad times. The estimated coefficient in good times is positive and significant. The coefficient in bad times is insignificant in all specifications. Thus an increase in economic activity triggers an increase in government spending if the economy is already doing well and no response if the economy is doing badly. Thus the US states also seem to respond to cyclical fluctuations in a asymmetric manner and with a procyclical bias in good times, just as other developed economies as documented in A-N.

In columns (5)-(7) of Table 1 we estimate cyclical response of government spending again, but now we also control for the degree of political polarization. The coefficient on the variable $gap_{i,t} \cdot d_{i,t}^{pos}$ now has to be interpreted slightly differently, since it now measures the cyclical response in good times *conditional* on the state scoring zero in the polarization measure. This coefficient is positive and significant. The coefficient on the variable $gap_{i,t} \cdot d_{i,t}^{pos} \cdot polar_{i,t}$ is negative and significant and suggests that the cyclical response of government spending in good times is smaller in more polarized states. A "back of the envelope" calculation shows that a unit increase in the output gap in good times increases direct government spending by 0.07% of GDP in non-polarized states (the lowest score in our polarization measure is 0.012). The corresponding effect in a highly polarized state (the highest polarization score is 1.28) is $0.071 - 0.074 \cdot 1.28 = -0.023$, thus either acyclical or slightly countercyclical. Hence, moving from the lowest to highest degree of political polarization eliminates the entire procyclical bias in good times. There is no effect of polarization on the responses in bad times as all

[35] Andersen, Lassen and Nielsen (20010) argue that late budgets is a good measure of legislative gridlock since it is a important and comparable piece of legislations across states and time. Further, since a budget appears exogenously on the legislative agenda it unaffected by low demand or supply for new laws.

the corresponding coefficients in bad times are all insignificant. In column (8) we use the Gini-coefficient as a measure of income polarization to proxy for general polarization of the state. This yields very similar results with $gap_{i,t} \cdot d_{i,t}^{pos}$ being positive and significant and $gap_{i,t} \cdot d_{i,t}^{pos} \cdot gini_{i,t}$ being negative and significant. Conducting a similar "back of the envelope" calculation as above suggests that moving from the states with the lowest degree of income inequality to the states with the highest degree of income inequality completely eliminates the procyclical bias in good times. As before there is no effect on the spending pattern in bad times.

However, as explained above, the effect of polarization might just work through increased gridlock making discretionary government spending unresponsive to cyclical fluctuations. If this was indeed the explanation then we would expect to observe that in years of high gridlock, government spending should be less procyclical. In column (9) we control for gridlock by including the late budget variable. As expected, we find that in years of prolonged budget negotiations, government spending is significant less procyclical in good times, in fact, the procyclical bias is now only half as big. There is no effect in bad times. If our estimated effect from polarization on the cyclical response was only reflecting increased political gridlock, then controlling for late budgets should render the coefficient on polarization insignificant. In column (10) we estimate the cyclical response of government spending controlling for both the degree of political polarization and late budgets. As seen, the coefficient on $gap_{i,t} \cdot d_{i,t}^{pos} \cdot polar_{i,t}$ is still significant on a 1% level.[36] The coefficient on late budgets is roughly unchanged and also still significant on a 1% level. Thus, there seem to be an independent effect of political polarization on the cyclical responses of government spending in good times that goes beyond political gridlock.[37] We interpret this as evidence in favour of our proposed model. Thus when estimating the cyclical response of fiscal policy it seems important to allow the effect to differ in good and bad times as well as to control for both the degree of political polarization and political gridlock.

[Table 1 about here]

Table 2 shows some robustness results. In all of the specifications we divide the output gap into good and bad times and interact these variables with both our polarization measure as well as whether the budget was late. We then control for various potential important factors: for the strictness of budget rules we use the ACIR index (ACIR, 1987), which does not seem

[36] It is also still the case that moving from the minimum to the maximum level of polarization removes the entire procyclical bias in good times.

[37] We also tried controlling for the level effect of political polarization on government spending. Including the degree of polarization in levels, while still controlling for the interaction of the output gap with polarization and late budgets, yields an insignificant coefficient on the level term, whereas the interaction term coefficients are roughly unchanged and still highly significant.

to affect the cyclical response in any noticeable way. The same is true for governor veto power and whether or not there is a no carry-over rule of budget deficits in place. Having more cash available in government funds (the general fund and the stabilization fund) seems to increase the procyclical bias in good times and make policy more countercyclical in bad times, although the effects are not significant. There does not seem to be an independent effect from divided government once we have controlled for polarization and gridlock. Finally, Democratic governors seem to conduct slightly more procyclical policies in good times and less procyclical policies in bad times. In all these specification the coefficient on polarization and late budgets in good times are clearly significant and with the expected negative sign.

[Table 2 about here]

As an additional robustness check we tried using overall government spending (thus also including intergovernmental spending) instead of *direct* spending. Our overall results are unchanged by this as shown in Table 3. Controlling for the degree of transparency (using data from Alt, Lassen and Rose, 2006) does not effect our results for polarization (results not reported). Hence our result that increased political polarization decreases the procyclical bias in good times seems robust.

[Table 3 about here]

6 Conclusion

Increased polarization are often associated with worse policy outcomes in many studies. The model presented in this paper highlights a different channel through which political polarization affects policy outcomes in a positive direction: an incumbent politician facing very polarized environment will fear losing power to a greater extend since the opposition's policy choice would be very far from the incumbent's preferred policy. The swing voters in the middle of the political spectrum, who decide the outcome of the election, will use that politicians are more disciplined to demand better policy outcomes. In this model setup this means that these voters will demand (and obtain) acyclical policies more frequently. Since losing office for the politician is now associated with a greater utility loss, the gain from engaging in excessive deficit creation now has to be greater. Hence the income shock (and the associated government surplus for achieving smoothing consumption) now has to be very large to make it worth while for the incumbent politician to take the risk of running an excessive hidden deficit. Thus an income shock now has to be bigger to trigger a procyclical policy response and so our model

predict that having a higher degree of polarization should reduced the procyclical bias in good times. We confirm this prediction using data for a sample of 48 US states from 1978 to 2007. We leave a more general treatment of political polarization and retrospective voting for future research.

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7 Appendix

7.1 Period 2 Policies

The incumbent, j, in period 2 solves the following problem:

$$\begin{aligned} & \underset{r_2,g_2,\tau_2}{Max}\ \lambda_j \log(g_2) + (1-\lambda_j)\log(c_2) + \eta r_2 \\ st\ \ r_2 \ &\leq\ \overline{r},\ g_2 = \tau_2 y_2 - \beta^{-1} d_1 - r_2,\ c_2 = (1-\tau_2) y_2 \end{aligned}$$

and substituting for g and c we get the following Lagrangian function:

$$\underset{r_2,g_2,\tau_2}{Max}\ L = \lambda_j \log(\tau_2 y_2 - \beta^{-1} d_1 - r_2) + (1-\lambda_j)\log((1-\tau_2)y_2) + \eta r_2 \quad - \mu\left[r_2 - \overline{r}\right]$$

which has the following first order conditions:

$$r_2 : -\lambda_j \frac{1}{g_2} + \eta = \mu$$

$$\tau_2 : \lambda_j \frac{1}{g_2} = (1-\lambda_j)\frac{1}{c_2} \Leftrightarrow \lambda_j c_2 = (1-\lambda_j) g_2$$

substituting into the budget constraint and using that $c_2 = g_2(1-\lambda_j)/\lambda_j$ yields:

$$\begin{aligned} g_2^j \ &=\ y_2 - \frac{(1-\lambda_j)}{\lambda_j} g_2^j - \beta^{-1} d_1 - r_2 \Leftrightarrow \\ g_2^j \ &=\ \lambda_j \left(y_2 - \beta^{-1} d_1 - r_2\right) \end{aligned}$$

and

$$c_2^j = (1-\lambda_j)\left(y_2 - \beta^{-1} d_1 - r_2\right)$$

we will assume that η is high such that the constraint $r_2 \leq \overline{r}$ is always binding (rents are very valuable to politicians relative public and private consumption)[38] so that it holds that $1 - \eta^{-1} u_g(d_1) = \mu\eta^{-1} > 0$. In this case the solution in period two is given as the following:

$$r_2 = \ \overline{r}$$

[38] We assume that $\eta > \lambda_A \frac{1}{g_2} = (1-\lambda_A)\frac{1}{c_2}$, i.e. that marginal utility of rents exceed that of public and private consumption.

$$g_2^j = \lambda_j \left(y_2 - \beta^{-1} d_1 - \ \overline{r} \right)$$

$$c_2^j = (1 - \lambda_j) \left(y_2 - \beta^{-1} d_1 - \ \overline{r} \right)$$

7.2 Who runs for election?

The expected utility from running for election in *option 1* for the incumbent is given as:

$$(1 - \pi) U_{A,A} + \pi U_{A,B}$$

Since the expected utility from not running for the incumbent is $U_{A,B}$, the expected gain from running for the incumbent is given as:

$$\Delta U_A = (1 - \pi) U_{A,A} + \pi U_{A,B} - U_{A,B} = (1 - \pi) \left(U_{A,A} - U_{A,B} \right)$$

and since $U_{A,A} - U_{A,B} = \lambda_A \log \left(\lambda_A / \lambda_B \right) + (1 - \lambda_A) \log \left(\{1 - \lambda_A\} / \{1 - \lambda_B\} \right) + \eta \overline{r}$, we get the following expression for the gain from running:

$$\Delta U_A = (1 - \pi) \left[\lambda_A \log \left(\frac{\lambda_A}{\lambda_B} \right) + (1 - \lambda_A) \log \left(\frac{1 - \lambda_A}{1 - \lambda_B} \right) + \eta \overline{r} \right]$$

Using that $\lambda_B = 1 - \lambda_A$, we obtain that:

$$\Delta U_A = (1 - \pi) \left[(1 - 2\lambda_A) \log \left(\frac{1 - \lambda_A}{\lambda_A} \right) + \eta \overline{r} \right]$$

The expected utility from running for candidate B in *option 1* is given as:

$$\pi U_{B,B} + (1 - \pi) U_{B,A}$$

and so the expected gain is given as:

$$\Delta U_B = \pi U_{B,B} + (1 - \pi) U_{B,A} - U_{B,A} = \pi \left(U_{B,B} - U_{B,A} \right)$$

Inserting the values for $U_{B,B}$ and $U_{B,A}$,using that $\lambda_A = 1 - \lambda_B$ and rearranging we get that:

$$\Delta U_B = \pi \left[(1 - 2\lambda_B) \log \left(\frac{1 - \lambda_B}{\lambda_B} \right) + \eta \overline{r} \right]$$

Expressing ΔU_B in terms of λ_A gives the following:

$$\Delta U_B = \pi \left[(1 - 2\lambda_A) \log \left(\frac{1 - \lambda_A}{\lambda_A} \right) + \eta \overline{r} \right]$$

Thus the condition for having A running in *option 1* is that $\Delta U_A \geq \delta$ and so A will run whenever:

$$(1 - \pi)(1 - 2\lambda_A) \log \left(\frac{1 - \lambda_A}{\lambda_A} \right) + (1 - \pi)\eta \overline{r} \geq \delta$$

and B will run in *option 1* if $\Delta U_B \geq \delta$, which implies that the following must hold:

$$\pi(1 - 2\lambda_A) \log \left(\frac{1 - \lambda_A}{\lambda_A} \right) + \pi \eta \overline{r} \geq \delta$$

7.3 Incumbent options

Option 3:

$$\begin{aligned} V_3 &= \lambda_A \log(\widetilde{g}) + (1 - \lambda_A) \log(\widetilde{c}) + \eta \widetilde{r} + (1 - \pi)\beta \left\{ \lambda_A \log(g_2^{A'}(\widetilde{d})) + (1 - \lambda_A) \log(c_2^{A'}(\widetilde{d})) \right\} \\ &\quad + \pi\beta \left\{ \lambda_A \log(g_2^{B}(\widetilde{d})) + (1 - \lambda_A) \log(c_2^{B}(\widetilde{d})) \right\} \end{aligned}$$

where $\widetilde{g}, \widetilde{c}, \widetilde{d}$ and $\widetilde{r}$ are chosen optimally by the incumbent given that she will not be in office in period 2. We have assumed that η is sufficiently high such that the incumbent will always want to grab the maximum level of rents possible. Hence $\widetilde{r} = \overline{r}$. The optimal choice for the incumbent of public and private consumption and the deficit is given as the solution to the following problem (using that $\widetilde{g} = \tau_1 y_1 - \widetilde{r} + \widetilde{d}$ and $\widetilde{c} = (1 - \tau_1) y_1$).

$$\begin{aligned} \underset{\widetilde{g}, \widetilde{c}, \widetilde{d}}{Max} \quad & \lambda_A \log(\widetilde{g}) + (1 - \lambda_A) \log(\widetilde{c}) + \eta \widetilde{r} \\ & + \beta \left\{ \log(y_2 - \beta^{-1} \widetilde{d} - \overline{r}) + (1 - \pi) C_{A,A'} + \pi C_{A,B} \right\} \end{aligned}$$

where $C_{A,i} = \lambda_A \log(\lambda_i) + (1 - \lambda_A) \log(1 - \lambda_i)$ and subject to $\widetilde{r} = \overline{r}$, $\widetilde{g} = \widetilde{\tau} y_1 - \widetilde{r} + \widetilde{d}$ and $\widetilde{d} \leq \overline{d}$. The Lagrangian becomes the following (using that $\lambda_{A'} = \lambda_A$):

$$\begin{aligned} L &= \lambda_A \log(y_1 - \widetilde{c} - \overline{r} + \widetilde{d}) + (1 - \lambda_A) \log(\widetilde{c}) + \eta \overline{r} \\ &\quad + \beta \left\{ \log(y_2 - \beta^{-1} \widetilde{d} - \overline{r}) + (1 - \pi) C_{A,A} + \pi C_{A,B} \right\} - \mu \left[\widetilde{d} - \overline{d} \right] \end{aligned}$$

which gives the following first order conditions:

$$\widetilde{c}: \lambda_A \frac{1}{\widetilde{g}} = (1-\lambda_A)\frac{1}{\widetilde{c}}$$

$$\widetilde{d}: \lambda_A \frac{1}{\widetilde{g}} = \frac{1}{y_2 - \beta^{-1}\widetilde{d} - \overline{r}} + \mu$$

since $\widetilde{r} \leq \overline{r}$ binds the condition $\widetilde{d} \leq \overline{d}$ would only become binding in extreme recessions (for very low ε), which we do not consider. Therefore $\mu = 0$ and so combining the budget constraint and the FOC wrt. $\widetilde{c}$ we get the following:

$$\begin{aligned}
\widetilde{g} &= y_1 - \widetilde{c} - \overline{r} + \widetilde{d} \Leftrightarrow \\
\widetilde{g} &= \lambda_A \left[y_1 - \overline{r} + \widetilde{d} \right] \Leftrightarrow \\
\widetilde{c} &= (1-\lambda_A) \left[y_1 - \overline{r} + \widetilde{d} \right]
\end{aligned}$$

and so from FOC wrt. $\widetilde{d}$ we get:

$$\begin{aligned}
\frac{1}{y_1 - \overline{r} + \widetilde{d}} &= \frac{1}{y_2 - \beta^{-1}\widetilde{d} - \overline{r}} \Leftrightarrow \\
\widetilde{d} &= (1+\beta^{-1})^{-1}(y_2 - y_1) = -\varepsilon
\end{aligned}$$

and so

$$\begin{aligned}
\widetilde{g} &= \lambda_A \left[\overline{y} - \overline{r} \right] \Leftrightarrow \\
\widetilde{c} &= (1-\lambda_A) \left[\overline{y} - \overline{r} \right]
\end{aligned}$$

7.4 When does the incumbent choose option 1?

The condition that makes the incumbent choose *option 1* over *option 3* is the following:

$$\begin{aligned}
V_1 &\geq V_3 \Leftrightarrow \\
(1-(1-\pi)\beta)\eta\overline{r} &\leq \widetilde{\Delta}(g^*, c^*) + \eta\left[y_1 - c^* - g^* + d^* \right] - \delta \\
&\quad + (1-\pi)\beta\Delta^A(d^*, \widetilde{d}) + \pi\beta\Delta^B(d^*, \widetilde{d})
\end{aligned}$$

where

$$\widetilde{\Delta}(g^*, c^*) \equiv \lambda_A \log(g^*) + (1-\lambda_A)\log(c^*) - (\lambda_A \log(\widetilde{g}) + (1-\lambda_A)\log(\widetilde{c}))$$

and

$$\Delta^i(d^*, \widetilde{d}) \equiv \lambda_A \log(g_2^i(d^*)) + (1-\lambda_A)\log(c_2^i(d^*) - \left(\lambda_A \log(g_2^i(\widetilde{d})) + (1-\lambda_A)\log(c_2^i(\widetilde{d}))\right)$$

Using the period 2 solution we see the following:

$$\Delta^i(d^*, \widetilde{d}) = \log(y_2 - \beta^{-1}d^* - \overline{r}) - \log(y_2 - \beta^{-1}\widetilde{d} - \overline{r})$$

and so we get that

$$(1-\pi)\beta\Delta^A(d^*, \widetilde{d}) + \pi\beta\Delta^B(d^*, \widetilde{d}) = \beta\left[\log(y_2 - \beta^{-1}d^* - \overline{r}) - \log(y_2 - \beta^{-1}\widetilde{d} - \overline{r})\right]$$

and the condition $V_1 \geq V_3$ becomes

$$\begin{aligned} & \widetilde{\Delta}(g^*, c^*) + \eta\left[y_1 - c^* - g^* + d^*\right] - \delta + \beta\log(y_2 - \beta^{-1}d^* - \overline{r}) \\ \geq \quad & \beta\log(y_2 - \beta^{-1}\widetilde{d} - \overline{r}) + (1-(1-\pi)\beta)\eta\overline{r} \end{aligned}$$

The condition that $V_1 \geq V_2$ can be written as:

$$\eta\left[d^* - \overline{d}\right] + \beta p(1-\pi)\eta\overline{r} + \beta(1-\pi)\Delta^A(d^*, \overline{d}) + \beta\pi\Delta^B(d^*, \overline{d}) + \beta p(1-\pi)\overline{\overline{\Delta}} \geq 0$$

where

$$\Delta^i(d^*, \overline{d}) \equiv \lambda_A \log(g_2^i(d^*)) + (1-\lambda_A)\log(c_2^i(d^*) - \left(\lambda_A \log(g_2^i(\overline{d})) + (1-\lambda_A)\log(c_2^i(\overline{d}))\right)$$

and

$$\overline{\overline{\Delta}} \equiv \lambda_A \log(g_2^A(\overline{d})) + (1-\lambda_A)\log(c_2^A(\overline{d})) - \left(\lambda_A \log(g_2^B(\overline{d})) + (1-\lambda_A)\log(c_2^B(\overline{d}))\right).$$

Using the above result about $\Delta^i(d^*, \widetilde{d})$ we get that the condition $V_1 \geq V_2$ can be written as:

$$\eta\left[d^* - \overline{d}\right] + \beta p(1-\pi)\eta\overline{r} + \beta p(1-\pi)\overline{\overline{\Delta}} \geq \beta\left(\log(y_2 - \beta^{-1}\overline{d} - \overline{r}) - \log(y_2 - \beta^{-1}d^* - \overline{r})\right)$$

We can re-write the expression for $\overline{\overline{\Delta}}$ as the following:

$$\overline{\overline{\Delta}} = (1-2\lambda_A)\log\left(\frac{1-\lambda_A}{\lambda_A}\right)$$

and note that

$$\frac{\partial\overline{\overline{\Delta}}}{\partial\lambda_A} = 2\left(\log(\lambda_A) - \log(1-\lambda_A)\right) - (1-2\lambda_A)\left(\frac{1}{\lambda_A(1-\lambda_A)}\right) \tag{8}$$

and so $\partial\overline{\overline{\Delta}}/\partial\lambda_A < 0$ for $\lambda_A < 1/2$, $\partial\overline{\overline{\Delta}}/\partial\lambda_A = 0$ for $\lambda_A = 1/2$ and $\partial\overline{\overline{\Delta}}/\partial\lambda_A > 0$ for $\lambda_A > 1/2$ and so $\overline{\overline{\Delta}}$ becomes larger when polarization increases.

7.5 Voter maximization problem

Voters must now set the criteria for re-electing an incumbent under the constraint that she chooses *option 1)*. Hence voters must decide which minimum level of consumption, g^* and c^* and maximum deficit d^* to ask for. Voters then have to maximize total discounted utility:

$$\underset{g^*,c^*,d^*}{Max} \quad (1/2)\log(g^*) + (1/2)\log(c^*) + \beta/2(1-\pi)\left\{\log(g_2^A(d^*)) + \log(c_2^A(d^*)\right\}$$

$$+\beta/2\pi\left\{\log(g_2^B(d^*)) + \log(c_2^B(d^*)\right\}$$

$$st.\ V_1 \geq V_3\ V_1 \geq V_2$$

where g_2^j and c_2^j are given from (2) and (3). Using this the Lagrangian can be written as:

$$\begin{aligned} L \quad = \quad & (1/2)\log(g^*) + (1/2)\log(c^*) + \beta\left\{\log(y_2 - \beta^{-1}d^* - \overline{r})\right\} \\ & +\beta\left\{(1-\pi)C_{m,A} + \pi C_{m,B}\right\} - \lambda_1\left[-V_1 + V_3\right] - \lambda_2\left[-V_1 + V_2\right] \end{aligned}$$

where $C_{m,i} = (1/2)\log(\lambda_i) + (1/2)\log(1-\lambda_i)$.

Differentiating yields the following Kuhn-Tucker first order conditions:

$$g^*: (1/2)\frac{1}{g^*} - \lambda_1\left[\eta - \frac{\partial\widetilde{\Delta}(g^*,c^*)}{\partial g^*}\right] = 0 \Leftrightarrow (1/2)\frac{1}{g^*} = \lambda_1\left[\eta - \lambda_A\frac{1}{g^*}\right]$$

$$c^*: (1/2)\frac{1}{c^*} - \lambda_1\left[\eta - \frac{\partial\widetilde{\Delta}(g^*,c^*)}{\partial c^*}\right] = 0 \Leftrightarrow (1/2)\frac{1}{c^*} = \lambda_1\left[\eta - (1-\lambda_A)\frac{1}{c^*}\right]$$

$$\begin{aligned} d^* \quad : \quad & \frac{-1}{y_2 - \beta^{-1}d^* - \overline{r}} = \lambda_1\left[-\frac{\partial V_1}{\partial d^*}\right] + \lambda_2\left[-\frac{\partial V_1}{\partial d^*} + \frac{\partial V_2}{\partial d^*}\right] \\ \Leftrightarrow \quad & \frac{1}{y_2 - \beta^{-1}d^* - \overline{r}} = \lambda_1\left[-\eta + \frac{1}{y_2 - \beta^{-1}d^* - \overline{r}}\right] + \lambda_2\left[-\eta + \frac{1}{y_2 - \beta^{-1}d^* - \overline{r}}\right] \end{aligned}$$

and the complementary slackness conditions are:

$$\lambda_1\left[-V_1 + V_3\right] = 0 \; and \; \lambda_2\left[-V_1 + V_2\right] = 0$$

We can combine the FOC for g^* and c^* to solve for the optimal relation between private and public consumption:

$$\frac{c^*}{g^*} = \frac{\eta - \lambda_A\frac{1}{g^*}}{\eta - (1-\lambda_A)\frac{1}{c^*}} \Leftrightarrow \eta c^* - (1-\lambda_A) = \eta g^* - \lambda_A \Leftrightarrow c^* = g^* + \frac{1-2\lambda_A}{\eta}$$

Since in optimum $V_1 = V_3$ must hold, we next move on to consider the two possible cases with respect to the second constraint:

Case 1: $\lambda_2 = 0$ (the constraint $V_1 \geq V_2$ is unbinding) From the first order condition wrt. d^* we get:

$$\frac{-1}{y_2 - \beta^{-1}d^* - \overline{r}} = \lambda_1\left[-\eta + \frac{1}{y_2 - \beta^{-1}d^* - \overline{r}}\right]$$

and using that from the FOC wrt. g^*, c^* we have that $\lambda_1 = (1/2)\frac{1}{\eta g^* - \lambda_A}$ we get:

$$\begin{aligned} \frac{1}{\lambda_1} &= \eta\left[y_2 - \beta^{-1}d^* - \overline{r}\right] - 1 \\ \eta g^* - \lambda_A &= \frac{1}{2}\left[\eta\left(y_2 - \beta^{-1}d^* - \overline{r}\right) - 1\right] \Leftrightarrow \\ g^* &= \frac{1}{2}\left[y_2 - \beta^{-1}d^* - \overline{r} - \frac{1-2\lambda_A}{\eta}\right] = \frac{1}{2\lambda_A}g_2^A(d^*) - \frac{1-2\lambda_A}{2\eta} \end{aligned}$$

and since $c^* = g^* + (1-2\lambda_A)/\eta$ we get that

$$c^* = \frac{1}{2}\left[y_2 - \beta^{-1}d^* - \ \overline{r} + \frac{1-2\lambda_A}{\eta}\right] = \frac{1}{2\lambda_A}g_2^A(d^*) + \frac{1-2\lambda_A}{2\eta}$$

Next we move on the find an expression for d^* : From the slackness condition $V_1 = V_3$ we get:

$$\begin{aligned} & \widetilde{\Delta}(g^*, c^*) + \eta\left[y_1 - c^* - g^* + d^*\right] - \delta \\ = \ & \beta\left[\log(y_2 - \beta^{-1}\widetilde{d} - \overline{r}) - \log(y_2 - \beta^{-1}d^* - \overline{r})\right] + (1-(1-\pi)\beta)\eta\overline{r} \end{aligned}$$

re-arranging this and using that $c^* = g^* + (1-2\lambda_A)/\eta$ and that $2g^* + \frac{1-2\lambda_A}{\eta} = y_2 - \beta^{-1}d^* - \overline{r}$ we get

$$\begin{aligned} y_2 - \beta^{-1}d^* - \overline{r} \ = \ & y_1 + d^* - (1-(1-\pi)\beta)\overline{r} + \eta^{-1}\widetilde{\Delta}(g^*, c^*) - \eta^{-1}\delta \\ & + \beta\eta^{-1}\left[\log(y_2 - \beta^{-1}d^* - \overline{r}) - \log(y_2 - \beta^{-1}\widetilde{d} - \overline{r})\right] \end{aligned}$$

and substituting in $\widetilde{\Delta}(g^*, c^*)$, the solution for $g^*, c^*, \widetilde{g}, \widetilde{d}$ and $\widetilde{c}$ as well as the definition of y_1 and y_2 we obtain:

$$\begin{aligned} -(1+\beta^{-1})\varepsilon - (1+\beta^{-1})d^* \ = \ & (1-\pi)\beta\overline{r} - \eta^{-1}\delta \\ & + \eta^{-1}\left[\lambda_A \log\left(y_2 - \beta^{-1}d^* - \ \overline{r} - \frac{1-2\lambda_A}{\eta}\right)\right] \\ & + \eta^{-1}\left[(1-\lambda_A)\log\left(y_2 - \beta^{-1}d^* - \ \overline{r} + \frac{1-2\lambda_A}{\eta}\right)\right] \\ & - \eta^{-1}\left[\log\left(\overline{y} - \ \overline{r}\right)\right] \\ & + \eta^{-1}\left[\log(\frac{1}{2}) - (\lambda_A\log(\lambda_A) + (1-\lambda_A)\log(1-\lambda_A))\right] \\ & + \beta\eta^{-1}\left[\log(y_2 - \beta^{-1}d^* - \overline{r}) - \log(\overline{y} - \ \overline{r})\right] \end{aligned}$$

from which it must be the case that d^* has a solution of the form:

$$d_I^* = -\varepsilon + B \tag{9}$$

where B is a term that does not depend on ε. B is determined implicitly from this equation:

$$\begin{aligned} -(1+\beta^{-1})B &= (1-\pi)\beta\overline{r} - \eta^{-1}\delta \\ &\quad +\eta^{-1}\left[\lambda_A \log\left(\overline{y} - \beta^{-1}B - \ \overline{r} - \frac{1-2\lambda_A}{\eta}\right)\right] \\ &\quad +\eta^{-1}\left[(1-\lambda_A)\log\left(\overline{y} - \beta^{-1}B - \ \overline{r} + \frac{1-2\lambda_A}{\eta}\right)\right] \\ &\quad -\eta^{-1}\left[\log\left(\overline{y} - \ \overline{r}\right)\right] \\ &\quad +\eta^{-1}\left[\log(\frac{1}{2}) - (\lambda_A\log(\lambda_A) + (1-\lambda_A)\log(1-\lambda_A))\right] \\ &\quad +\beta\eta^{-1}\left[\log(\overline{y} - \beta^{-1}B - \overline{r}) - \log(\overline{y} - \ \overline{r})\right] \end{aligned} \tag{10}$$

Using the solution for d^* we get the following solution candidates:

$$g_I^* = \frac{1}{2}\left[\overline{y} - \beta^{-1}B - \ \overline{r} - \frac{1-2\lambda_A}{\eta}\right]$$

$$c_I^* = \frac{1}{2}\left[\overline{y} - \beta^{-1}B - \ \overline{r} + \frac{1-2\lambda_A}{\eta}\right]$$

Note that these solution candidates are independent of cyclical fluctuations in income. The condition that needs to be satisfied for this solution to be feasible is the following:

$$V_1 \geq V_2 \Leftrightarrow$$

$$\begin{aligned} & -\varepsilon + B - \overline{d} + \beta p(1-\pi)\overline{r} + \beta p\eta^{-1}(1-\pi)\overline{\overline{\Delta}} \\ \geq\ & \beta\eta^{-1}\left(\log(\overline{y} - \beta^{-1}\varepsilon - \beta^{-1}\overline{d} - \overline{r}) - \log(\overline{y} - \beta^{-1}B - \overline{r})\right) \Leftrightarrow \\ & \varepsilon + \beta\eta^{-1}\log(\overline{y} - \beta^{-1}\varepsilon - \beta^{-1}\overline{d} - \overline{r}) \\ \leq\ & \beta\eta^{-1}\log(\overline{y} - \beta^{-1}B - \overline{r}) + B - \overline{d} + \beta p(1-\pi)\left(\overline{r} + \eta^{-1}\overline{\overline{\Delta}}\right) \end{aligned}$$

Note that $\overline{d}$ is an exogenous constant that does not depend on ε. In the above inequality the LHS depends on ε and the RHS does not. Differentiating the LHS wrt. ε yields the following:

$$\frac{\partial LHS}{\partial \varepsilon} = 1 + \beta\eta^{-1}\frac{1}{\overline{y} - \beta^{-1}\varepsilon - \beta^{-1}\overline{d} - \ \overline{r}}(-\beta^{-1}) = 1 - \eta^{-1}u_g(g_2(\overline{d}))$$

where we define $u_g(g_2(d_1)) \equiv (y_2 - \beta^{-1}d_1 - \ \overline{r})^{-1},\ d_1 \leq \overline{d}$. The above derivative is positive which can been seen from the following: from the maximization problem in period $t = 2$ we know (since $r_2 = \overline{r}$) that $\eta - \lambda_j\left(g_2^j\right)^{-1} = \mu > 0 \Leftrightarrow 1 - \eta^{-1}u_g(g_2(d_1)) = \mu\eta^{-1} > 0,$ which also

holds for $d_1 = \overline{d}$. Therefore the LHS increases with ε whereas the RHS is constant. Hence the condition will only be satisfy for sufficiently small shocks. Define $\widetilde{\varepsilon}$ as the maximum shock for which this constraint holds with equality. $\widetilde{\varepsilon}$ is determined then implicitly from the following equation:

$$\begin{aligned} & \widetilde{\varepsilon} + \beta\eta^{-1}\left[\log(\overline{y} - \beta^{-1}\widetilde{\varepsilon} - \beta^{-1}\overline{d} - \overline{r}) - \log(\overline{y} - \beta^{-1}B - \overline{r})\right] \\ = & \beta p(1-\pi)\left(\overline{r} + \eta^{-1}\overline{\overline{\Delta}}\right) + B - \overline{d} \end{aligned}$$

and so the **Case 1** solution is feasible whenever:

$$\varepsilon \leq \widetilde{\varepsilon}$$

Case 2: $\lambda_2 > 0$ (the constraint $V_1 \geq V_2$ is binding) From the binding condition $V_1 = V_2$ we get the following:

$$\beta p(1-\pi)\left(\eta\overline{r} + \overline{\overline{\Delta}}\right) = \eta\left[\overline{d} - d^*\right] - \beta\left(\log(y_2 - \beta^{-1}d^* - \overline{r}) - \log(y_2 - \beta^{-1}\overline{d} - \overline{r})\right) \qquad (11)$$

which implicitly defines d^*, where the general form of d^* can be written as:

$$d^*_{II} = a(\varepsilon) + D$$

where D is a term that does not depend on ε. From the condition $V_1 = V_3$ (and using that $c^* = g^* + (1 - 2\lambda_A)/\eta$) we can implicitly determine the second set of solution candidates for public and private consumption:

$$\begin{aligned} & \lambda_A \log(g^*_{II}) + (1-\lambda_A)\log(c^*_{II}) + \eta\left[y_1 - c^*_{II} - g^*_{II} + d^*_{II}\right] - \delta \\ & + \beta(1-\pi)\eta\overline{r} + \beta\log(y_2 - \beta^{-1}d^*_{II} - \overline{r}) \\ = & \lambda_A \log(\widetilde{g}) + (1-\lambda_A)\log(\widetilde{c}) + \eta\overline{r} + \beta\log(\overline{y} - \overline{r}) \end{aligned}$$

Below we show the properties of these solution candidates, in particular how they depend on ε, but first we need to determine which of the solution candidates is the actual solution. First note that if $\varepsilon > \widetilde{\varepsilon}$ then the only feasible solution is the one from **Case 2**. Given the concavity of the object function the acutal solution must in this case be given by $(g^*, c^*, d^*) = (g^*_{II}, c^*_{II}, d^*_{II})$. If $\varepsilon \leq \widetilde{\varepsilon}$ then the solution is given by $(g^*, c^*, d^*) = (g^*_I, c^*_I, d^*_I)$ since this must

yield a higher utility. This can be seen by noting that the **Case 1** solution candidate is the only inner solution and the object function is well-behaved.

7.6 Case 2 properties

Next we move on to determine the properties with respect to ε in the **Case 2** solution. In **Case 1** the slope of d^* wrt. ε was constant and equal to -1, however, it is no longer obvious that this is true in **Case 2**. To find the slope of d^* wrt. the ε, differentiate (11) wrt. ε and d^* and obtain the following:

$$\frac{dd^*_{II}}{d\varepsilon} = \eta^{-1}\frac{u_g(g_2(d^*)) - u_g(g_2(\overline{d}))}{1-\eta^{-1}u_g(g_2(d^*))}$$

We know from period $t=2$ maximization that $1-\eta^{-1}u_g(g_2(d^*)) > 0$ and we know that $d^* < \overline{d}$ and that $u_{gg} < 0$ such that $u_g(g_2(d^*)) - u_g(g_2(\overline{d})) < 0$ and so $dd^*/d\varepsilon < 0$. We also note that $dd^*/d\varepsilon > -1$ since the following holds:

$$\begin{aligned} \eta^{-1}\frac{\left(u_g(g_2(d^*)) - u_g(g_2(\overline{d}))\right)}{1-\eta^{-1}u_g(g_2(d^*))} &> -1 \Leftrightarrow \\ 1-\eta^{-1}u_g(g_2(\overline{d})) &> 0 \end{aligned}$$

which is true (the condition holds for all $d_1 \leq \overline{d}$). Hence

$$\frac{dd^*_{II}}{d\varepsilon} \in (-1;0)$$

The **Case 2** solution for g^* and $c^* = g^* + (1-2\lambda_A)\eta^{-1}$ is pinned down by the condition

$V_1 = V_3$. Substituting in the solutions for $\widetilde{g}, \widetilde{c}$ and $\widetilde{d}$ in *option 3* we can differentiate the $V_1 = V_3$ condition to obtain:

$$\frac{dg^*}{d\varepsilon} = \frac{\left(1-\eta^{-1}u_g(g_2(d^*))\right)\left[1+\frac{\partial d^*}{\partial \varepsilon}\right]}{\left[2-\eta^{-1}\left(\lambda_A u_g(g^*) + (1-\lambda_A)u_c(c^*)\right)\right]}$$

and inserting the solution to $\partial d^*/\partial\varepsilon$ we get:

$$\frac{dg^*_{II}}{d\varepsilon} = \frac{1-\eta^{-1}u_g(g_2(\overline{d}))}{2-\eta^{-1}\left(\lambda_A u_g(g^*) + (1-\lambda_A)u_c(c^*)\right)} > 0$$

This derivative is positive which can be seen from the following argument: since $g^*_{II} + c^*_{II} > g^*_I + c^*_I > \widetilde{g} + \widetilde{c}$, (since $B < 0$) we get that it must be the case that $\lambda_A u_g(g^*) + (1-\lambda_A)u_c(c^*) <$

$\lambda_A u_g(\widetilde{g}) + (1-\lambda_A)u_c(\widetilde{c})$ (since$\overline{y} - \overline{r} > \eta^{-1}$) and so $2 - \eta^{-1}\left[\lambda_A u_g(g^*) + (1-\lambda_A)u_c(c^*)\right] > 2 - \eta^{-1}\left[\lambda_A u_g(\widetilde{g}) + (1-\lambda_A)u_c(\widetilde{c})\right] > 0$.[39] We know that $1 - \eta^{-1}u_g(g_2(\overline{d})) > 0$ and so $dg^*/d\varepsilon > 0$, hence public consumption is increasing with the size of the shock, however, this is less that one for one since (including the sum of public and private consumption and noting that $dg^*/d\varepsilon = dc^*/d\varepsilon$):

$$\begin{aligned} \frac{dg^*}{d\varepsilon} + \frac{dc^*}{d\varepsilon} &< 1 \Leftrightarrow \\ \lambda_A u_g(g^*) + (1-\lambda_A)u_c(c^*) &< \lambda_A u_g(g_2^A(\overline{d})) + (1-\lambda_A)u_c(c_2^A(\overline{d})) \end{aligned}$$

which is true since $\lambda_A u_g(g^*) + (1-\lambda_A)u_c(c^*) < \lambda_A u_g(\widetilde{g}) + (1-\lambda_A)u_c(\widetilde{c}) = \lambda_A u_g(g_2^A(\widetilde{d})) + (1-\lambda_A)u_c(c_2^A(\widetilde{d}) < \lambda_A u_g(g_2^A(\overline{d})) + (1-\lambda_A)u_c(c_2^A(\overline{d}))$.

7.7 How does $\widetilde{\varepsilon}$ move with transparency and polarization

7.7.1 Transparency

First we consider how $\widetilde{\varepsilon}$ moves with respect to the degree of transparency and second how it depends on the degree of political polarization. Differentiating equation (5) wrt. to $\widetilde{\varepsilon}$ and p we get the following:

$$\frac{d\widetilde{\varepsilon}}{dp} = \frac{\beta(1-\pi)\left(\overline{r} + \eta^{-1}\overline{\overline{\Delta}}\right)}{1 - \eta^{-1}u_g(g_2(\overline{d}))}$$

where $\overline{\overline{\Delta}} = -(1-2\lambda_A)\left(\log(\lambda_A) - \log(1-\lambda_A)\right) \geq 0$ and so since $1 - (1+\alpha_A)\eta^{-1}u_g(g_2(\overline{d})) > 0$ it must be the case that

$$\frac{d\widetilde{\varepsilon}}{dp} > 0$$

7.7.2 Polarization

Next we consider the effect on $\widetilde{\varepsilon}$ from increased political polarization. Higher polarization implies that λ_A decreases if $\lambda_A < 1/2$ or increases if $\lambda_A > 1/2$. Differentiating (5) wrt. to $\widetilde{\varepsilon}$ and λ_A we get the following:

$$\frac{d\widetilde{\varepsilon}}{d\lambda_A} = \frac{\partial B/\partial\lambda_A\left[1 - \eta^{-1}u_g(g_2(d^*))\right] + \beta p(1-\pi)\eta^{-1}\partial\overline{\overline{\Delta}}/\partial\lambda_A}{1 - \eta^{-1}u_g(g_2(\overline{d}))}$$

[39] That $2 - \eta^{-1}\left[\lambda_A u_g(\widetilde{g}) + (1-\lambda_A)u_c(\widetilde{c})\right] > 0$ comes from having $r_1 \leq \overline{r}$ bind in *option 3*.

To determined the sign of this derivative we next calculate $\partial B/\partial\lambda_A$ by differentiating (10) wrt. B and λ_A:

$$\frac{dB}{d\lambda_A} = \frac{-\eta^{-1}\partial\widetilde{\Delta}/\partial\lambda_A}{\beta^{-1}\left(1-\eta^{-1}(\lambda_A u_g(g^*)+(1-\lambda_A)u_c(c^*))+(1-\eta^{-1}u_g(g_2(d^*))\right)}$$

where

$$\begin{aligned}\frac{\partial\widetilde{\Delta}}{\partial\lambda_A} &= \log\left(\overline{y}-\beta^{-1}B-\overline{r}-\frac{1-2\lambda_A}{\eta}\right)-\log\left(\overline{y}-\beta^{-1}B-\overline{r}+\frac{1-2\lambda_A}{\eta}\right)\\ &+\lambda_A\frac{2/\eta}{\overline{y}-\beta^{-1}B-\overline{r}-\frac{1-2\lambda_A}{\eta}}-(1-\lambda_A)\frac{2/\eta}{\overline{y}-\beta^{-1}B-\overline{r}+\frac{1-2\lambda_A}{\eta}}\\ &-(\log(\lambda_A)-\log(1-\lambda_A))\end{aligned}$$

In order to determine the sign of $\partial\widetilde{\Delta}/\partial\lambda_A$, define $\widetilde{y}\equiv\overline{y}-\beta^{-1}B-\overline{r}$ and $\widetilde{\lambda}_A\equiv(1-2\lambda_A)/\eta$ and note that since $c^*,\ g^*>0$ we have that $\widetilde{y}>\eta^{-1}$. Then we can re-write $\partial\widetilde{\Delta}/\partial\lambda_A$ as:

$$\frac{\partial\widetilde{\Delta}}{\partial\lambda_A} = \log\left(\frac{\widetilde{y}-\widetilde{\lambda}_A}{\widetilde{y}+\widetilde{\lambda}_A}\frac{1-\lambda_A}{\lambda_A}\right)+\frac{-2\widetilde{\lambda}_A(\widetilde{y}-\eta^{-1})}{\widetilde{y}^2-\widetilde{\lambda}_A^2} \tag{12}$$

It can be shown that the fist term is positive for $\lambda_A<1/2$ (and negative for $\lambda_A>1/2$) and zero for $\lambda_A=1/2$. It easy to se that the second term in equation (12) is negative for $\lambda_A<1/2$ (and positive for $\lambda_A>1/2$) and zero at $\lambda_A=1/2$. Thus the sign of $\widetilde{\Delta}/\partial\lambda_A$ depends on whether the first term dominates the second term:

$$\begin{array}{ccc}\frac{\partial\widetilde{\Delta}}{\partial\lambda_A} & \begin{array}{c}>\\=\\<\end{array} & 0\Leftrightarrow\log\left(\frac{\widetilde{y}-\widetilde{\lambda}_A}{\widetilde{y}+\widetilde{\lambda}_A}\frac{1-\lambda_A}{\lambda_A}\right)\ \begin{array}{c}>\\=\\<\end{array}\ \frac{2\widetilde{\lambda}_A(\widetilde{y}-\eta^{-1})}{\widetilde{y}^2-\widetilde{\lambda}_A^2}\end{array} \tag{13}$$

from where we define $LHS\equiv\log\left(\frac{\widetilde{y}-\widetilde{\lambda}_A}{\widetilde{y}+\widetilde{\lambda}_A}\frac{1-\lambda_A}{\lambda_A}\right)$ and $RHS\equiv\frac{2\widetilde{\lambda}_A(\widetilde{y}-\eta^{-1})}{\widetilde{y}^2-\widetilde{\lambda}_A^2}$. First observe that equation (13) holds with equality when $\widetilde{y}=\eta^{-1}$. This can be seen from the following:

$$LHS_{|\widetilde{y}=\eta^{-1}} = \log\left(\frac{\eta^{-1}-\frac{1-2\lambda_A}{\eta}}{\eta^{-1}+\frac{1-2\lambda_A}{\eta}}\frac{1-\lambda_A}{\lambda_A}\right)=\log\left(\frac{2\lambda_A\eta^{-1}}{2\eta^{-1}(1-\lambda_A)}\frac{1-\lambda_A}{\lambda_A}\right)=0$$

and

$$RHS_{|\widetilde{y}=\eta^{-1}} = \frac{2\frac{1-2\lambda_A}{\eta}(\eta^{-1}-\eta^{-1})}{\eta^{-2}-\frac{(1-2\lambda_A)^2}{\eta^2}} = 0$$

Next we consider the effect of raising $\widetilde{y}$ above η^{-1} on the LHS and the RHS. Differentiating the LHS with respect to $\widetilde{y}$ gives the following:

$$\frac{\partial LHS}{\partial \widetilde{y}} = \frac{2\widetilde{\lambda}_A}{\widetilde{y}^2 - \widetilde{\lambda}_A^2}$$

Differentiating the RHS with respect to $\widetilde{y}$ gives the following:

$$\frac{\partial RHS}{\partial \widetilde{y}} = \left(\frac{\partial LHS}{\partial \widetilde{y}}\right) \underbrace{\left(1 - \frac{2\widetilde{y}_A(\widetilde{y}-\eta^{-1})}{\widetilde{y}^2 - \widetilde{\lambda}_A^2}\right)}_{<1}$$

Since $\widetilde{y}^2 - \widetilde{\lambda}_A^2 = \left(\widetilde{y} + \widetilde{\lambda}_A\right)\left(\widetilde{y} - \widetilde{\lambda}_A\right) = 4\left(g_I^* \cdot c_I^*\right) > 0$ we have that:

$$\begin{array}{rcl} & > & for\ \widetilde{\lambda}_A > 0 \\ \frac{\partial LHS}{\partial \widetilde{y}} & = & \frac{\partial RHS}{\partial \widetilde{y}} \quad for\ \widetilde{\lambda}_A = 0 \\ & < & for\ \widetilde{\lambda}_A < 0 \end{array}$$

Using that $\widetilde{\lambda}_A \equiv (1-2\lambda_A)/\eta$ this condition becomes:

$$\begin{array}{rcl} & > & for\ \lambda_A < 1/2 \\ \frac{\partial LHS}{\partial \widetilde{y}} & = & \frac{\partial RHS}{\partial \widetilde{y}} \quad for\ \lambda_A = 1/2 \\ & < & for\ \lambda_A > 1/2 \end{array}$$

Since $LHS = RHS$ for $\widetilde{y} = \eta^{-1}$, then it must be the case that for $\widetilde{y} > \eta^{-1}$

$$\begin{array}{rcl} & > & for\ \lambda_A < 1/2 \\ LHS & = & RHS \quad for\ \lambda_A = 1/2 \\ & < & for\ \lambda_A > 1/2 \end{array}$$

and so it must be that case that

$$\frac{\partial\widetilde{\Delta}}{\partial\lambda_A}\begin{cases} > 0 & for\ \lambda_A < 1/2 \\ = & for\ \lambda_A = 1/2 \\ < 0 & for\ \lambda_A > 1/2 \end{cases}$$

and so

$$\frac{dB}{d\lambda_A} = \begin{cases} < 0 & for\ \lambda_A < 1/2 \\ = & for\ \lambda_A = 1/2 \\ > 0 & for\ \lambda_A > 1/2 \end{cases}$$

since $1-\eta^{-1}(\lambda_A u_g(g^*)+(1-\lambda_A)u_c(c^*) > 0$ and $1-\eta^{-1}u_g(g_2(d^*)) > 0$.

Then we can now sign $d\widetilde{\varepsilon}/\lambda_A$ (the sign of $\partial\overline{\overline{\Delta}}/\partial\lambda_A$ is given in (8):

$$\frac{d\widetilde{\varepsilon}}{d\lambda_A} = \frac{\partial B/\partial\lambda_A\left[1-\eta^{-1}u_g(g_2(d^*))\right]+\beta p(1-\pi)\eta^{-1}\partial\overline{\overline{\Delta}}/\partial\lambda_A}{1-\eta^{-1}u_g(g_2(\overline{d}))}$$

$$\begin{cases} < 0 & for\ \lambda_A < 1/2 \\ = & for\ \lambda_A = 1/2 \\ > 0 & for\ \lambda_A > 1/2 \end{cases}$$

since $1-\eta^{-1}u_g(g_2(d^*)) > 0$ and $1-\eta^{-1}u_g(g_2(\overline{d})) > 0$.

7.8 The effect on $dg^*/d\varepsilon$ of increased polarization

The slope of g^* in **Case 2** is given as the following, as shown above:

$$\frac{dg^*}{d\varepsilon} = \frac{1-\eta^{-1}u_g(g_2(\overline{d}))}{2-\eta^{-1}\left(\lambda_A u_g(g^*)+(1-\lambda_A)u_c(c^*)\right)}$$

The numerator of this expression does not depend on the level of polarization. The denominator, $Q \equiv 2-\eta^{-1}\left(\lambda_A u_g(g^*)+(1-\lambda_A)u_c(c^*)\right)$ does. Differentiating the denominator wrt. λ_A and using that $c^* = g^* + (1-2\lambda_A)\eta^{-1}$we obtain the following:

$$\frac{\partial Q}{\partial \lambda_A} = -\eta^{-1} \left[\begin{array}{c} \left\{ (g^*)^{-1} - \left(g^* + (1-2\lambda_A)\eta^{-1} \right)^{-1} \right\} + \\ \left\{ -\lambda_A (g^*)^{-2} \frac{\partial g^*}{\partial \lambda_A} - (1-\lambda_A) \left(g^* + (1-2\lambda_A)\eta^{-1} \right)^{-2} \left[\frac{\partial g^*}{\partial \lambda_A} - \frac{2}{\eta} \right] \right\} \end{array} \right]$$

Consider the sign of $\partial Q / \partial \lambda_A$ for $\lambda_A < 1/2$: It is easy to see that in this case, the term $(g^*)^{-1} - \left(g^* + (1-2\lambda_A)\eta^{-1} \right)^{-1}$ is positive. The second term is also positive. Since $\partial g^* / \lambda_A > \eta^{-1}$ for $\lambda_A < 1/2$ (see section 9.8.1 below), then the second term must be positive for $\lambda_A < 1/2$ if the following is true:

$$-\lambda_A (g^*)^{-2} \eta^{-1} - (1-\lambda_A) \left(g^* + (1-2\lambda_A)\eta^{-1} \right)^{-2} \left[\eta^{-1} - \frac{2}{\eta} \right] > 0$$

Re-arragning this, we get the following condition:

$$g^* > \lambda_A \eta^{-1}$$

so since $g^* > 0$, the above holds for $\lambda_A = 0$. Since $\partial g^* / \lambda_A > \eta^{-1}$ increasing λ_A above zero implies that the above inequality still holds. Doing a similar exercise for $\lambda_A > 1/2$ would simply reverse all results and so we obtain that

$$\frac{\partial Q}{\partial \lambda_A} \begin{cases} < 0 & for\ \lambda_A < 1/2 \\ > 0 & for\ \lambda_A > 1/2 \end{cases}$$

and so we get that

$$\frac{\partial \left(dg^* / d\varepsilon \right)}{\partial \lambda_A} \begin{cases} > 0 & for\ \lambda_A < 1/2 \\ < 0 & for\ \lambda_A > 1/2 \end{cases}$$

hence, the greater the degree of polarization, the less g^* increases with income shocks in **Case 2**.

7.8.1 The effect on g^* of increased polarization

In this section we show that $\partial g^* / \lambda_A > \eta^{-1}$ for $\lambda_A < 1/2$ is true. In **Case 2**, g^* is defined from the condition $V_1 = V_3$. Differentiating with respect to g^* and λ_A and using that $c^* = g^* + (1-2\lambda_A)/\eta$ we obtain the following:

$$\frac{dg^*}{d\lambda_A} = -\frac{\log\left(\frac{\lambda_A}{1-\lambda_A}\right) - \log\left(\frac{g^*}{c^*}\right) + \frac{2(1-\lambda_A)}{\eta c^*} - 2 - \eta\left[1 - \eta^{-1}u_g(g_2(d^*)\right]\frac{\partial d^*}{\partial \lambda_A}}{\eta\left[2 - \eta^{-1}\left(\lambda_A u_g(g^*) + (1-\lambda_A)u_c(c^*)\right)\right]}$$

Using that d^* is defined from the condition $V_1 = V_2$ and differentiating with respect to d^* and λ_A we obtain that

$$\frac{dd^*}{d\lambda_A} = -\frac{\beta p(1-\pi)\frac{\partial \overline{\overline{\Delta}}}{\partial \lambda_A}}{\eta\left[1 - \eta^{-1}u_g(g_2(d^*)\right]}$$

where $\partial\overline{\overline{\Delta}}/\partial\lambda_A$ is given from equation (8). Substituting we obtain that

$$\frac{dg^*}{d\lambda_A} = \frac{\log\left(\frac{1-\lambda_A}{\lambda_A}\right)(1 + 2\beta p(1-\pi)) + \log\left(\frac{g^*}{c^*}\right) - \frac{2(1-\lambda_A)}{\eta c^*} + 2 + \beta p(1-\pi)\frac{1-2\lambda_A}{\lambda_A(1-\lambda_A)}}{\eta\left[2 - \eta^{-1}\left(\lambda_A u_g(g^*) + (1-\lambda_A)u_c(c^*)\right)\right]}$$

from which we see that $\lim(dg^*/d\lambda_A) = \infty$ for $\lambda_A \to 0$, $dg^*/d\lambda_A = \eta^{-1}$ for $\lambda_A = 1/2$ and $\lim(dg^*/d\lambda_A) = -\infty$ for $\lambda_A \to 1$.

To see that $dg^*/d\lambda_A > \eta^{-1}$ for $\lambda_A < 1/2$ note that the two terms involving $\beta p(1-\pi)$ are both positive for $\lambda_A < 1/2$. Therefore if for $\lambda_A < 1/2$,

$$\frac{\log\left(\frac{1-\lambda_A}{\lambda_A}\right) + \log\left(\frac{g^*}{c^*}\right) - \frac{2(1-\lambda_A)}{\eta c^*} + 2}{\eta\left[2 - \eta^{-1}\left(\lambda_A u_g(g^*) + (1-\lambda_A)u_c(c^*)\right)\right]} > \eta^{-1}$$

then so is $dg^*/d\lambda_A$.Re-arranging, we get the following condition:

$$\log\left(\frac{1-\lambda_A}{\lambda_A}\right) + \log\left(\frac{g^*}{c^*}\right) > \eta^{-1}\left(\frac{(1-\lambda_A)}{c^*} - \frac{\lambda_A}{g^*}\right) \tag{14}$$

Since $c^* = g^* + (1-2\lambda_A)\eta^{-1} > 0$, for all $\lambda_A \in (0;1)$, we have that $g^* > \eta^{-1}$.Inserting this for c^* and letting g^* be equal to its minimum value, η^{-1}, we get that the condition becomes the following:

$$\log\left(\frac{1}{2}\right) - \log\left(\lambda_A\right) > \frac{1}{2} - \lambda_A$$

which is true for $\lambda_A < 1/2$. Thus the condition holds for $g^* = \eta^{-1}$. Next we see what happens to the condition when increasing g^* above η^{-1}. Differentiating condition (14) with respect to g^* we get that $\partial LHS/\partial g^* = (g^*)^{-1} - (c^*)^{-1}$ and that $\partial RHS/\partial g^* = \eta^{-1}\left(\lambda_A\left(g^*\right)^{-2} - (1-\lambda_A)\left(c^*\right)^{-2}\right)$. Using that $c^* = g^* + (1-2\lambda_A)\eta^{-1}$ and re-arranging, we get the following condition for having the LHS increase more that the RHS when increasing g^* beyond η^{-1} :

$$\frac{1-2\lambda_A}{\eta}\left(2g^* + \frac{1-2\lambda_A}{\eta}\right)\left(g^* - \lambda_A\eta^{-1}\right) > 0$$

which is true for $\lambda_A < 1/2$ since $g^* > \eta^{-1} > \lambda_A\eta^{-1}$. Thus is must be the case that for $\lambda_A < 1/2$, $dg^*/d\lambda_A > \eta^{-1}$.

7.9 Data Appendix

[Table A1 about here]

Figure 1. Reaction of government consumption to a positive output shock

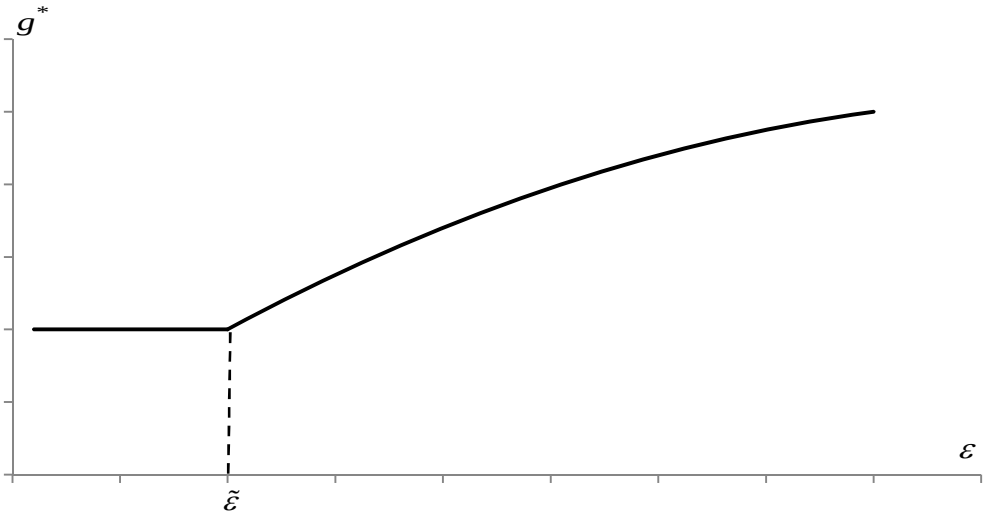

Figure 2. Increasing the degree of political polarization

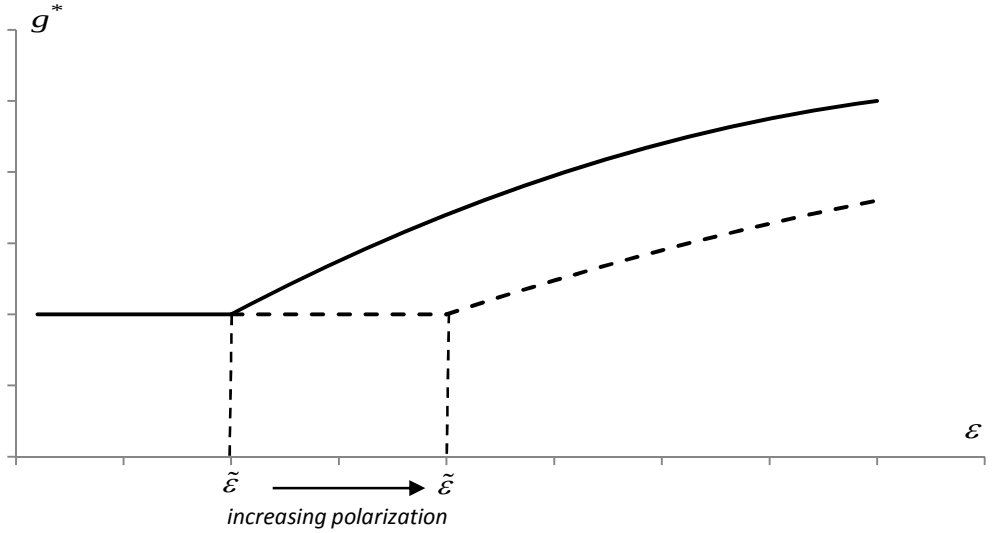

Table 1. Cyclical Response in Direct Government Expenditure, 48 US states, 1978-2007

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dependent Variable:	----------				*Direct Spending in % of trend GDP*					----------
Estimation method:	*OLS-IV*	*OLS-IV*	*Within-IV*	*GMMSYS*	*OLS-IV*	*Within-IV*	*GMMSYS*	*GMMSYS*	*GMMSYS*	*GMMSYS*
$gap_{i,t} \cdot d_{i,t}^{pos}$	*0.045**	*0.042****	*0.071***	*0.038****	*0.092****	*0.122****	*0.071****	*0.309****	*0.059****	*0.118****
	(0.027)	*(0.015)*	*(0.029)*	*(0.009)*	*(0.030)*	*(0.044)*	*(0.022)*	*(0.079)*	*(0.015)*	*(0.027)*
$gap_{i,t} \cdot (1 - d_{i,t}^{pos})$	*0.011*	*0.007*	*-0.003*	*0.016*	*-0.028*	*-0.017*	*-0.017*	*-0.094*	*0.018*	*-0.028*
	(0.026)	*(0.013)*	*(0.035)*	*(0.012)*	*(0.034)*	*(0.057)*	*(0.024)*	*(0.098)*	*(0.017)*	*(0.046)*
$d_{i,t}^{pos}$	*-0.027*		*-0.061*	*0.014*	*0.048*	*-0.122*	*0.023*	*0.067*	*-0.043*	*0.002*
	(0.180)		*(0.208)*	*(0.045)*	*(0.161)*	*(0.228)*	*(0.041)*	*(0.041)*	*(0.059)*	*(0.061)*
$gap \cdot d_{i,t}^{pos} \cdot Polar_{i,t}$					*-0.106****	*-0.090**	*-0.074****			*-0.122****
					(0.033)	*(0.053)*	*(0.028)*			*(0.033)*
$gap_{i,t} \cdot (1 - d_{i,t}^{pos}) \cdot Polar_{i,t}$					*0.029*	*0.027*	*0.056*			*0.066*
					(0.038)	*(0.062)*	*(0.035)*			*(0.056)*
$gap \cdot d_{i,t}^{pos} \cdot Gini_{i,t}$								*-0.714****		
								(0.199)		
$gap_{i,t} \cdot (1 - d_{i,t}^{pos}) \cdot Gini_{i,t}$								*0.254*		
								(0.255)		
$gap \cdot d_{i,t}^{pos} \cdot Late_{i,t}$									*-0.033****	*-0.032****
									(0.012)	*(0.011)*
$gap_{i,t} \cdot (1 - d_{i,t}^{pos}) \cdot Late_{i,t}$									*0.002*	*-0.018*
									(0.022)	*(0.021)*
Time dummies:	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Control variables included	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
No of observations	*1344*	*1344*	*1344*	*1344*	*1010*	*1010*	*1032*	*1200*	*736*	*579*

Notes

(1) The output gap is instrumented using two to five lags in the GMM procedure. For OLS and Within we use one lag.

(2) Two lags of the dependent variable are included. The differenced equation is instrumented using 2 to 12 lags of the dependent varaible.

*(3) *,**,*** denoted significance on a 10%, 5% and 1% level, respectively.*

Table 2. Controlling for Political and Institution factors, 48 US states, 1978-2007

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	---------- Direct Spending in % of trend GDP ----------					
Estimation method:	GMMSYS	GMMSYS	GMMSYS	GMMSYS	GMMSYS	GMMSYS
$gap_{i,t} \cdot d_{i,t}^{pos}$	0.132***	0.116***	0.104***	0.092***	0.116***	0.086***
	(0.033)	(0.026)	(0.030)	(0.027)	(0.024)	(0.028)
$gap_{i,t} \cdot (1 - d_{i,t}^{pos})$	-0.053	-0.038	0.000	0.000	-0.039	-0.021
	(0.042)	(0.040)	(0.056)	(0.056)	(0.046)	(0.035)
$d_{i,t}^{pos}$	-0.005	0.000	-0.0042	0.002	0.008	-0.002
	(0.057)	(0.057)	(0.061)	(0.056)	(0.061)	(0.056)
$gap \cdot d_{i,t}^{pos} \cdot Polar$	-0.111***	-0.112***	-0.123***	-0.125***	-0.115***	-0.101***
	(0.030)	(0.029)	(0.033)	(0.033)	(0.030)	(0.035)
$gap_{i,t} \cdot (1 - d_{i,t}^{pos}) \cdot Polar_{i,t}$	0.056	0.0646	0.070	0.0485	0.069	0.081*
	(0.046)	(0.046)	(0.060)	(0.059)	(0.047)	(0.05)
$gap \cdot d_{i,t}^{pos} \cdot Late_{i,t}$	-0.041**	-0.035***	-0.031***	-0.018*	-0.029***	-0.030**
	(0.018)	(0.014)	(0.011)	(0.010)	(0.011)	(0.013)
$gap_{i,t} \cdot (1 - d_{i,t}^{pos}) \cdot Late_{i,t}$	-0.007	-0.0097	-0.0192	-0.0244	-0.024	-0.029
	(0.026)	(0.025)	(0.023)	(0.021)	(0.018)	(0.019)
$gap \cdot d_{i,t}^{pos} \cdot ACIR_i$	-0.003					
	(0.003)					
$gap_{i,t} \cdot (1 - d_{i,t}^{pos}) \cdot ACIR_i$	0.004					
	(0.003)					
$gap \cdot d_{i,t}^{pos} \cdot No\_Carry_i$		-0.0047				
		(0.008)				
$gap_{i,t} \cdot (1 - d_{i,t}^{pos}) \cdot No\_Carry_i$		0.010				
		(0.009)				
$gap \cdot d_{i,t}^{pos} \cdot Veto_i$			0.0151			
			(0.020)			
$gap_{i,t} \cdot (1 - d_{i,t}^{pos}) \cdot Veto_i$			-0.031			
			(0.024)			
$gap \cdot d_{i,t}^{pos} \cdot Endbalance_{i,t}$				0.004		
				(0.003)		
$gap_{i,t} \cdot (1 - d_{i,t}^{pos}) \cdot Endbalance_{i,t}$				-0.003		
				(0.002)		
$gap \cdot d_{i,t}^{pos} \cdot Divided\_Gov._{i,t}$					-0.009	
					(0.017)	
$gap_{i,t} \cdot (1 - d_{i,t}^{pos}) \cdot Divided\_Gov_{i,t}$					0.018	
					(0.018)	
$gap \cdot d_{i,t}^{pos} \cdot Democratic\_Gov._{i,t}$						0.031*
						(0.017)
$gap_{i,t} \cdot (1 - d_{i,t}^{pos}) \cdot Democratic\_Gov_{i,t}$						-0.038*
						(0.022)
Time dummies:	Yes	Yes	Yes	Yes	Yes	Yes
Control variables included	Yes	Yes	Yes	Yes	Yes	Yes
No of observations	579	579	579	579	579	579

Notes

(1) The output gap is instrumented using two to five lags in the GMM procedure.

(2) Two lags of the dependent variable are included. The differenced equation is instrumented using 2 to 12 lags of the dependent varaible.

*(3) *,**,*** denoted significance on a 10%, 5% and 1% level, respectively.*

Table 3. General Government Expenditure, 48 US states, 1978-2007

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dependent Variable:	*General Spending in % of trend GDP*									
Estimation method:	*OLS-IV*	*OLS-IV*	*Within-IV*	*GMMSYS*	*OLS-IV*	*Within-IV*	*GMMSYS*	*GMMSYS*	*GMMSYS*	*GMMSYS*
$gap_{i,t} \cdot d_{i,t}^{pos}$	*0.063*	*0.049***	*0.074**	*0.049****	*0.078**	*0.123****	*0.092****	*0.457****	*0.049***	*0.101****
	(0.040)	*(0.024)*	*(0.042)*	*(0.012)*	*(0.042)*	*(0.059)*	*(0.030)*	*(0.150)*	*(0.023)*	*(0.034)*
$gap_{i,t} \cdot (1 - d_{i,t}^{pos})$	*0.048*	*0.028*	*0.048*	*0.017*	*-0.046*	*-0.058*	*-0.004*	*-0.018*	*0.019*	*0.028*
	(0.044)	*(0.017)*	*(0.057)*	*(0.018)*	*(0.051)*	*(0.088)*	*(0.033)*	*(0.150)*	*(0.019)*	*(0.062)*
$d_{i,t}^{pos}$	*-0.123*		*-0.170*	*0.108*	*0.189*	*-0.012*	*0.024*	*0.061*	*-0.008*	*0.047*
	(0.266)		*(0.305)*	*(0.068)*	*(0.232)*	*(0.318)*	*(0.049)*	*(0.052)*	*(0.070)*	*(0.072)*
$gap \cdot d_{i,t}^{pos} \cdot Polar$					*-0.110****	*-0.118**	*-0.091***			*-0.105****
					(0.039)	*(0.063)*	*(0.036)*			*(0.040)*
$gap_{i,t} \cdot (1 - d_{i,t}^{pos}) \cdot Polar_{i,t}$					0.0517	0.0973	*0.066*			*-0.004*
					(0.052)	*(0.093)*	*(0.045)*			*(0.080)*
$gap \cdot d_{i,t}^{pos} \cdot Gini_{i,t}$								*-1.049****		
								(0.380)		
$gap_{i,t} \cdot (1 - d_{i,t}^{pos}) \cdot Gini_{i,t}$								*0.112*		
								(0.380)		
$gap \cdot d_{i,t}^{pos} \cdot Late_{i,t}$									*-0.034***	*-0.032***
									(0.015)	*(0.014)*
$gap_{i,t} \cdot (1 - d_{i,t}^{pos}) \cdot Late_{i,t}$									*0.015*	*-0.010*
									(0.022)	*(0.021)*
Time dummies:	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Control variables included	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
No of observations	*1344*	*1344*	*1344*	*1344*	*1010*	*1010*	*1032*	*1200*	*736*	*579*

Notes

(1) The output gap is instrumented using two to five lags in the GMM procedure. For OLS and Within we use one lag.

(2) Two lags of the dependent variable are included in all estimations. The differenced equation is instrumented using 2 to 12 lags of the dependent varaible.

*(3) *,**,*** denoted significance on a 10%, 5% and 1% level, respectively.*

(4) In column (4) d^{pos} is equal to one if the output gap is greater than -1, in all other specification the cut-off point is 0.

Table A1. Variable definitions and sources

Variable	Description	Source
Dir_gov_exp $_{i,t}$	Direct general government expenditure	US Census Bureau
Gov_exp $_{i,t}$	General government expenditure	US Census Bureau
Debt $_{i,t}$	Debt at the end of fiscal year	US Census Bureau
Unemployment_rate_hp	HP filter of the yearly average of unemployment rates	Bureau of Labor Statistics
Infl $_{i,t}$	Percentage change in the GDP deflator	Bureau of Economic Analysis
gap $_{i,t}$	Percentage deviation of real GDP from HP filtered trend GDP	Bureau of Economic Analysis
d_gap_pos $_{i,t}$	Dummy equal to one if the output gap is positive	Bureau of Economic Analysis
late_budget $_{i,t}$	Dummy variable equal to 1 if budget was signed into law after end of fiscal year	Andersen, Lassen and Nielsen (2010)
Divided_gov $_{i,t}$	Dummy variable equal to 1 if either *i)* both legislative chambers controlled by other party than governor's, or *ii)* two chambers controlled by different parties	http://www.ipsr.ku.edu/SPPQ/journal_datasets/klarner.shtml
Elex $_{i,t}$	Dummy variable equal to 1 in years with a gubernatorial election	Book of the States, various editions.
Endbalance $_{i,t}$	End-of-year balances in the general fund and stabilization fund, as projected in executive budget proposal. Measured in percent of proposed general fund expenditure	National Association of State Budget Officers: *The Fiscal Survey of States* , various editions
Dem_gov $_{i,t}$	Dummy variable equal to 1 if the governor is a Democrat	http://www.ipsr.ku.edu/SPPQ/journal_datasets/klarner.shtml
No_carry $_{i}$	Dummy variable equal to 1 if the state law does not allow a budget deficit to be carried over to the next fiscal year	Bohn and Inman (1996)
Line_item_veto $_{i}$	Dummy variable equal to 1 if the the governor has line item veto powers	Bohn and Inman (1996)
ACIR $_{i}$	Index of stringency of balanced budget rules, ranging from 0 (least strict) to 10 (most strict)	Bohn and Inman (1996), ACIR (1987)
Polar $_{i,t}$	Difference between the average position of the state delegation of Democrats and Republicans on the liberal-conservative axis (1st axis) based on roll call votes in the house of the US Congress. The position of each legislator for Congress 95 to Congress 110 is calculate by Poole and Rosenthal using the DW-NOMNATE score	Poole and Rosenthal (1997)
Gini $_{i,t}$	Gini-Coefficient. Available until 2004	Galbraith and Hale (2006)

Chapter 3

Late Budgets

Late Budgets*

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Abstract

The budget forms the legal basis of government spending. If a budget is not in place at the beginning of the fiscal year, planning as well as current spending are jeopardized and government shutdown may result. This paper develops a continuous-time war-of-attrition model of budgeting in a presidential style-democracy to explain the duration of budget negotiations. We build our model around budget baselines as reference points for loss averse negotiators. We derive three testable hypotheses: there are more late budgets, and they are more late, when fiscal circumstances change; when such changes are negative rather than positive; and when there is divided government. We test the hypotheses of the model using a unique data set of late budgets for US state governments, based on dates of budget approval collected from news reports and a survey of state budget officers for the period 1988-2007. For this period, we find 23 % of budgets to be late. The results provide strong support for the hypotheses of the model.

Keywords: government budgeting, state government, presidential democracies, political economy, late budgets, fiscal stalemate, war of attrition
JEL codes: D72, H11, H72, H83

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1 Introduction

In the Summer of 2009, the state of California captured national headlines by failing to enact a budget before the beginning of the fiscal year. In fact, the situation in California was so severe that the state could not meet its obligations and began issuing IOUs to cover payments to local governments, private contractors, and taxpayers. After 24 days of negotiations beyond the fiscal year deadline between Republican governor Arnold Schwarzenegger and the Democratic-controlled state legislature, a budget was approved. California is not alone in finishing its budget late: in 2009, eleven states failed to approve a budget before the beginning of the fiscal year,[1] and in our entire sample, which covers the 48 continental states in the years 1988-2007, 23% of all budgets were approved after the fiscal year deadline. Delayed appropriations are even more common at the federal level: Meyers (1997) reports that in the period 1977-97, 68 percent of all federal appropriation bills were enacted after the beginning of the fiscal year.

In state governments in the United States, as across all political arenas and at all levels of government, the government budget provides the legal foundation for government spending. If a budget is not approved and enacted by the beginning of the fiscal year, the legal basis for government spending is jeopardized, and the consequences can range from a continuation of operations based on last year's budget to partial government shutdown, depending on both specific constitutional provisions and the overall institutional framework.

Late budgets are an important object of study for three reasons: Economic costs, as a measure of legislative productivity, and as a measure of good governance. We address each in turn. First, when state governments are unable to enact a full budget before the beginning of a new fiscal year, they often resort to passing temporary budget bills that allow appropriations for state government operations for a limited time only.[2] Passing a temporary budget bill is not always possible, however, in some cases because of state laws,[3] and in other cases because of political conflict among state lawmakers. In the absence of a budget, many state governments find themselves in unknown legal territory. As a result, the consequences of budget delays vary considerably across states, and sometimes even from year to year within the same state. Some state governments stop paying their employees or withhold payments to state vendors and contractors, providers of Medicaid, school districts and local governments. In the most extreme cases, the state government shuts down all so-called "non-essential" services until a new budget is in place. In addition, the mere threat of a late budget means that state agencies,

[1] These are Arizona, California, Connecticut, Delaware (by one day), Illinois, Michigan, Mississippi, New York, North Carolina, Ohio and Pennsylvania.

[2] At the level of the federal government in the US, such bills are very common and known as "continuing resolutions." When such resolutions fail, the result may be government shutdown, witnessed most recently for the case of the US federal government in 1996; see Meyers (1997) for an account.

[3] For an overview of procedures when the state budget is not passed by the beginning of the fiscal year, see the National Conference of State Legislatures: http://www.ncsl.org/default.aspx?TabId=12616

school boards and local government must spend time developing plans for what to do if a stalemate extends beyond the end of the fiscal year, whcih complicates planning and may lead to distorted decisions, such as hiring stops and hoarding of funds.[4]

Finally, state government creditworthiness may suffer.[5] In on-going, companion work (Andersen, Lassen and Nielsen, 2010), we investigate the consequences of late budgets for, among other things, state borrowing costs. We find that late budgets are associated with higher state bond yields, as measured by the Chubb Relative Value Survey.[6] Combining these estimates with state debt stocks, we find late budgets to be associated with substantial per capita interest rate premiums. In short, late state budgets have significant economic consequences within as well as beyond state governments.

Second, our measure of budget negotiation duration provides a replicable, and easily extendable, measure of *legislative gridlock*, defined as the inability of the legislative and executive branches to pass major legislation, at the state level. While a major part of the literature on legislative gridlock has focsued on the US federal government (e.g. Mayhew, 1991; Binder, 1999), the logic behind the models and arguments applies to veto player democracies everywhere (Tsebelis, 2002). There is no generally agreed-upon measure of legislative gridlock (see, e.g., Chiou and Rothenberg, 2008), but the budget arguably is the most important piece of legislation for any executive and legislature. As recognized by Mayhew (1991), and emphasized by Fiorina (1996) and Binder (1999), a true measure of gridlock should take into consideration both the supply and demand for legislation; while low legislative output could reflect high levels of gridlock, it could equally well reflect both a lack of demand for such output and a lack of supply due to less frequent introduction of bills in periods where chances of passage are lower. Our measure corrects for endogeneity both on the supply and the demand side, as the budget's (re-)appearance on the legislative agenda is exogenously given.[7]

Third, timely budgets can, more generally, be viewed as a measure of good governance. In his analysis of the effects of social capital and the civic community on governance outcomes, Putnam (1993) includes as one of his twelve indicators of institutional performance *budget*

[4] In Maine in 1991, 10,000 state government workers were sent home without pay and all non-essential services were closed. The budget was 18 days late. In Illinois, delays in payments from the state government creates problems of liquidity for counties ("County copes with cash flow", Lincoln Courier, April 8, 2010). In Michigan, late state budgets affect staffing and tuition decisions at schools and universities (Citizens Research Council of Michigan: Late Budgets in Michigan, August 2009).

[5] On July 6, 2009, a few days after the beginning of the fiscal year, Fitch Ratings dropped California's bond rating to BBB, down from A minus (Wall Street Journal, July 8, 2009: Big Banks don't want California's IOUs).

[6] The measure is based on a survey, carried out by the Chubb Corporation, of sell-side bond traders who are asked to rate the relative yield on a 20 year general obligation bond for a state i compared with a similar bond issued by New Jersey. See Lowry and Alt (2001) and Poterba and Rueben (2001) for more on the Chubb Relative Survey and Andersen, Lassen and Nielsen (2010) for the analysis.

[7] Obviously, by restricting ourselves to studying budgets as a venue for gridlock, we leave out many important policy areas; however, little agreement exists in the literature (Chiou and Rothenberg, 2008) on how to measure major bills.

promptness, defined as the (lack of) delay relative to the beginning of the fiscal year of the approval of the budget by the regional councils. Putnam (1993, p. 65-67) argues that budget promptness is a measure of a government's "essential internal affairs" which, in turn, is one component of an evaluation of good government.[8] Our rich panel data set allows us to include measures of social capital alongside economic and political explanatory variables to assess their relative importance in explaining late budgets.

A final reason for studying late budgets is methodological in nature: Empirical analyses of budget outcomes and fiscal stabilizations are almost always based on models of political bargaining, often involving a number of veto players, but the analyses are rarely based on data on the actual bargaining process. As such, studies based on real-world data linking institutions to outcomes by way of bargaining are essentially estimating reduced form-relationships by stipulating an unobserved bargaining process, weakening the link between the proposed theory and the empirical results. In contrast, our approach makes the bargaining process the center of the analysis with the aim of evaluating directly the hypoteses about the bargaining solution derived from the theoretical model.

We model the political bargaining proces as a war of attrition in the spirit of Alesina and Drazen (1991), but we focus on the time to reach an agreement on the annual budget rather than the delay in implementing crises-induced reforms. In our model, the two bargaining parties suffer costs from not being able to reach a deal. These costs may be political of nature, because the public dislikes budget delays, or they may be personal, since legislators must spend time and effort to keep battling over the budget. When a party finds that it can no longer bear the costs of continued bargaining, it concedes, and the opposing party is free to implement its preferred policy. We derive the unique symmetric equilibrium of the bargaining game and show that it implies a number of testable hypotheses. The three main predictions are: One, changes in fiscal circumstances, regardless of direction, increase the expected duration of budget stalemates; Two, the expected duration is higher in fiscal downturns than in upswings of similar magnitudes; And three, divided government increases the expected duration.

Our modeling approach is based on the key assumption that bargaining over a government budget is carried out with reference to a *budget baseline*. Budget baselines generally fall in two categories: (1) nominal spending the previous year; or (2) "current services" which is the provision of services financed by the previous year's spending. In US state governments, which form the focus of our empirical analysis, Crain and Crain (1998) report that in the 1990's 34 states used last year's spending level as baseline while the remaining 16 used a current services baseline. While the determination of baselines themselves is also subject to political

[8] This sentiment is echoed among policy makers; for example, Scott Pattison, the current executive director of the National Association of State Budget Officers, notes that "a well-managed state would never, ever" have a late budget (quoted from "*Mischief After Midnight*", governing.com, June 2009. Available online at http://www.governing.com/article/mischief-after-midnight).

manoeuvring and debate, a baseline remains, given the baseline regime, a common reference point against which all changes being bargained over are compared; as noted by Schick (2007, p. 67) in the context of the US federal government budget, "[o]nce a baseline has been constructed, any variance from it due to legislation is measured as a policy change."

We combine the notion of a formalized reference point in the form of a budget baseline with the behavioural assumption that budget negotiators have political preferences and that they are loss averse over changes from the baseline, making the preferences a variant of Tversky and Kahneman (1991). It is well documented that public responses to negative economic information is greater than responses to positive information (Soroka, 2006), that negative attitudes towards candidates have a greater impact on voting behavior than do positive attitudes (Kernell, 1977), and that negative economic trends penalize incumbents while they reap few benefits from positive trends (Bloom and Price, 1975; Nannestad and Paldam, 1997). These observations are in accord with the differential valuation of negative and positive political outcomes reported in Quattrone and Tversky (1988), suggesting that voters exhibit loss aversion over goods, services and transfers obtained from the public sector. We do not model the relationship between voters and politicians; instead, we directly assume politicians to be loss averse, which can either simply reflect loss averse voters or reflect the fact that politicians themselves are subject to the same processes of preference formation as are voters. Loss aversion implies a *status quo bias* (Samuelson and Zeckhauser, 1988), or - in our model - more precisely, a *bias towards the baseline budget*. This means that the opposing parties in our model find it relatively easy to agree on keeping the budget unchanged in years when fiscal conditions are stable. When exposed to large changes in fiscal circumstances, however, their innate differences in policy preferences make the parties disagree over how to adapt to such changes, and long stalemates become more likely. Because of loss aversion, this is more pronounced when fiscal conditions change for the worse than when they improve.

We apply the model to data on US state government budget processes. Using state and local newspaper sources as well as responses to a survey of state budget offices administered for this purpose, we collect data on dates of final budget enactment and compare these to the beginning of the state governments' fiscal years. Carrying out this comparison for all states for every year since 1988 yields a replicable measure of budget lateness (as well as legislative gridlock and governance).[9]

We find that adverse changes in economic conditions, measured by the increase in unemployment, substantially increases the duration of the budget negotiations: a one percentage point increase in unemployment rate relative to the previous year increases the expected du-

[9] The Government Performnace Project at Pew Center of the States provides overall assessments of government performance to produce an index of same. This index was employed by Knack (2002) in his cross-state analysis of the effects of social capital on governance. 'Budget timeliness' is one of many factors included in this assessment, but it is not reported separately nor is it based on hard data.

ration of the budget negotiations by about a week in our preferred specification. Similarly, divided government substantially increases both the risk of experiencing a late budget and its duration, the latter by about two weeks. On the other hand, budget negotiations are, on average, between one and two weeks shorter in election years.

The paper is structured as follows: The next subsection presents related literature, section 2 presents our theoretical model, and section 3 describes the collection and construction of data. Section 4 describes the empirical specification and section 5 reports results. We provide a discussion and some concluding remarks in the final section.

1.1 Related literature

Our study of late budgets relates to a number of different literatures, in addition to the legislative gridlock and good governance literature already mentioned. First, it is related to the political reform literature, in particular the literature on fiscal adjustments in the face of large, external shocks. This is evident not only from the descendancy of the model from the Alesina-Drazen framework, but also from the fact that budget lateness, as will become evident from the empirical analysis, is crucially related to an adverse economic environment and specific political factors. However, the theoretical and empirical literatures on fiscal adjustments are not concerned with annual budgets per se, but with fiscal imbalances over the medium- and long-term, and have as a key parameter the economic costs of continuing conflict.[10] In contrast, we set up a framework to cover all budgets, in normal times and economic crises alike, based on political costs of bargaining rather than economic costs, and provide empirical evidence to match the theory closely.

Second, our study is a part of the large literature on the effects of political, economic and institutional determinants of government budget outcomes. In this literature, government budget outcomes, i.e. realized revenue and spending patterns, are related to partisan differences (Alt and Lowry, 2000), budget institutions (Poterba, 1994; Alt and Lowry, 1994; Poterba and von Hagen, 1999) and political institutions (e.g. Grossman and Helpman, 2007). While most theoretical work in this literature explicitly recognizes the bargaining nature of government budgeting and policy determination, direct empirical tests based on quantitative data of the theoretical claims regarding the bargaining process are, to our knowledge, non-existent.

Third, our paper is related to the concept of incrementalism as well as to the general public administration literature on budgeting. Incrementalism in budgeting is traditionally associated with Wildavsky's (1964) observations that government budgets are not re-calculated from scratch every year but that they are rather, due to information processing costs, based, by-and-large, on the previous year's budget. Our approach, based on budget baselines as points

[10] In a recent contribution to this literature, Alesina, Ardagna and Trebbi (2006) provide an investigation of the determinants of fiscal balance stabilizations across countries.

of departure for budget negotiations, is not derived from incrementalism; if anything, as noted by Schick (1980, p. 217), the adoption of the current services baseline institutionalized incrementalism.[11] The role of the status quo and agenda control in models of policy determination was first recognized by Romer and Rosenthal (1978).

Fourth, the paper is closely related to a small literature studying bargaining in positive analyses of political and policy processes. Bargaining models are frequently employed in the positive political economy literature, but, as noted above, most empirical studies go on to evaluate economic and political outcomes directly, rather than studying the bargaining process by which exogenous circumstances are translated into outcomes. Analyses linking formal bargaining models to data on the bargaining process are rare outside of laboratory experiments, but notable exceptions exist: Merlo (1997) and Diermeier, Eraslan and Merlo (2005) examine government formation in Italy and parliamentary democracies, respectively, based on the stochastic bargaining model proposed by Merlo and Wilson (1995). The duration of the government formation phase can be interpreted as a measure of the intensity of the conflict, as can the duration of the budget negotiation phase.

2 A Stylized Model of Budget Delays

We consider a government with two players, A and B, who must agree to pass a budget. The players could be thought of as the executive vs. the legislature, or as majority leaders from different chambers within the legislature. Each player has veto power, so that no one player can pass a budget without the consent of the other player.

The government faces a given amount of revenue, y, which can be spent on two different types of publicly provided goods, g_1 and g_2. There is a balanced budget constraint in place, so any budget plan must satisfy $g_1 + g_2 = y$. All variables are measured in units per capita. The players derive utility from both types of spending, but they disagree on the preferred composition of total spending. An alternative interpretation is that g_1 and g_2 are public- and private consumption, respectively, and that y is the tax base, assumed for simplicity to be equal to income per capita. The tax rate is then equal to g_1/y. In this interpretation, the conflict between the two players is over the size of the budget, rather than the composititon. Which of these two alternative interpretations is the appropriate one depends on the relevant context in which we wish to apply the model's predictions. However, for consistency, we stick to the first interpretation in the following exposition.

The political game resembles the set-up in Alesina and Drazen (1991): The two players engage in a war of attrition, during which the budget adoption is delayed. Delaying agreement

[11] The debate over incrementalism and alternative public administration models of budgeting cannot be done justice here. For a critique of incrementalism, and an alternative budgetary theory, see Meyers (1996).

is costly to both players. First, budget delays imply a political cost to those responsible, since voters disapprove. And second, there is a personal cost of delay to the players involved, since they must spend time and resources on negotiating, lobbying and servicing the press as long as the adoption phase continues.

There may also be actual budgetary costs associated with delays. As explained above, government agencies must spend time and effort to deal with the delayed appropriations and the possibility of shutdown of services, and this may divert resources away from provision of public goods and services. This would suggest a negative relationship between the duration of the delay and y in our model. However, to keep things simple we focus on the first two types of costs of delay and let y be constant over time.

The war of attrition ends when one of the players "concedes". We model our political conflict as a "winner-takes-all" game: once a player has conceded, the other player is free to choose whatever composition of spending he prefers. Thus, as in Alesina and Drazen's model, players can only "win" or "lose". Endogenously determined compromises reached during negotiations are ruled out, which is of course a major simplification.[12]

The players have reference-dependent preferences, so that budget outcomes (g_1, g_2) are evaluated relative to a budget baseline, (g_1^b, g_2^b). To be specific, we assume that their preferences over government spending can be represented by the utility functions

$$\begin{aligned} u_A(g_1, g_2|g_1^b, g_2^b) &= \theta \cdot v(g_1 - g_1^b) + v(g_2 - g_2^b) \\ u_B(g_1, g_2|g_1^b, g_2^b) &= v(g_1 - g_1^b) + \theta \cdot v(g_2 - g_2^b) \end{aligned} \tag{1}$$

where

$$v(x) = \begin{cases} x & if\ x \geq 0 \\ \lambda x & if\ x < 0 \end{cases} \quad and\ \lambda > \theta > 1$$

The parameter θ captures that each player prefers spending on one type of good over the other, other things equal, but they disagree on which of the two goods is preferable. With $\theta > 1$, player A has a preference for spending on good 1, while player B prefers spending on good 2. The players evaluate budget outcomes in terms of deviations from the baseline, using the value function $v(\cdot)$. The value function is everywhere increasing and has a kink at zero, as suggested by Tversky and Kahneman (1991).[13] This implies that the players are loss-averse: They dislike negative deviations from the baseline more than they like equal-sized positive deviations.

[12] Hsieh (2000) provides an extension of a simplified Alesina-Drazen framework where the payoff distribution at stabilization is determined endogenously in a formal bargaining process.

[13] Tversky and Kahneman also argued that in order to explain observed attitudes towards risk, the value function must be concave in the positive domain and convex in the negative domain. This feature of the value function is known as *diminishing sensitivity*. Since we are not explicitly interested in explaining attitudes towards risk, we abstract from this feature and settle for the simpler, linear version adopted here.

To see what our specification of preferences implies for budget outcomes, define $y^b \equiv g_1^b + g_2^b$. We label this the *baseline revenue level*. When $y > y^b$ the players face an opportunity to raise spending on both types of goods over the baseline levels. Since $\theta > 1$, player A gets higher marginal utility from raising g_1 than from raising g_2 whenever $g_2 \geq g_2^b$. Hence, player A would never raise spending on good 2 above the baseline level. On the other hand, the assumption $\lambda > \theta$ implies that player A does not wish to drive g_2 below its baseline level. Player A thus prefers the bundle $(g_1^b + y - y^b, g_2^b)$ to all other feasible combinations of g_1 and g_2 when $y > y^b$. Correspondingly, the marginal benefit to player A from raising g_1 at the expense of g_2 is positive when $g_1 < g_1^b$ and $g_2 < g_2^b$, but negative when $g_1 \geq g_1^b$ and $g_2 < g_2^b$. If given the opportunity, player A will therefore choose the bundle $(g_1^b, g_2^b - y^b + y)$ when $y < y^b$. Of course, player B's preferences imply the same choices, only with the goods reversed.

In words, whenever the players are given an opportunity to raise overall spending, they will prefer to increase spending on their preferred good only, while leaving spending on the other good unchanged. And whenever faced with a need to cut overall spending, the players will prefer to keep spending on their preferred good unchanged, letting spending on the least preferred good carry the entire burden of adjustment.

The assumption $\lambda > \theta$ is crucial for these results. Without this assumption, both players would always prefer to spend the entire revenue on their own preferred good, irrespective of the sign of $y - y^b$. The interpretation is that the players are so averse to losses that they are willing to sacrifice increases in spending on their most preferred good in order to avoid even the smallest cuts in spending on their least preferred good. Of course, this is an extreme prediction. However, we believe that it does capture an important feature of fiscal policy: Spending cuts carry a greater weight in the minds of citizens, in the public debate, and therefore also in the minds of policymakers, than spending increases. Fiscal policymakers are therefore inclined to avoid spending cuts, even at substantial opportunity costs.

The costs from a stalemate over the budget are individual-specific and linearly increasing in the time until a concession occurs. Time is continuous and we normalize the start of the budget adoption phase to $t = 0$. If a concession occurs at time $t = T$, the players incur disutility

$$D_i = \delta_i T \ , \quad i = A, B \tag{2}$$

The parameter δ_i captures how costly delays are to player i. We assume that δ_A and δ_B are independent and drawn randomly from a uniform distribution on an interval $(\underline{\delta}; \overline{\delta}]$. As in Alesina and Drazen (1991), we assume that δ_i is private information to player i. The other player does not observe the realized value of δ_i but knows the distribution from which it is drawn.

Total utility is given by the utility from the budget outcome minus the disutility from a

delayed agreement. If player i ultimately wins the war of attrition at time $t = T$, his total utility may then be written as

$$U_i^W(T) = u^W - D_i(T) = \begin{cases} \theta(y - y^b) - \delta_i T & if \quad y \geq y^b \\ -\lambda(y^b - y) - \delta_i T & if \quad y < y^b \end{cases} \tag{3}$$

while the total utility of losing at time T is

$$U_i^L(T) = u^L - D_i(T) = \begin{cases} (y - y^b) - \delta_i T & if \quad y \geq y^b \\ -\lambda\theta(y^b - y) - \delta_i T & if \quad y < y^b \end{cases} \tag{4}$$

The gain from winning is then straightforwardly computed as

$$U_i^W(T) - U_i^L(T) = u^W - u^L = \begin{cases} (\theta - 1)(y - y^b) & if \quad y \geq y^b \\ \lambda(\theta - 1)(y^b - y) & if \quad y < y^b \end{cases} \tag{5}$$

Note that the gain from winning is always positive, equal for both players and independent of the time of concession. It is increasing in $\left|y - y^b\right|$, the absolute value of the deviation of total revenue from its baseline. Note further that for a given value of $\left|y - y^b\right|$, the gain from winning is higher if $y < y^b$ than if $y \geq y^b$: because of loss aversion, the stakes are higher when revenue drops below the baseline level than when it is above it.

Each player must now choose an optimal concession time T_i. This is the date on which player i concedes and allows his opponent to choose her preferred spending plan, conditional on the opponent not having conceded already. We assume that players choose T_i so as to maximize their expected total utility. Expected utility depends on the utilities that the player gets from winning and losing, respectively, as well as the probability of winning. Player i wins whenever his chosen concession time exceeds that of his opponent. Let $H(t)$ denote the cumulative distribution function of the opponent's optimal concession date, with associated density function $h(t)$.[14] $H(t)$ is of course endogenous, but it is exogenous as seen from the point view of player i, since player i can in no way influence his opponent's choice of concession time. Integrating over the opponent's concession time, we can then express the expected utility

[14] As emphasized below, we concentrate on equilibria where each player's concession time is a differentiable function of his type. This implies that $H(t)$ is differentiable, and that the density function $h(t)$ does in fact exist.

of player i as a function of T_i as

$$\begin{aligned} EU_i(T_i) &= \int_0^{T_i} U_i^W(t)h(t)dt + \int_{T_i}^{\infty} U_i^L(T_i)h(t)dt \\ &= \int_0^{T_i} U_i^W(t)h(t)dt + (1 - H(T_i))U_i^L(T_i) \end{aligned} \tag{6}$$

If a positive, finite optimal concession time exists, it must then satisfy the first-order condition

$$\frac{dEU_i(T_i)}{dT_i} = \left[U_i^W(T_i) - U_i^L(T_i)\right] h(T_i) - (1 - H(T_i))\delta_i = 0 \tag{7}$$

where we have used that $\partial U_i^L(T_i)/\partial T_i = -\delta_i$. Recall that the term in brackets is the gain from winning, which does not depend on T_i. We may therefore write this term as $u^W - u^L$. We can then rewrite the first-order condition as

$$[u^W - u^L]\frac{h(T_i)}{1 - H(T_i)} = \delta_i \tag{8}$$

This representation of the first-order condition has an intuitive interpretation: The left-hand side is equal to the expected marginal benefit of waiting one more instant to concede. This is equal to the probability that the opponent will concede "within the next instant", conditional on the fact that he has not already conceded, times the gain that follows if the opponent does actually concede. The left hand side is equal to the marginal cost of postponing concession. At the optimal concession time, the marginal benefit and the marginal cost exactly balance.

We now look for a symmetric Bayesian Nash equilibrium in which each player's optimal concession time T_i is a differentiable function of his type, $T_i = T(\delta_i)$. In the appendix we show that there exists a unique such equilibrium. The equilibrium function $T(\delta_i)$ satisfies the differential equation

$$T'(\delta_i) = -[u^W - u^L](\delta_i(\delta_i - \underline{\delta}))^{-1} \tag{9}$$

and the boundary condition

$$T(\overline{\delta}) = 0 \tag{10}$$

Combining equations (9) and (10) then gives the following explicit solution for $T(\delta_i)$:

$$T(\delta_i) = \left[u^W - u^L\right] \frac{1}{\underline{\delta}} \ln\left(\frac{\delta_i(\overline{\delta} - \underline{\delta})}{(\delta_i - \underline{\delta})\overline{\delta}}\right) \tag{11}$$

The equilibrium distribution of concession times, H, is of course related to this solu-

tion. More precisely, we may back out the equilibrium distribution by noting that $H(t) = Prob\left[T(\delta_j) < t\right] = Prob\left[\delta_j > T^{-1}(t)\right]$, where T^{-1} is the inverse function to T.[15]

To understand the mechanisms of the game in the symmetric equilibrium, recall that when deciding whether to concede or keep fighting, the players weigh the expected marginal benefits of a further delay against the marginal costs, δ_i. The marginal benefit consists of the conditional probability that the opponent will concede "within the next instant", times the gain from winning that follows if he actually does so. In the beginning of the conflict, this marginal benefit can be shown to be exactly $\overline{\delta}$, implying that no player with $\delta_i < \overline{\delta}$ will concede immediately. However, since opponents with high costs from delays will concede faster, the passage of time without a concession makes players adjust their beliefs about their opponent's costs downwards. With the specific distributional assumption we have made about costs, it also implies that the conditional probability that the opponent will concede within the next instant falls.[16] Thus, the marginal expected benefit of postponing concession decreases over time, and after a certain time it becomes so low that equation (9) exactly holds. This is the optimal time for player i to capitulate and accept defeat.

A budget agreement is reached as soon as one of the players concedes. The date when this happens is given by

$$T^{agree} = \min\left\{T(\delta_A); T(\delta_B)\right\}$$

Of course, T^{agree} is a random variable. Using equations (11) and (5), and the fact that δ_A and δ_B are independent and both uniformly distributed on $(\underline{\delta}; \overline{\delta}]$, we show in the appendix that the expected date of agreement is

$$ET^{agree} = \begin{cases} (\theta - 1)(y - y^b)\Omega & if \quad y \geq y^b \\ \lambda(\theta - 1)(y^b - y)\Omega & if \quad y < y^b \end{cases} \tag{12}$$

where $\Omega \equiv \left[\overline{\delta} - \underline{\delta} - (\ln(\overline{\delta}) - \ln(\underline{\delta}))\underline{\delta}\right](\overline{\delta} - \underline{\delta})^{-2}$.

2.1 Predictions from the model

A number of predictions are immediately apparent from equation (12). First, large deviations in revenue from the baseline level increase the expected time until concession. Since baseline budgets are strongly linked to the previous budget, it follows that we should expect changes in fiscal circumstances relative to the previous year, whether to the better or worse, to increase the expected duration of budget stalemates. The intuition is that in years when revenue is

[15] The appendix also proves that the function T is strictly decreasing, so that the inverse function does exists.

[16] This conditional probability is equal to the hazard rate, $h(T)/(1 - H(T))$. The assumption that the δ_i's are uniformly distributed ensures that this rate is decreasing in T.

stable, reference dependence and loss aversion imply that both players prefer to keep spending levels unchanged. This consensus between players, which arises despite their innate differences in preferences, means that there is little at stake in the conflict over the budget, and both players will therefore prefer to concede quickly, rather than dragging the stalemate to a length and incur the political costs associated with the delay. In contrast, in the face of large changes in fiscal conditions, the players disagree on how to adapt to those changes. This increases the stakes in the budget conflict, and the opposing parties will be more willing to prolong the stalemate in the hope of getting their preferred outcome.

Second, negative deviations from the baseline have a stronger impact on the expected time of concession than positive deviations of the same size. Hence, the model suggests that we should observe longer budget delays during fiscal downturns than during upswings. This prediction follows directly from the assumption of loss aversion: since players dislike spending cuts more than they like spending increases, it becomes extra important for them to control the budget in years where revenue has dropped. Loosely formulated, "avoiding to lose" is a stronger motivation to keep fighting than "hoping to win".

Based on the first two predictions, we should expect to see longer and more frequent budget delays in states where revenue is highly volatile. On the other hand, it is the need for spending to adapt to changes in revenue, not the change in revenue in itself, which leads to delays in our model. Going slightly outside the model, we would therefore expect fiscal institutions that facilitate smoothing of fluctuations over time to dampen the impact of revenue volatility.

A third prediction relates to the parameter θ. The larger θ is, the stronger are the players' relative preferences for their favored types of spending, and the deeper is their disagreement over how to react to a change in revenue from the reference level. $\theta = 1$ corresponds to a complete consensus on the budget, in which case the model predicts immediate agreement always. Naturally, significant discrepancies between the policy preferences of the players involved in the budget process are much more likely when there is divided partisan control of the government than when all players belong to the same party. Thus, we expect budget stalemates to be longer and more frequent when the two chambers in the legislature are controlled by different parties, or when the legislature is controlled by the opposite party of the executive.

Finally, the expected date of concession is inversely proportional to the scale of the interval $(\underline{\delta}; \overline{\delta}]$. That is, multiplying $\underline{\delta}$ and $\overline{\delta}$ with a positive constant k implies that ET^{agree} is multiplied with k^{-1}. Similarly, adding a positive constant to both $\underline{\delta}$ and $\overline{\delta}$ lowers ET^{agree}.[17] Hence, a shift to the right in the distribution of the marginal costs of delay leads to shorter expected stalemates. We therefore expect to see shorter delays when the political and personal costs to

[17] To see this, totally differentiate equation (12) with respect to $\overline{\delta}$ and $\underline{\delta}$ and set $d\overline{\delta} = d\underline{\delta}$. This gives $dET^{agree}/d\overline{\delta} = -[U^W - U^L](\overline{\delta} - \underline{\delta})^{-2}(\frac{\underline{\delta}}{\overline{\delta}} - \ln(\frac{\underline{\delta}}{\overline{\delta}}) - 1) < 0$. The term in the parentheses is positive since $\ln(x) < x - 1$ for all $x \neq 1$.

politicians of late budgets are high. This may for example be the case in election years: First, electoral success is likely to depend on recent performance, so the political costs of delays are extra high in such years. And second, legislators face an extra personal opportunity cost of spending time on battling over the budget in election years, since they cannot devote their time to campaigning for re-election until the budget is done. Institutional arrangements may also influence the political and personal costs of budget delays, an issue that we address further in the empirical analyses below.

3 Defining and measuring late budgets

Budget processes vary considerably across US states. This complicates cross-state comparisons of budget timeliness somewhat, since there is no obvious, universal definition of when, and by how much, a budget is late. For any meaningful measure of budget lateness, one must identify two points in time, namely *1)* the date by which the budget is supposed to be enacted; and *2)* the date on which it is actually enacted. To begin with the former, many state legislatures face a deadline to pass the budget that is prior to the end of the fiscal year. For example, the California state constitution requires that the legislature pass the budget bill before June 15, whereas the fiscal year starts on July 1st. Other state legislatures face constitutional or statutory deadlines for ending their regular sessions. Whether such deadlines also constitute an effective deadline for passing the state budget varies from state to state, however, and is often a question of interpretation. Moreover, while violations of pre-fiscal year deadlines are often met with harsh criticism in news media, most of the political and economic costs of a budget stalemate that we discussed in the introduction do not become relevant until the stalemate approaches the end of the fiscal year. Most notably, government shutdowns can only happen if the impasse extends into the new fiscal year. In our view, therefore, the ultimate deadline for enacting a state budget will always be the end of the fiscal year.

Turning to the date of actual budget enactment, two natural candidates come to mind: the date of final legislative approval and the date of final enactment. Final legislative approval is achieved when the new budget has been passed in both chambers of the legislature in its final form. Final enactment is the event that formally makes the new budget become law. In most cases, this happens when the governor signs the budget, but important exceptions exist: For example, if the governor vetoes the entire budget, the legislature can in most states override the veto by some super majority vote in both chambers, and the budget then becomes law without the governor's signature. In such cases we interpret the date of the legislative override as the date of final enactment. Furthermore, some states have a deadline for gubernatorial action, and the governor may sometimes let the budget become law without actively signing it

by letting this deadline expire. In these cases we use the date on which the deadline expired.[18] For convenience, however, we shall henceforth simply refer to the date of final enactment as the date the budget was signed into law.

It is not obvious which of the two events most accurately captures the end of budget negotiations. Sometimes, all conflict is effectively resolved when the budget has been passed by both legislative chambers, and the governor's signature appears to be a mere formality. This speaks for using the date of legislative passage as the indicator of actual budget enactment. In other cases, however, the conflict over the budget is far from resolved with the legislative passage. Many governors actively use their power to veto the budget - or the threat to do so - to influence the final budget outcome. In such cases, the final budget enactment, i.e. the signing into law, is the appropriate indicator for the end of budget negotiations. Since this is also what formally marks the end of the budget adoption process, we prefer the date when the budget is signed into law as our indicator of budget enactment.[19]

Thus, our preferred measure defines a late budget as a budget that has been signed into law after the end of the fiscal year, and we measure the length of the delay as the number of days from the end of the old fiscal year to the date of final enactment. We have also experimented with two other measures, however, namely 1) the number of days from the state-specific deadline for legislative passage of the budget to the date of actual legislative passage, and 2) the number of days from the end of the old fiscal year to the date of legislative passage.

3.1 Budget enactment data

The data for the budget enactment dates were collected from three sources: (i) State legislatures' websites; (ii) Archived newspaper articles; and (iii) a survey sent to state budget officers. Some state legislatures' websites have detailed information on the status and histories of all bills enacted in previous legislative sessions, including the budget bill(s). However, most state legislatures' bill tracking tools only cover the most recent legislative sessions, if any. We therefore supplemented with information from archived newspaper articles accessed via Newslibrary.com.[20] Finally, we also sent a survey to state budget officers asking them to confirm the

[18] Another exception is Maryland, where the governor cannot veto the budget, which means that the budget becomes law once it has been passed by both chambers in the legislature. Consequently, final legislative passage and final budget enactment coincide in Maryland.

[19] Our measurement is further complicated by the fact that some states do not pass a single, all-encompassing budget bill. Instead, their budgets consist of several individual appropriation bills. In such cases we do not consider the budget fully enacted until the last appropriation bill for state operations has been enacted. Also, state governments sometimes react to unexpected developments in state government finances by passing within-fiscal year supplementary appropriation bills. We do not view such supplementary budget bills as part of the budget adoption process that we are interested in, however, and we therefore restrict our attention to the budgets as originally enacted.

[20] Newslibrary.com is an online newspaper archive that covers more than 2,500 news sources across the United States. We also used The New York Times online archive on several occasions to access relevant news articles.

data we had collected ourselves as well as provide us with the information that we had not been able to find via any of the other sources. Out of 48 states (we exclude Alaska and Hawaii), 19 responded to our survey. When overlapping, the data they reported were virtually identical to the data we collected ourselves.[21]

In the survey, as well as in our own information search, we asked the following questions for each legislative session in which a budget was adopted:

1. When did the regular session of the legislature start?
2. When was the executive budget proposal submitted to the legislature?
3. When was the deadline for the legislature to pass the budget?
4. When did the legislature pass the budget?
5. When was the budget signed into law?

Our main dependent variable, *days_late*, is constructed as the difference between the answer to question 5 and the last day of the old fiscal year. Note that this variable is uncensored, so that both positive and negative values occur. For example, a value of *days_late* equal to -5 means that the budget was signed into law five days before the end of the fiscal year. We also construct a binary variable, *late_budget*, that takes the value one if *days_late* is strictly positive, and zero otherwise. In addition, we construct a censored variable, *days_late_cens*, that sets all negative values equal to zero. Our two alternative measures, *days_delayed*, and, *days_delayed_FY*, are constructed as the difference between the answer to question 4 and *i)* the answer to question 3, and *ii)* the last day of the old fiscal year, respectively. Binary and censored versions of these variables are constructed in a similar way. Table 1 shows descriptive statistics for all dependent variables.

<**Table 1 about here** [Descriptive statistics of dependent variables]>

For the years 1988-2007 we have recorded 167 cases where the budget was signed into law after the beginning of the new fiscal year. This amounts to 23 percent of the budgets for which we have data.[22] Figure 1 gives a detailed picture of the distribution of *days_late*. There is a clear effect of the fiscal year deadline, as can be seen from the spike at zero. This spike reflects the great number of budgets that are enacted on the last day of the old fiscal year. The

[21] The instructions for the survey are available from the authors upon request. Table A1 in the appendix gives details on the source of information on late budgets for each state.

[22] 190 budgets (26%) received legislative passage after the legislature's state-specific deadline, while 119 (17%) were finally passed by the legislature after the beginning of the new fiscal year.

budgets that were signed into law after the beginning of the new fiscal year ($days\_late > 0$) were on average 31 days late. The variation is large, however, ranging from one day to almost six months with a standard deviation of 36 days. 13 percent of the late budgets were signed into law on the first day of the fiscal year, while 33 percent were more than one month late.

<**Figure 1 about here**. [No. of days from end of fiscal year to final budget enactment]>

Figure 2 illustrates the occurrences of late budgets over time. In addition to our preferred definition of a late budget, the figure also displays the number of budgets that were passed by the legislature after the state-specific deadline for legislative passage. Such delays are generally much more common than delays that extend into the new fiscal year. For both measures, budgets delays were frequent in the early 1990s and in the beginning of the new century. The late 1990s were a period with relatively few late budgets.[23]

<**Figure 2 about here.** [The number late budgets over time, 48 states]>

Figure 3 illustrates the relative frequencies of late budgets for each of the 48 states in our data set, using our preferred definition of a late budget ($days\_late > 0$). In comparison, Figure 4 does the same for one of our alternative definitions ($days\_delayed > 0$). Most states have experienced at least once that the state legislature didn't live up to its deadline for budget passage, while 22 states have experienced a budget enacted after the beginning of the new fiscal year in the time period considered here. New York, North Carolina, California, Oregon and Wisconsin score high on both measures of budget lateness, while Southeastern, Plains- and Rocky Mountain states dominate the group that have never experienced any late budgets.

In what follows, we report results for our preferred definition of late budgets only. Table A3 in the appendix reports results for our main explanatory variables of interest using the two alternative definitions. A full set of results that parallel those reported below are available from the authors upon request. In short, all of our main conclusions are highly robust to plausible alternative definitions of a late budget.

<**Figure 3 about here**.[No. of budgets enacted after beginning of fiscal year, relative to total no. of enacted budgets 1988-2007]>

<**Figure 4 about here**.[No. of budgets passed after legislature's deadline, relative to total no. of enacted budgets 1988-2007]>

[23] Note that odd years generally have more late budgets than even years. This is due to the fact that almost all states with biennial budgeting pass new two-year budgets in odd years, so more budgets are enacted in odd years than in even years. Relative to the total number of budgets being enacted, there is no difference between odd years and even years.

4 Explanatory variables

This section describes the set of explanatory variables in our empirical analyses. More detailed descriptions of all variables, including their sources, can be found in table A1 in the appendix.

A key prediction of the model is that a shock to the fiscal climate (as compared to the previous year) should lead to a delay in the budget adoption, with the delay being longer, the greater the shock is. To test this prediction, we include different measures of changes in the fiscal climate in our estimations. Our preferred measure is the change in the state unemployment rate compared to the previous year. An important advantage of this measure over other candidates is that unemployment statistics are typically available with a much shorter time lag than, say, growth rates in state GDP. Thus, the state unemployment rate is likely to reflect the information available to policymakers at the time of budget adoption more accurately than other measures of the business cycle. Furthermore, Scheppach (2009, p. 1) notes that "the trough in state revenue generally coincides with the peak in unemployment". Finally, the change in the state unemployment has the nice property that there is a natural distinction between positive shocks to the fiscal climate (decreases) and negative shocks (increases).[24] We also consider an alternative measure that focuses more directly on fiscal conditions, namely the revenue schock measure developed in Poterba (1994) and Poterba and Rueben (2001).

As explained above, we expect divided control over the state government to produce longer and more frequent budget delays. We therefore include a dummy variable that takes the value one if either *i)* both chambers in the legislature are controlled by another party than the governor's (*split branch*), or *ii)* the two chambers are controlled by different parties (*split legislature*).We shall later look more into the difference between these two types of divided government.

An additional prediction of the model is that the greater the cost politicians incur during delays, the shorter is the expected delay. As mentioned in section 2, we expect such costs to be higher in election years than in non-election years. We also consider measures that plausibly correlate with the opportunity cost of budget stalemates for the politicians involved: Part-time legislators often have well-paid civil occupations in addition to their political office, and they typically receive only a modest compensation (and perhaps none at all if the deadline is exceeded) for spending time at the state assembly. Hence, part-time legislators have a much greater opportunity cost of delaying agreement than full-time legislators, who have no or limited outside occupation. We therefore include a variable that characterizes the state legislature on a 1 to 5 scale, where 1 corresponds to a part time "citizen legislature, while 5 corresponds to a full-time professional legislature. Our prior is that delays are both longer and more frequent

[24] No equally natural distinction exists for another potential measure, namely the growth rate in real state GDP; what constitutes a negative shock in this case? A negative growth rate? A below-average growth rate? Or a drop in the growth rate relative to last year? In our opinion, there is no obvious answer to this question.

in full-time legislatures.

In a similar spirit, we also include dummy variables for whether the legislature is required (by constitution or statute) to end its regular session before a certain deadline. Where such deadlines are present, a failure to pass the budget before the deadline means that the legislature must go into overtime session, or that a special session must be called. This increases the salience of budget impasses, and we therefore expect the political costs of proctracted negotiations to be higher in states that have such deadlines. We distinguish between two types of legislative session deadlines: *Hard* deadlines require the regular session to end by a certain, clearly specified date, with no room for extension. *Soft* deadlines are deadlines that either do not specify a certain *calendar* date by which the regular session must end (for example, the Georgia constitution limits the regular session to 40 *legislative* days, but it does not require these legislative days to be consecutive), or gives the legislature some leeway to extend the session beyond the deadline (for example, the Arkansas legislature can, and frequently does, extend its 60-days deadline by a two-thirds vote in both chambers).

Finally, states differ widely in the consequences that can arise in the event of a late budget. To capture some of these differences, we include a dummy for whether entering a new fiscal year without a budget in place could lead to a shutdown of state government activities. Unfortunately for our purposes, the reliability of this information is impaired by the fact that many states have never experienced a late budget, and their state laws do not address the issue. The true consequences of a late budget are therefore unknown in these states.

In addition to the above categories of variables that test our main predictions, we explore the impact of a range of institutional, political, cultural and demographic factors: We consider various institutions related to the budget, such as whether there any super majoritarian requirements for passing the budget (as is the case in California). Balanced budget rules are another potentially important institution. Conditional on the state of the economy, how much fiscal adjustment is needed is likely to depend on the strictness of these rules, but also on the cash available in the general fund and the stabilization fund, both of which we control for. We also control for the party affiliation of the governor, whether the governor faces a binding term limit, the length of the governor's incumbency, and whether the current budget adoption process is the first to be handled by the incumbent governor.

Knack (2002) argues that a range of cultural and demographic variables might influence government performance, including the timeliness of the budget. We therefore control for the effect of the state population size, the proportion of non-working aged people, the proportion of blacks and the proportion of college graduates in the population. Knack (2002) also documents that certain types of social capital, such as civic reciprocity, are determinants of good governance, and so we proxy for this by including the Census 1990 mail response rate as an explanatory variable.

Finally, we run all regressions both with and without state fixed effects. Unfortunately, some of the control variables mentioned above are time invariant and must therefore be dropped when state fixed effects are included. Five-year interval time dummies are included to account for nation-wide trends across time.[25]

5 Results

5.1 Binary response models

We start out with the simplest of our measures of budget lateness, the binary variable *late_budget*. Columns (1) to (4) in Table 2 present results from some basic estimations in which we have only included our two main explanatory variables of interest: The change in the state unemployment rate and a dummy variable for divided government. We use a pooled probit estimator as well as the fixed effect logit estimator.[26]

In columns (1) and (2) we simply include the change in the unemployment rate, without distinguishing positive changes from negative changes. The change in the unemployment rate and divided control of the government are both associated with more frequent occurrences of late budgets. However, these specifications impose a linear effect of changes in the unemployment rate, in the sense that decreases in the unemployment rate are restricted to have the same impact as increases, but with the sign reversed. Columns (3) and (4) relax this restriction by explicitly separating positive changes in the unemployment rate from negative changes. More precisely, the variable *unempl_increase* is equal to the change in the unemployment rate if the change is positive, and takes the value zero in all other cases. The variable *unempl_drop* is equal to the *absolute value* of the change in the unemployment rate if the change is negative, and otherwise zero.[27] This reveals an important non-linearity: As expected, increases in the unemployment rate are associated with higher probabilities of observing budget delays, relative to a stable unemployment rate. In contrast, a drop in the unemployment rate does not appear to lower the probability of budget delays. If anything, delays are *more* likely when the state unemployment rate drops below the level from the previous year, as our model would predict.

[25] In general, we wish to include time dummies to capture heterogeneity across time. But since economic conditions are highly correlated across states, it may be difficult to disentangle the effect of national trends from the effect of changes in fiscal climates. This means that precise estimation of the coefficients on the unemployment variables may be difficult if we also include yearly time dummies. As a compromise, we therefore use dummies for 5-year periods to capture national trends, rather than yearly dummy variables. Using yearly time dummies yields similar coefficient estimates but with substantially higher standard errors on the cyclical variables.

[26] The Fixed Effect logit can only be estimated for the 20 states that have have some variation in the dependent variable (not all 0's or 1's).

[27] With these definitions, the restriction imposed in columns (1) and (2) is that the coefficient on *unempl_increase* is equal to minus one times the coefficient on *unempl_drop*.

But as the model also predicts, the impact of a drop in the unemployment rate appears to be weaker than the impact of a similar-sized increase: The coefficients on drops in the unemployment rate are always smaller than the coefficients on increases, although the differences are not statistically significant.

To illustrate the magnitude of the effects, we calculate the marginal effects of the explanatory variables in the probit estimations. Columns (3) suggest that, compared to a zero change, a one percentage-point increase in the state unemployment rate increases the likelihood that the state budget will not be signed into law before the new fiscal year by 7.8%-points. The corresponding number for a one percentage-point *drop* in the unemployment rate is 6.2%-points. Compared to a unified government, divided control of the state government raises the probability of a late budget by 14.8%-points.

<**Table 2 about here.** [Binary response models, 1988-2007]>

Columns (5) to (7) include a full set of control variables, as described in the previous section. Adding control variables does not change the main results: Divided government significantly increases the probability of a late budget, and so do increases in the unemployment rate. Drops in the unemployment rate also appear to increase the probability of late budgets. The estimated effect is significant on a 5% level when using the pooled probit estimator, but not quite so when we use the fixed effect logit estimator (the p-value is 0.14). The coefficient on *unemp_drop* is in all cases smaller than the coefficient on *unemp_increase*, but the differences are again not statistically significant.

Turning to the control variables, we find no effect of election years in either of the columns, in contrast to our priors. In column (5) we omit state fixed effects to estimate the effect of a range of time-invariant state characteristics. As expected, we find a strongly significant negative impact of deadlines that limit the length of the legislature's regular session. Somewhat surprisingly, the results suggest that "soft" deadlines have a stronger impact than "hard" deadlines. At a p-value of 0.12, the difference is borderline statistically significant. Less surprisingly, the coefficient on *shut_down* shows that late budgets are less common in states where they may result in shutdowns of state government activities.[28] Also in line with our expectations is the negative and significant coefficient on *census_reponse_rate*, which suggests that late budgets are indeed less common in states with a high level of social capital. Our results for super majority requirements (not reported) do not suggest in any way that such requirements

[28] Although in line with our theoretical priors, we would advise caution in interpreting this particular result: Many of those states that list shutdown as a likely (or even unavoidable) outcome of a late budget have never actually experienced a late budget in recent times. While this could of course reflect a causal relationship from budget procedures to outcomes, the causality could also run in the opposite direction. States that have never experienced late budgets can "afford" to warn of dire consequences in case of a highly hypothetical budget delay. Experience suggests, however, that once faced with an actual budget stalemate, state governments have a tendency to soften the rhetoric and be innovative in their efforts to avoid very harsh consequences.

increase the frequency of late budgets. This is a consistent finding throughout our empirical analyses.[29] Finally, in contrast to our priors, the results in column (5) do not provide any evidence that full-time legislatures are more prone to producing late budgets than part-time legislatures. This could of course reflect that there is in fact no causal effect, but it could also be caused by a problem of multicollinearity. In particular, *full_time_legislature* and *population* are highly correlated, both individually insignificant, but jointly significant at a 10% level (p-value of 0.07). In column (6) we therefore leave out *population*. This produces the expected positive and significant coefficient on *full_time_legislature*.

5.2 Linear regression models

The results in this section exploit the full variation in our measure of budget lateness. This allows us to study the *length* of budget stalemates, rather than the frequency. As in the previous section, we start out with some parsimonious specifications. Columns (1) and (2) in Table 3 report basic fixed effects estimations with the change in the unemployment rate (separated into drops and increases in column (2)) and a dummy for divided government as the only explanatory variables. The results are in line with those from the previous section: Divided government is strongly associated with longer budget negotiations. The change in the unemployment rate, when included in its simplest form, is also positively related to our measures of budget lateness. But as in the previous section, distinguishing positive changes from negative changes suggests that the relationship is non-linear: A rise in the unemployment rate increases the expected length of the budget adoption process, as can be seen from the positive and significant coefficient on *unempl_increase*. The coefficient on *unempl_drop*, on the other hand, is imprecisely estimated, and there is no solid evidence that a falling unemployment rate has any impact on the length of budget negotiations. These results suggest that economic slowdowns have a greater impact on the duration of budget negotiations than economic upswings. In terms of magnitude, the estimates indicate that a 1 percentage-point rise in the unemployment rate postpones final enactment by about a week.

<**Table 3 about here**. [Linear regression models, 1988-2007]>

In columns (3) to (5) we include our full set of control variables. This produces even larger coefficients on *unempl_increase*. The coefficient is significant at the 1% level in all columns. In contrast, the estimated coefficients on *unempl_drop* are small and statistically insignificant across all columns. [30] Divided government again has a large and highly significant effect on the

[29] We do not elaborate further on this but a full set of estimation results, including estimated coefficients for super majority requirements, can be obtained from the authors upon request.

[30] Unlike the results in the previous section, the coefficients on *unempl_increase* and *unempl_drop* are now significantly different at a 1% level across all columns. In contrast, the hypothesis that the coefficient

expected length of the budget process. Compared to a unified government, our results show that the expected length of the budget process is about two weeks longer (using the fixed effect estimate) when the state government is under divided control.

Unlike in the previous section, we now find a significant effect of election years. As expected, budget negotiations are shorter in election years than in non-election years. The difference is estimated to be between one and two weeks. The first budget adoption process under a new governor appears to finish a little later than in other years. Rookie governors sign the budget about a week later than governors who have led at least one budget negotiation process, although the difference is not statistically significant when state fixed effects are included.

Turning to the time-invariant variables, we again find highly significant effects of deadlines that limit the length of the legislative session. State budgets tend to be signed into law 2-3 weeks earlier in states where a delay would trigger a shutdown of non-essential services than in states where such shutdowns cannot happen. There is some evidence that higher social capital is associated with shorter delays, but the results are now not significant. Finally, parallelling the results from the previous section, we find a positive but statistically insignificant coefficient on $full\_time\_leg$ when we also control for state population size. The coefficient becomes much bigger and statistically significant when *population* is excluded, as shown in column (4).

5.3 Censored models

A potential issue with our dependent variable $days\_late$ is the manner in which negative values are treated. To illustrate, governors usually sign the budget quickly after receiving it from the legislature. $Days\_late$ will then record a negative value if this happens before the end of the fiscal year. But some governors sometimes choose to postpone signing the budget until the last day of the fiscal year for ceremonial reasons only. In such cases, the postponed enactment is not due to a budget stalemate, but $days\_late$ records a zero, rather than a negative value. Thus, the variation in $days\_late$ that is within the negative domain may just reflect unimportant, idiosyncratic noise.

In order to deal with this issue, we left-censor our dependent variables at zero in this section. By censoring the data we can view budget negotiations as a process that either leads to a timely budget or a delay of some (stochastic) duration. Zero or negative values of $days\_late$ then indicate a corner solution outcome, while strictly positive observations reflect interior solution outcomes. In Table 4 we use the Tobit model as well as the Honore (1992) semi-parametric panel Tobit estimator with fixed effects on the left-censored version, $days\_late\_cens$, of our dependent variable.

on $unempl\_increase$ is equal to minus one times the coefficient on $unempl\_drop$ (the restriction imposed in column (1)) is now only rejected at the 10% level in column (5).

<Table 4 about here. Censored outcomes, 1988-2007>

The results broadly confirm our previous findings. Starting with the Tobit estimates in columns (1) and (2), the estimated effect of an increase in the unemployment rate has the usual positive sign and is significant at a 5% level. As in the linear regressions, the coefficient on *unempl_drop* is negative, but numerically small and statistically insignificant. As usual, the coefficient estimate on *divided_gov* is positive and highly significant. The results for the time-invariant variables also resemble the results in the previous sections: Legislative session deadlines reduce the expected duration of budget delays, and so do "shut down" provisions and higher levels of social capital, as proxied by the Census response rate. As usual, the coefficient on *full_time_legislature* is positive but insignificant when *population* is included, but it becomes significant at a 10% level when *population* is omitted, as shown in column (2). The coefficient estimates produced by the Tobit fixed effect estimator in column (3) have the same sign as the Tobit estimates, but they generally lack precision. The p-value for *unempl_increase* is 0.15.[31]

5.4 Fiscal institutions and economic fluctuations

If fluctuations in economic activity cause delays in the adoption of state budgets, then we should expect fiscal institutions that influence policymakers' ability to smooth such fluctuations to affect the relationship between economic conditions and the occurrence of delays. In this section we examine the interaction between two such institutions, balanced budget rules and budget stabillization funds, and the change in the state unemployment rate. Recall the intuition from our model: A change in the amount of available resources relative to the baseline, whether positive or negative, increases the stakes in budget negotiations and produces longer delays. Following this logic, we should expect budget stabilization funds that ease smoothing by forcing extra saving in good years while providing back-up resources in bad years to alleviate the impact of economic fluctuations.

The case of balanced rules is slightly more complicated. On the one hand, balanced budget rules may hinder smoothing in bad times and could therefore exacerbate the effect of fiscal deteriorations. On the other hand, strict rules may promote fiscal discipline in good years and therefore dampen the effect of rising revenues. All states except Vermont have some kind of balanced budget requirement, but the strictness of these requirements varies considerably. Below we consider two variables that have been used in the literature to characterize the

[31] The estimated coefficient on *divided_gov* is insignificant in column (3). However, if we distinguish split-branch governments from split-legislature governments - an issue that we address further in the next section - we find a significant effect of split legislatures, and a considerably smaller and statistically insignificant effect of split-branch governments.

strictness of balanced budget rules: Whether the state is allowed to carry over a deficit into the next fiscal year, and whether the governor has line-item veto power over the budget. [32]

In columns (1) and (2) of Table 5 we split our sample between "carry-over" states and "no carry-over" states and estimate the probability of having a late budget using the FE logit estimator. A rising unemployment rate has a significant effect on the probability of late budget in states that have a "No carry-over" provision in place, whereas there is no such effect in states that allow deficits to be carried over. In column (3) we use $days\_late$ as the dependent variable. Rather than splitting the sample, we instead interact a dummy for "no carry-over" with the unemployment variables $unempl\_increase$ and $unempl\_drop$. The results from this approach do not provide support for the results in columns (1) and (2), since the coefficients on the interaction terms are insignificant and have the wrong signs. In conclusion, we find only weak evidence that a "no carry-over" provision exacerbates the effect of fiscal deteriorations. In column (4) we interact the unemployment variables with a dummy for governor line-item veto power. This produces a large and significant coefficient on $unemp\_fall$, but a significant and even larger negative coefficient on the associated interaction term. Our interpretation of these results is that the influx of revenue that follows a drop in unemployment intensifies the conflict over the budget, as our model predicts, but that governors equipped with line-item veto power can curb the spending pressure that the extra revenue generates, thereby neutralizing its effect on the conflict level and the length of the budget negotiations.

Columns (5) through (7) in Table 5 focus on the impact of budget stabilization funds. $stab\_fund_{i,t}$ is a dummy variable that takes the value 1 if the state had a stabilization fund in year t. In column (5) we interact this variable with $unempl\_increase$ and $unempl\_drop$. The results suggest a remarkable effect of budget stabilization funds. In the absence of a stabilization fund, a drop in the unemployment rate has a strong positive impact on the expected duration of a late budget. When present, budget stabilization funds appear to neutralize this effect. On the other hand, the results in column (5) do not suggest that the introduction of stabilization funds has done anything to alleviate the impact of rising unemployment rates on the length of budget negotiations.

Columns (6) and (7) investigate how the impact of a stabilization fund depends on the specific rules that govern deposits into- and withdrawals from the fund. Wagner and Elder (2005) characterize the strictness of deposit and withdrawal rules on a 1 to 4 scale, where higher values correspond to less discretion and stricter rules. For both deposit and withdrawal rules, we create dummy variables for each of the four steps on the scale. We then interact our unemployment variables with $stab\_fund_{i,t}$ and with each of these dummies. Column (6) focuses on deposit rules, while column (7) does the same for withdrawal rules. The results show that the negative coefficient on the interaction between $unempl\_drop$ and $stab\_fund_{i,t}$

[32] See for example Alt and Lowry (1994), Bohn and Inman (1996) or Fatás and Mihov (2006).

found in column (5) is mainly driven by states in the upper categories on Wagner and Elder's scale. In particular, stabilization funds are effective in states where deposits into the fund are required in the event of a budget surplus ($depos\_rule2 = 1$) or given by a mathematical formula ($depos\_rule4 = 1$), and where withdrawals from the fund are only allowed in the event of a budget deficit ($withdraw\_rule2 = 1$) or a supermajority legislative approval ($withdraw\_rule3 = 1$). Budget stabilization funds appear to be least effective at preventing budget delays in states where deposits and withdrawals are made by legislative appropriation ($depos\_rule1 = 1$ and $withdraw\_rule1 = 1$).

<**Table 5 about here.** [Economic conditions and fiscal rules, 1988-2007]>

5.5 Alternative indicators of fiscal conditions and divided government

Table 6 investigates our main results in greater depth. First, we use the revenue shock variable constructed by Poterba (1994) and Poterba and Rueben (2001) as an alternative indicator of changes in state fiscal conditions. Poterba and Rueben measure revenue shocks as the percentage deviation of actual general fund revenues from original projections, with a correction for the impact of tax changes enacted during the fiscal year. Their variable thus captures any unforeseen developments in general fund revenue collections since the enactment of the previous budget. Following our usual strategy, we let positive shocks and negative shocks (measured in absolute values) enter separately. The results broadly confirm our previous findings: Negative revenue shocks raise the probability of a late budget significantly, judging from the probit estimates in column (1). The fixed effects regression in column (2) produces a positive but marginally insignificant coefficient on negative revenue shocks (p-value of 0.107). For positive shocks, we get a positive and weakly significant coefficient in the probit estimation in column (1), but an insignificant coefficient in the other columns.

Second, columns (5)-(8) take a closer look at our divided government variable. Here we distinguish situations in which the governor faces a united legislature controlled by the opposite party (*split branch*) from situations in which the two chambers in the legislature are controlled by different parties (*split legislature*). Across all columns, we find an economically and statistically strong effect of split legislatures. In comparison, the estimated effect of split branch governments is smaller across all columns and statistically significant in only two out of four columns. [33]These results suggest that partisan conflicts within state legislatures play a more prominent role in the explanation of budget stalemates than do conflicts between different branches of state government.

[33]We also tried interacting the divided government variables with a measure of political polarization, but none of the interaction terms came out significant and were therefore omitted.

<**Table 6 about here.** [Robustness of economic indicators and divided government, 1988-2007]>

6 Concluding remarks

The government budget is the legal basis for government spending and a prime venue for political conflict. Occasionally, this leads to prolonged budget negotiations, beyond both state specific deadlines and the beginning of the fiscal year. We have collected and systematized data on budget negotiation durations for US state governments for the period 1988-2007. We use this data to test a war-of-attrition model of bargaining between politicians from different branches of government; the politicians are loss averse with respect to deviations from budgetary baselines as references points, and the model generates a number of testable hypotheses that we take to the budget negotiation data.

Our main empirical conclusions support the hypotheses of the model: increasing unemployment leads to a longer budget negotiation process, it increases the risk of exceeding budget deadlines and it prolongs periods with no budget in place. Falling unemployment also weakly increases the risk of seeing a late budget, in accordance with our model's predictions, but in contrast to widely held beliefs that more funds automatically make agreeing on a budget easier. Divided government makes late budgets more likely in all cases. In addition, higher political costs, present in election years, decrease the duration of late budgets, while higher personal costs, for non-professional legislators, decrease both the risk of late budgets as well as their duration. Soft or hard deadlines that require the legislature to end its regular session before the end of the fiscal year limit the occurence of late budgets.

While the effects of balanced budget institutions are somewhat weak, gubernatorial line-item veto powers limit negotiations during good times as do stabilization funds with strict deposit rules. The results for withdrawals from stabilization funds in times of increasing unemployment are less clear cut, possibly owing to our lack of controlling for whether funds are actually present to be withdrawn; in the most recent episode of late budgets, several states entered hard times with very low levels of rainy-day savings. Finally, using late budgets as a measure of good governance, higher social capital does seem to be associated with better governance, confirming the findings of Putnam (1993) and Knack (2002).

Finally, why do some states never experience late budgets? Our results suggest that government shutdown provisions and the use of soft or hard deadlines that limit the length of the regular session are important determinants of the presences of late budgets. In contrast, super-majority requirements, often mentioned as a contributing factor to the late budgets of California, do not show up significantly in our results. However, California have no soft or hard deadlines for ending the regular session of the legislature and no government shutdown provisions, which suggests that there are many institutional possibilities available to reformers

of the California budget process and across governments.[34]

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7 Appendix

7.1 The symmetric Nash Equilibrium

This part of the appendix shows that there exists a unique symmetric Nash equilibrium in the war of attrition model studied in the main text. We continue in two steps.

The first step is to realize that in any symmetric equilibrium, the players' chosen concession times must be a strictly decreasing function of their respective marginal costs of delay.

Lemma 1 *Let $(T(\delta_A), T(\delta_B))$ be a symmetric Bayesian Nash equilibrium in the war of attrition game studied in section 2, where $T : (\underline{\delta}; \overline{\delta}] \to [0; \infty)$ is a differentiable function. T must then satisfy $T'(\delta_i) < 0$.*

Proof. [35]Let $EU(T_i, \delta_i)$ denote the expected utility for a player with marginal cost δ_i who chooses concession time T_i. Further, let $T(\delta_i')$ and $T(\delta_i'')$ denote the chosen concession times of players with marginal costs δ_i' and δ_i'', respectively. Equilibrium then requires that

$$EU(T(\delta_i'), \delta_i') \geq EU(T(\delta_i''), \delta_i')$$

and

$$EU(T(\delta_i''), \delta_i'') \geq EU(T(\delta_i'), \delta_i'')$$

Adding these two inequalities and rearranging yields

$$EU(T(\delta_i'), \delta_i') - EU(T(\delta_i'), \delta_i'') \geq EU(T(\delta_i''), \delta_i') - EU(T(\delta_i''), \delta_i'') \tag{A1}$$

By equations 3, 4 and 6, $EU(T_i, \delta_i)$ is given by

$$EU(T_i, \delta_i) = (1 - H(T_i))(u^L - \delta_i T_i) + H(T_i)u^W - \int_0^{T_i} t \cdot h(t)dt$$

Substituting this into the inequality in A1 then gives, after some rearranging,

$$(\delta_i'' - \delta_i') \left[G(T(\delta_i')) - G(T(\delta_i'')) \right] \geq 0 \tag{A2}$$

where

$$G(x) \equiv (1 - H(x))x + \int_0^x t \cdot h(t)dt$$

[35]This proof draws heavily on Example 6.3 in Fudenberg and Tirole (1991).

Notice now that $G'(x) = -h(x)x + 1 - H(x) + xh(x) = 1 - H(x) \geq 0$. Combined with the inequality in A2, this means that if $\delta_i' < \delta_i''$, then we must have $T(\delta_i') \geq T(\delta_i'')$, so $T'(\delta_i) \leq 0$.

To see that equilibrium concession times must be *strictly* decreasing in the marginal cost of delay, consider the following argument: If T were not strictly decreasing, there would exist some closed interval $X \subseteq (\underline{\delta}; \overline{\delta}]$ and some $t \geq 0$, such that $T(\delta_j) = t$ for all $\delta_j \in X$. This would then imply that $prob(T(\delta_j) = t) > 0$. Consider now a player i with $\delta_i \in X$: Symmetry would require this player to set $T_i = T(\delta_i) = t$. However, given that $prob(T(\delta_j) = t) > 0$, player i would never choose $T_i = t$. She would do better setting T_i just above t, because this would increase the probability of winning "discontinuously", while only increasing the cost from delay infinitesimally. Hence, $T(\delta_i)$ would not be a best response to itself, so $(T(\delta_A), T(\delta_B))$ could not be a symmetric Nash equilibrium. ■

The next step uses Lemma 1 to prove existence and uniqueness of a symmetric Bayesian Nash equilibrium.

Proposition 2 *Let $T : (\underline{\delta}; \overline{\delta}] \to [0; \infty)$ be a differentiable function. $(T(\delta_A), T(\delta_B))$ is a symmetric Bayesian Nash equilibrium if and only if $T(\delta_i)$ satisfies*

$$T'(\delta_i) = -\left[u^W - u^L\right] \delta_i (\delta_i - \underline{\delta})^{-1} \quad for\ all\ \delta_i \in (\underline{\delta}; \overline{\delta}] \tag{A3}$$

and

$$T(\overline{\delta}) = 0 \tag{A4}$$

Proof. We show the "only if" part of the proof first, since the "if" part then follows straightforwardly afterwards.

"*Only if*":

If $(T_A, T_B) = (T(\delta_A), T(\delta_B))$ is a Nash equilibrium, it must satisfy for $i, j = A, B\,,\ i \neq j$:

$$EU(T(\delta_i), \delta_i) \geq EU(\tilde{T}, \delta_i)\ for\ all\ \tilde{T} \geq 0\ and\ for\ all\ \delta_i \in (\underline{\delta}; \overline{\delta}],\ given\ T_j = T(\delta_j)$$

Any *interior* solution to the utility maximazation problem must satisfy the first-order condition $\frac{dEU(T(\delta_i))}{dT_i} = 0$. That is, *if* $T(\delta_i) > 0$, the derivative of expected utility with respect to T_i must be zero at $T_i = T(\delta_i)$.

Now recall that

$$\frac{dEU(T_i, \delta_i)}{dT_i} = (u^W - u^L)h(T_i) - (1 - H(T_i))\delta_i \tag{A5}$$

where H is the cdf of T_j, the opponent's concession time, and h is the associated density function. Let $T^{-1}(T_i)$ be the inverse to T, so that $T^{-1}(T(\delta_i)) = \delta_i$. T^{-1} is then defined on the interval $[T(\overline{\delta}); \lim_{\delta \to \underline{\delta}} T(\delta))$. Use that $T_j = T(\delta_j)$. For $T_i \in [T(\overline{\delta}); \lim_{\delta \to \underline{\delta}} T(\delta))$ we can then write $H(T_i)$ as

$$H(T_i) = prob(T(\delta_j) < T_i) = prob(\delta_j > T^{-1}(T_i)) = 1 - \frac{T^{-1}(T_i) - \underline{\delta}}{\overline{\delta} - \underline{\delta}} \tag{A6}$$

while $H(T_i) = 0$ for $T_i < T(\overline{\delta})$ and $H(T_i) = 1$ for $T_i \geq \lim_{\delta \to \underline{\delta}} T(\delta)$. In this derivation of $H(T_i)$, we have used that $T'(\delta) < 0$, and the fact that δ_j is uniformly distributed on $(\underline{\delta}; \overline{\delta}]$. Differentiating with respect to T_i then gives us that for $T_i \in [T(\overline{\delta}); \lim_{\delta \to \underline{\delta}} T(\delta))$:

$$h(T_i) = -\frac{1}{\overline{\delta} - \underline{\delta}} \frac{1}{T'(T^{-1}(T_i))} \tag{A7}$$

while $h(T_i) = 0$ for all other T_i. Inserting (A6) and (A7) into (A5) and evaluating at $T_i = T(\delta_i)$ then gives

$$\begin{aligned} \frac{dEU(T(\delta_i))}{dT_i} &= -(u^W - u^L)\frac{1}{\overline{\delta} - \underline{\delta}} \frac{1}{T'(\delta_i)} - \frac{\delta_i - \underline{\delta}}{\overline{\delta} - \underline{\delta}} \delta_i = 0 \Leftrightarrow \\ T'(\delta_i) &= -(u^W - u^L)(\delta_i(\delta_i - \underline{\delta}))^{-1} \end{aligned} \tag{A8}$$

To summarize, we have now established that if $(T(\delta_A), T(\delta_B))$ is a Nash equilibrium, it must be the case for all $\delta_i \in (\underline{\delta}; \overline{\delta}]$ that $T(\delta_i) > 0 \Rightarrow T'(\delta_i) = -(u^W - u^L)(\delta_i(\delta_i - \underline{\delta}))^{-1}$. Note now that we must have $T(\delta_i) > 0$ for all $\delta_i \in (\underline{\delta}; \overline{\delta})$: This follows from $T'(\delta_i) < 0$ and and the requirement $T(\delta_i) \geq 0$ for all $\delta_i \in (\underline{\delta}; \overline{\delta}]$. Combined with the result above, this implies that $T(\delta_i)$ must satisfy equation (A3).

The last step is now to prove the boundary condition $T(\overline{\delta}) = 0$. To do this, let $T_0(\delta_i)$ denote the function that satisfies equation (A3) and $T_0(\overline{\delta}) = 0$. Consider then another function $T_1(\delta_i)$ that satisfies (A3) with $T_1(\overline{\delta}) > 0$. We can then write this function as $T_1(\delta_i) = T_0(\delta_i) + T_1(\overline{\delta})$. Assume that the opponent plays according to $T_j = T_1(\delta_j)$, and imagine now the choice problem facing a player i with $\delta_i = \overline{\delta}$: If he plays according to $T_i = T_1(\delta_i)$, it means that he will be waiting $T_1(\overline{\delta})$ time units before conceding. Since there is zero probability that the opponent will concede in this time interval, this implies a certain utility loss of $\delta_i T_1(\overline{\delta})$, with no chance of winning the battle over the budget. Clearly, it would then be better for player i to concede immediately and avoid the costs of the delay. Thus, $T_1(\delta_i)$ is not a best reply to itself for all possible values of δ_i, and so it cannot be a Nash equilibrium.

"*If*":

Assume that player j chooses $T_j = T(\delta_j)$, where T satisfies (A3) and (A4). Integrating

equation (A3) over δ_i and using (A4) to solve for the additive constant then gives

$$T(\delta_i) = [u^W - u^L]\frac{1}{\underline{\delta}}\left(\ln\left(\frac{\delta_i}{\delta_i - \underline{\delta}}\right) - \ln\left(\frac{\overline{\delta}}{\overline{\delta} - \underline{\delta}}\right)\right)$$

from which it is clear that $T(\overline{\delta}) = 0$ and $\lim_{\delta \to \underline{\delta}} T(\delta) = \infty$. The inverse function $T^{-1}(T_i)$ is therefore defined for all $T_i \geq 0$, so from (A6) and (A7) we get that for all $T_i \geq 0$:

$$H(T_i) = 1 - \frac{T^{-1}(T_i) - \underline{\delta}}{\overline{\delta} - \underline{\delta}}\ , \quad h(T_i) = -\frac{1}{\overline{\delta} - \underline{\delta}}\frac{1}{T'(T^{-1}(T_i))}$$

Now use that $T'(T^{-1}(T_i))^{-1} = -[u^W - u^L]^{-1}(T^{-1}(T_i)(T^{-1}(T_i) - \underline{\delta}))^{-1}$ to get

$$h(T_i) = \frac{1}{\overline{\delta} - \underline{\delta}}\frac{T^{-1}(T_i)(T^{-1}(T_i) - \underline{\delta})}{[u^W - u^L]}$$

The first-order condition for player i then becomes

$$\begin{aligned}
\frac{1}{\overline{\delta} - \underline{\delta}}T^{-1}(T_i)(T^{-1}(T_i) - \underline{\delta}) &= \frac{T^{-1}(T_i) - \underline{\delta}}{\overline{\delta} - \underline{\delta}}\delta_i \Leftrightarrow \\
T^{-1}(T_i) &= \delta_i \Longleftrightarrow \\
T_i &= T(\delta_i)
\end{aligned}$$

To find the second-order derivative, note that

$$\begin{aligned}
h'(T_i) &= \frac{1}{\overline{\delta} - \underline{\delta}}\frac{(2T^{-1}(T_i) - \underline{\delta})}{[u^W - u^L]}\frac{1}{T'(T^{-1}(T_i))} \\
&= -\frac{(2T^{-1}(T_i) - \underline{\delta})}{[u^W - u^L]}h(T_i)
\end{aligned}$$

so the second-order derivative is

$$\begin{aligned}
\frac{d^2EU_i(T_i)}{dT_i^2} &= [u^W - u^L]h'(T_i) + h(T_i)\delta_i \\
&= (-2T^{-1}(T_i) + \underline{\delta} + \delta_i)h(T_i)
\end{aligned}$$

Now use the result from the first-order condition that $T^{-1}(T_i) = \delta_i$ to get:

$$\frac{d^2EU_i(T_i)}{dT_i^2}|_{T_i = T(\delta_i)} = -(\delta_i - \underline{\delta})h(T_i) < 0$$

Hence, marginal utility is zero at $T_i = T(\delta_i)$, and the second-order derivative is negative at this point. This shows that $T_i = T(\delta_i)$ is a local utility maximum point. Further, since there

are no other extremum points, $dEU(T_i)/dT_i$ must be positive for all $T_i < T(\delta_i)$ and negative for all $T_i > T(\delta_i)$. It then follows that $T_i = T(\delta_i)$ is also a global maximum point. Hence, $T(\delta)$ is a best response to itself, so $(T_A, T_B) = (T(\delta_A), T(\delta_B))$ is indeed a Nash equilibrium. ■

7.2 Proof of equation 12

Let $A(t)$ be the cumulative distribution function for T^{agree}. We can then derive $A(t)$ by noting that

$$\begin{aligned} A(t) &= prob(T^{agree} < t) = 1 - prob(T(\delta_A) > t) \cdot prob(T(\delta_B) > t) \\ &= 1 - prob(\delta_A < T^{-1}(t)) \cdot prob(\delta_B < T^{-1}(t)) \\ &= 1 - \left[\frac{T^{-1}(t) - \underline{\delta}}{\overline{\delta} - \underline{\delta}}\right]^2 \end{aligned}$$

where we have used that δ_A and δ_B are independent and both uniformly distributed on $(\underline{\delta}; \overline{\delta}]$. Let $a(t)$ denote the associated density function of T^{agree}. We then get that the expected time of budget agreement is

$$\begin{aligned} ET^{agree} &= \int_{T(\overline{\delta})}^{\lim_{\delta \to \underline{\delta}} T(\delta)} t \cdot a(t) dt \\ &= \int_{T(\overline{\delta})}^{\lim_{\delta \to \underline{\delta}} T(\delta)} -2t \cdot (T^{-1}(t) - \underline{\delta}) \cdot (\overline{\delta} - \underline{\delta})^{-2} \left[T'(T^{-1}(t))\right]^{-1} dt \\ &= \int_{\underline{\delta}}^{\overline{\delta}} 2T(\delta) \cdot (\delta - \underline{\delta})(\overline{\delta} - \underline{\delta})^{-2} d\delta \\ &= \frac{[u^W - u^L]}{\underline{\delta}(\overline{\delta} - \underline{\delta})^2} \int_{\underline{\delta}}^{\overline{\delta}} 2 \ln\left(\frac{\delta(\overline{\delta} - \underline{\delta})}{\overline{\delta}(\delta - \underline{\delta})}\right)(\delta - \underline{\delta}) d\delta \\ &= \frac{[u^W - u^L]}{\underline{\delta}(\overline{\delta} - \underline{\delta})^2} \left[(\delta^2 - 2\delta\underline{\delta}) \ln(\delta(\overline{\delta} - \underline{\delta})) - (\delta - \underline{\delta})^2 \ln(\overline{\delta}(\delta - \underline{\delta})) + \delta\underline{\delta}\right]_{\underline{\delta}}^{\overline{\delta}} \\ &= [u^W - u^L] \left(\frac{\overline{\delta} - \underline{\delta} - \left[\ln(\overline{\delta}) - \ln(\underline{\delta})\right] \underline{\delta}}{\left(\overline{\delta} - \underline{\delta}\right)^2}\right) \end{aligned}$$

where we have used the substitution $t = T(\delta)$ to change variables in the integration.[36] Substituting in for $[u^W - u^L]$ from equation (5) then gives equation (12).

[36] For the last equation, we have used l'Hôpital's rule by noting that $(\delta - \underline{\delta})^2 \ln(\overline{\delta}(\delta - \underline{\delta})) = \ln(\overline{\delta}(\delta - \underline{\delta}))/((\delta - \underline{\delta})^{-2})$, so

$$\lim_{\delta \to \underline{\delta}} \left[(\delta - \underline{\delta})^2 \ln(\overline{\delta}(\delta - \underline{\delta}))\right] = \lim_{\delta \to \underline{\delta}} \left[\overline{\delta}(\delta - \underline{\delta})^{-1}/(-2(\delta - \underline{\delta})^{-3})\right] = \lim_{\delta \to \underline{\delta}} \left[-\frac{\overline{\delta}}{2}(\delta - \underline{\delta})^2\right] = 0$$

Figure 1: No. of days from end of fiscal year to final budget enactment, 1988-2007

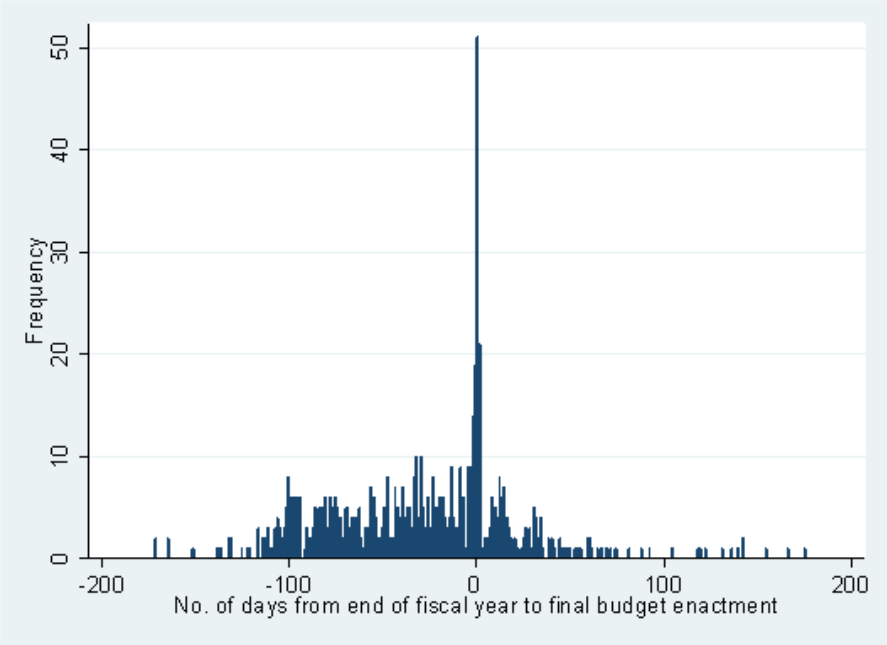

Figure 2: The number of late budgets over time, 48 states

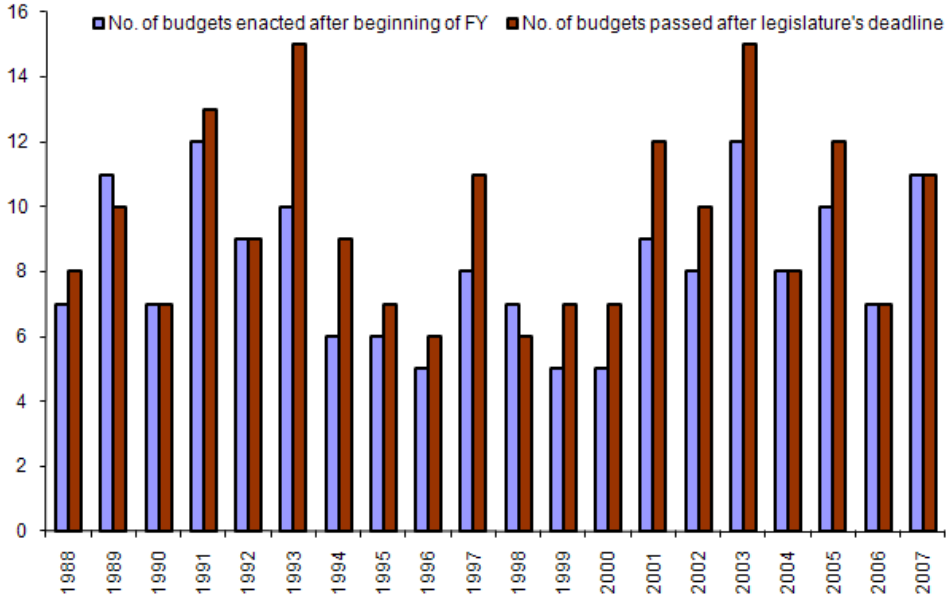

Figure 3: No. of budgets enacted after beginning of fiscal year relative to total no. of enacted budgets, 1988-2007

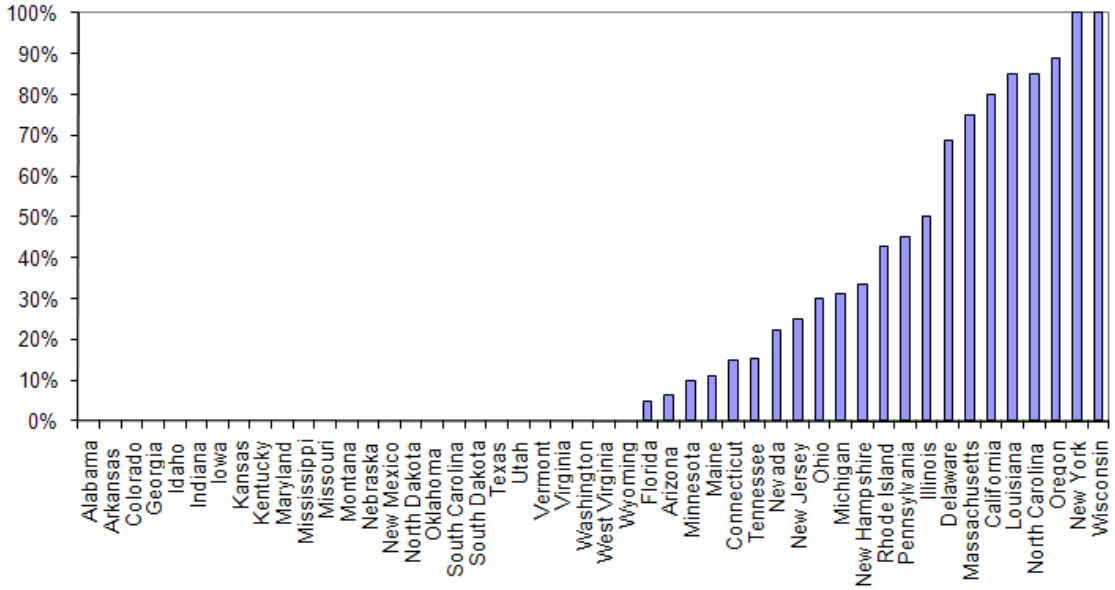

Figure 4: No. of budgets passed after legislature's deadline relative to total no. of enacted budgets 1988-2007

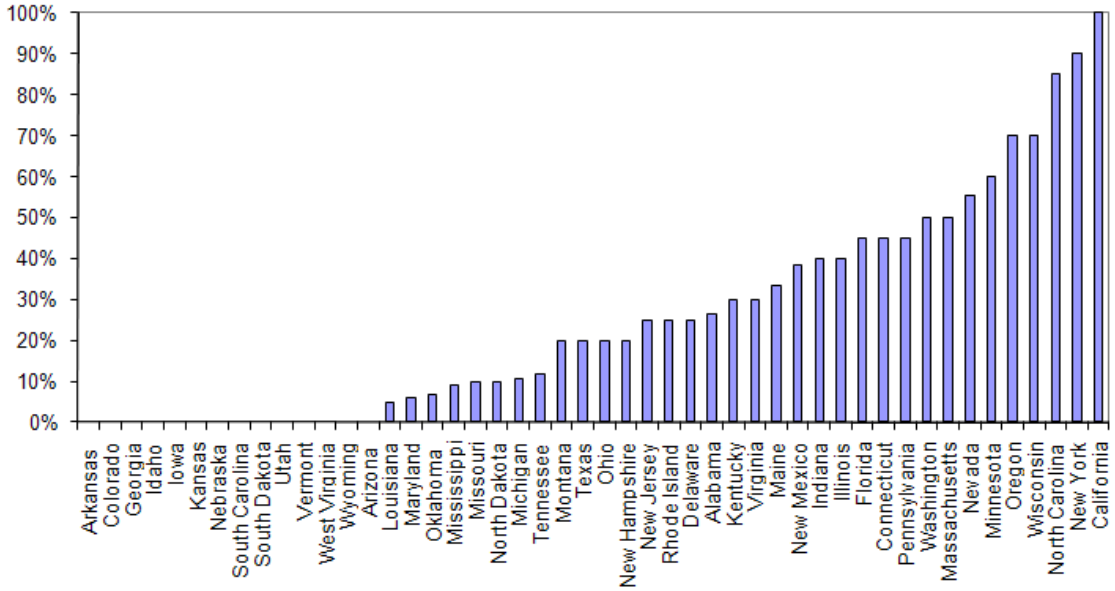

Table 1. Summary statistics[(1)]

Variable	Obs[(2)]	Mean	Std. Dev.	Min	Max
late_budget	736	0.23	0.42	0	1
days_late	734	-29.86	49.99	-172	176
days_late_cens	734	6.92	21.45	0	176
delayed_budget	720	0.26	0.44	0	1
days_delayed	720	-9.97	43.19	-115	175
days_delayed_cens	720	9.63	24.18	0	175
delayed_budget_FY	720	0.17	0.37	0	1
days_delayed_FY	720	-42.60	52.07	-178	175
days_delayed_cens_FY	720	5.26	19.14	0	175

Notes:

(1) The total number of observations may vary betwen the different forms of the dependent variable. This is due to a few cases where we know that the budget was signed into law after the beginning of the new fiscal year, but where we do not know the exact date on which this happened.

(2) The total number of enacted budgets in the period 1988 to 2007 is 808.

Table 2. Binary response models, 1988-2007

	Budget signed into law after end of fiscal year						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$Unempl\_change_{i,t}$	0.117	0.335*					
	(0.090)	(0.181)					
$Unempl\_increase_{i,t}$			0.560***	0.963***	0.494**	0.487**	0.901**
			(0.140)	(0.323)	(0.218)	(0.220)	(0.403)
$Unempl\_drop_{i,t}$			0.446**	0.558	0.334**	0.333**	0.770
			(0.187)	(0.430)	(0.162)	(0.163)	(0.519)
$Divided\_gov_{i,t}$	0.656***	0.957***	0.685***	1.026***	0.635***	0.616***	0.846**
	(0.184)	(0.332)	(0.178)	(0.334)	(0.188)	(0.190)	(0.369)
$Elex_{i,t}$					-0.121	-0.116	0.031
					(0.178)	(0.177)	(0.397)
$Population_{i,t}$					0.011		-0.339
					(0.029)		(0.327)
$Full\_time\_legislature_{i}$					0.130	0.175*	
					(0.170)	(0.092)	
$Shut\_down_{i}$					-1.185***	-1.174***	
					(0.287)	(0.299)	
$Census\_response\_rate_{i}$					-0.079**	-0.081**	
					(0.036)	(0.036)	
$Deadline\_soft_{i}$					-2.829***	-2.768***	
					(0.678)	(0.628)	
$Deadline\_hard_{i,t}$					-1.756***	-1.755***	
					(0.285)	(0.291)	
Estimator	Pooled probit	FE logit	Pooled probit	FE logit	Pooled probit	Pooled probit	FE logit
Time dummies	No	No	No	No	5-Year	5-Year	5-Year
Control variables	No	No	No	No	Yes	Yes	Yes
P[y=1|div. gov.] - P[y=1|uni. gov.] [5], [8]	18.6%	Na	14.8%	Na	24.5%	23.9%	Na
Marginal effect of ΔUNR > 0 [6], [8]	2.4%	Na	7.8%	Na	19.6%	19.3%	Na
Marginal effect of ΔUNR < 0 [7], [8]	-2.4%	Na	6.2%	Na	13.2%	13.1%	Na
Observations	732	320	732	320	732	732	320

Notes:

(1) Std. errors in parantheses. Cluster std. errors are used in the pooled probit estimations

*(2) ***,**,* denote significance on the 1%,5% and 10% levels, respectively.*

(3) A constant is included in all estimations.

(4) Also included in columns (5), (6) and (7) are: endbalance, kids and aged as well as dem_gov, term_limited, new_gov and gov_experience. Columns (5) and (6) also includes the following time-invariant variables: No_carry, supermajority, proportion_black and proportion_college.

(5) Reports the increase in the probability of a late budget when there is divided government instead of unified government

(6) Reports the impact on the probability of a late budget of a marginal increase in the state unemployment rate

(7) Reports the impact on the probability of a late budget of a marginal drop in the state unemployment rate

(8) All marginal effects on P[y=1] are evaluated at a unified government and a zero change in the unemployment rate. The additional controls in columns (5), (6) and (7) are evaluated at their averages except for the dummies for election, democratic gov., lame duck, new governor, No_carry, super majority rule, shut down provision and deadlines, which are set to zero.

Table 3. Linear regression models, 1988-2007

	No. of days from end of fiscal year to signed into law				
	(1)	(2)	(3)	(4)	(5)
Unempl _change$_{i,t}$	5.152***				
	(1.695)				
Unempl _increase$_{i,t}$		6.932***	10.818***	10.629***	8.763***
		(2.454)	(3.244)	(3.247)	(2.544)
Unempl _drop$_{i,t}$		-2.898	-1.606	-2.41	-0.264
		(3.575)	(3.856)	(3.812)	(3.251)
Divided _gov$_{i,t}$	12.791***	12.857***	24.452***	22.594***	13.511***
	(3.347)	(3.331)	(4.099)	(4.014)	(3.600)
Elex$_{i,t}$			-13.050***	-12.807***	-8.532***
			(3.126)	(3.166)	(2.726)
New _gov$_{i,t}$			8.444**	7.757*	5.157
			(4.016)	(4.040)	(3.779)
Population$_{i,t}$			1.292*		0.826
			(0.749)		(1.515)
Full _time _legislature$_i$			0.485	4.713*	
			(4.047)	(2.711)	
Shut _down$_i$			-18.650**	-17.798**	
			(7.638)	(7.879)	
Census _response _rate$_i$			-1.079	-1.247	
			(0.908)	(0.897)	
Deadline _soft$_i$			-39.090***	-35.899***	
			(12.884)	(13.357)	
Deadline _hard$_{i,t}$			-44.441***	-43.819***	
			(9.173)	(9.614)	
Estimator	FE	FE	OLS	OLS	FE
Time dummies	No	No	5-Year	5-Year	5-Year
Control variables	No	No	Yes	Yes	Yes
Observations	730	730	730	730	730

Notes:

(1) Robust std. errors in parantheses. Cluster std. errors are used in the OLS estimations

*(2) ***,**,* denote significance on the 1%,5% and 10% levels, respectively.*

(3) A constant is included in all estimations.

(4) Also included in columns (3), (4) and (5) are: endbalance, kids and aged as well as dem_gov, term_limited and gov_experience. Columns (3) and (4) also includes the following time-invariant variables: No_carry, supermajority, proportion_black and proportion_college.

Table 4. Censored outcomes, 1988-2007

	Censored no. of days from end of fiscal year to signed into law		
	(1)	(2)	(3)
$Unempl\_increase_{i,t}$	13.446**	13.472**	10.629
	(5.703)	(5.706)	(7.404)
$Unempl\_drop_{i,t}$	-3.232	-3.255	-24.578
	(6.563)	(6.565)	(22.818)
$Divided\_Gov_{i,t}$	18.654***	18.415***	23.922
	(6.028)	(5.986)	(19.068)
$Elex_{i,t}$	-9.276	-9.21	-19.943**
	(6.083)	(6.084)	(7.956)
$Population_{i,t}$	0.348		-2.831
	(1.139)		(3.396)
$Full\_time\_legislature_i$	7.671	9.119*	
	(6.831)	(5.006)	
$Shut\_down_i$	-42.661***	-42.630***	
	(13.101)	(13.217)	
$Census\_response\_rate_i$	-2.405*	-2.506**	
	(1.266)	(1.236)	
$Deadline\_soft_i$	-83.084***	-81.843***	
	(21.197)	(20.810)	
$Deadline\_hard_{i,t}$	-51.559***	-51.456***	
	(11.236)	(11.283)	
Estimator	Tobit	Tobit	Panel Tobit
Time dummies	5-year	5-year	5-year
Controls variables	Yes	Yes	Yes
Observations	730	730	730

Notes:

(1) Std. errors in paranthesis.

*(2) ***,**,* denote significance on the 1%,5% and 10% levels, respectively.*

(3) A constant is included in all estimations.

(4) Also included are: endbalance, kids and aged as well as dem_gov, term_limited, new_gov and gov_experience. Columns (1) and (2) also includes the following time-invariant variables: No_carry, supermajority, proportion_black and proportion_college.

Table 5. Economic Fluctuations and Fiscal Rules, 1988-2007

	Budget signed into law after end of fiscal year		No. of days from end of fiscal year to signed into law				
	(1)	(2)	(3)	(4)	(5)	(6)[4]	(7)[5]
$Unempl\_increase_{i,t}$	0.788	1.422*	8.786**	11.312**	11.108	10.612	10.828
	(0.596)	(0.735)	(3.896)	(5.258)	(10.004)	(9.729)	(9.808)
$Unempl\_drop_{i,t}$	1.002	0.451	-4.845	13.336**	17.631**	17.664**	18.462**
	(0.698)	(0.961)	(6.258)	(6.480)	(7.309)	(6.985)	(6.891)
$Divided\_gov_{i,t}$	0.926*	0.891	13.425***	13.642***	13.652***	13.542***	13.815***
	(0.488)	(0.722)	(3.634)	(3.616)	(3.530)	(3.524)	(3.538)
$Unempl\_increase_{i,t} \times no\_carry_i$			-0.064				
			(4.689)				
$Unempl\_drop_{i,t} \times no\_carry_i$			9.174				
			(7.405)				
$Unempl\_increase_{i,t} \times line\_item\_veto_i$				-3.021			
				(5.626)			
$Unempl\_increase_{i,t} \times line\_item\_veto_i$				-15.356**			
				(7.540)			
$Stab\_fund_{i,t}$					7.778	8.089	7.964
					(8.395)	(7.940)	(7.914)
$Unempl\_increase_{i,t} \times stab\_fund_{i,t}$					-3.071		
					(11.068)		
$Unempl\_drop_{i,t} \times stab\_fund_{i,t}$					-21.491**		
					(9.070)		
$Unempl\_increase_{i,t} \times J\_rule1$						-4.314	0.615
						(10.811)	(11.771)
$Unempl\_increase_{i,t} \times J\_rule2$						0.061	-9.115
						(11.359)	(10.508)
$Unempl\_increase_{i,t} \times J\_rule3$						-4.039	-0.286
						(11.424)	(14.419)
$Unempl\_increase_{i,t} \times J\_rule4$						-9.588	0.794
						(12.631)	(10.476)
$Unempl\_drop_{i,t} \times J\_rule1$						-12.412	-17.061*
						(7.890)	(9.143)
$Unempl\_drop_{i,t} \times J\_rule2$						-22.599**	-22.426**
						(10.020)	(9.056)
$Unempl\_drop_{i,t} \times J\_rule3$						-11.182	-40.662***
						(9.578)	(11.412)
$Unempl\_drop_{i,t} \times J\_rule4$						-34.356**	-32.203
						(14.706)	(21.866)
Estimator	FE logit	FE logit	FE	FE	FE	FE	FE
Time dummies	5-year	5-year	5-year	5-year	5-year	5-year	5-year
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sample	Carry-over states	No carry-over states	Full	Full	Full	Full	Full
Observations	173	147	730	730	730	730	730
Number of States	11	9	48	48	48	48	48

Notes:

(1) Std. errors in paranthesis. Robust std. errors are used in columns (3) - (7)

*(2) ***,**,* denote significance on the 1%,5% and 10% level, respectively.*

(3) Same control variables included as in standard fixed effect specification

(4) J=Deposit

(5) J=Withdraw

Table 6. Alternative indicators of fiscal conditions and divided government, 1988-2007

	Late_budget	Days_late	Days_late_cens		Late_budget	Days_late	Days_late_cens	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Rev_shock_neg$_{i,t}$	0.180***	0.616	1.306*	0.956				
	(0.058)	(0.375)	(0.672)	(0.865)				
Rev_shock_pos$_{i,t}$	0.053*	-0.078	0.471	0.452				
	(0.030)	(0.134)	(0.381)	(0.489)				
Unemp_increase$_{i,t}$					0.887**	8.523***	12.614**	9.931
					(0.398)	(2.655)	(5.683)	(6.998)
Unemp_drop$_{i,t}$					0.783	-0.421	-4.116	-25.469
					(0.526)	(3.180)	(6.565)	(23.044)
Divided_gov$_{i,t}$	0.783**	13.529***	18.535***	23.946				
	(0.377)	(3.579)	(6.110)	(20.255)				
Split_branch$_{i,t}$					0.66	12.190***	11.891*	12.133
					(0.428)	(4.253)	(6.945)	(21.413)
Split_legislature$_{i,t}$					1.204***	14.251***	22.923***	27.864*
					(0.448)	(3.797)	(6.987)	(15.455)
Estimator	FE logit	FE	Tobit	Panel Tobit	FE logit	FE	Tobit	Panel Tobit
Time dummies	5-year	5-year	5-year	5-year	5-year	5-year	5-year	5-year
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	319	727	727	727	320	730	730	730

Notes:

(1) Std. errors in parantheses. Robust Std. errors in column (2) and (6)

*(2) ***,**,* denote significance on the 1%,5% and 10% levels, respectively.*

(3) A constant is included in all estimations.

(4) Same control variables as in standard specification included in all columns.

Table A1. Late budgets data by state

	Information on late budget available for [1]	Responded to survey	Number of late budgets observed
Alabama	1989, 1991-2007	No	0
Alaska	-	-	-
Arizona	*1988-90* , **1991-2007**	Yes	1
Arkansas	1988-2007	No	0
California	**1988-2007**	Yes	16
Colorado	1988-89, 1991, 1993-2007	No	0
Connecticut	**1988-2007**	Yes	3
Delaware	1992-2007	No	11
Florida	**1988-2007**	Yes	1
Georgia	**1988-92**, *1993* , **1994-2007**	Yes	0
Hawaii	-	-	-
Idaho	*1988-97* , **1998-2007**	Yes	0
Illinois	**1988-2007**	Yes	10
Indiana	1988-2007	No	0
Iowa	1992-2007	No	0
Kansas	1989-91, 1993, 1997-2007	No	0
Kentucky	1988-2007	No	0
Louisiana	1988-2007	No	17
Maine	**1991-2007**	Yes	1
Maryland	1991-2007	No	0
Massachusetts	**1988-2007**	Yes	15
Michigan	1988-98, 1991, 1995-2007	No	5
Minnesota	1988-2007	No	1
Mississippi	**1997-2007**	Yes	0
Missouri	1988-2007	No	0
Montana	1999-2007	No	0
Nebraska	1997-2007	No	0
Nevada	1991-2007	No	2
New Hampshire	1991-2007	No	3
New Jersey	1988-2007	No	5
New Mexico	*1988-94* , **1995-2007**	Yes	0
New York	1988-2007	No	20
North Carolina	1988-2007	No	17
North Dakota	**1988-2007**	Yes	0
Ohio	1988-2007	No	3
Oklahoma	1993-2007	No	0
Oregon	1988-90, 1992-2007	No	8
Pennsylvania	**1988-2007**	Yes	9
Rhode Island	*1988-2000* , **2001-2007**	Yes	7
South Carolina	**1988-2007**	Yes	0
South Dakota	1996-2007	No	0
Tennessee	1995-2007	No	0
Texas	1988-2007	No	0
Utah	1989-2007	No	0
Vermont	1988-2007	No	0
Virginia	**1988-2007**	Yes	0
Washington	**1988-2007**	Yes	0
West Virginia	*1988-92* , **1993-2007**	Yes	0
Wisconsin	**1988-2007**	Yes	10
Wyoming	1998-2007	No	0

[1] *Normal font indicates that authors' own data collection is the only source of information. Italics indicate that the survey sent to state budget offices is the only source of information. Bold indicates that information is available from both sources.*

Table A2. Variable definitions and sources

Variable	Description	Source
days_late $_{i,t}$	Number of days from end of fiscal year to budget signed into law	Own data collection, survey sent to state budget offices
days_delayed $_{i,t}$	Number of days from legislative deadline to legislative budget passage	Own data collection, survey sent to state budget offices
days_delayed_FY $_{i,t}$	Number of days from end of fiscal year to legislative budget passage	Own data collection, survey sent to state budget offices
late_budget $_{i,t}$	Dummy variable equal to 1 if budget was signed into law after end of fiscal year	Own data collection, survey sent to state budget offices
delayed_budget $_{i,t}$	Dummy variable equal to 1 if budget was passed by legislature after legislative deadline	Own data collection, survey sent to state budget offices
delayed_FY_budget $_{i,t}$	Dummy variable equal to 1 if budget was passed by legislature after end of fiscal year	Own data collection, survey sent to state budget offices
days_late_cens $_{i,t}$	= *days_late* $_{i,t}$ if *days_late* $_{i,t}$ > 0, otherwise zero	Own data collection, survey sent to state budget offices
days_delayed_cens $_{i,t}$	= *days_delayed* $_{i,t}$ if *days_delayed* $_{i,t}$ > 0, otherwise zero	Own data collection, survey sent to state budget offices
days_delayed_FY_cens $_{i,t}$	= *days_delayed_FY* $_{i,t}$ if *days_delayed_FY* $_{i,t}$ > 0, otherwise zero	Own data collection, survey sent to state budget offices
Unempl_change $_{i,t}$	Change in unemployment rate since previous year	Bureau of Labor Statistics
Unempl_increase $_{i,t}$	= *Unempl_change* $_{i,t}$ if *Unempl_change* $_{i,t}$ > 0, otherwise zero	Bureau of Labor Statistics
Unempl_fall $_{i,t}$	= -1 x *Unempl_change* $_{i,t}$ if *Unempl_change* $_{i,t}$ < 0, otherwise zero	Bureau of Labor Statistics
Divided_gov $_{i,t}$	Dummy variable equal to 1 if either *i)* both legislative chambers controlled by other party than governor's, or *ii)* two chambers controlled by different parties	Klarner (????) [Vi mangler en ordentlig reference]
Elex $_{i,t}$	Dummy variable equal to 1 in years with a gubernatorial election	????
Population $_{i,t}$	State population (in millions of people)	U.S. Census Bureau
Full_time_legislature $_{i}$	1 to 5 scale for full- vs. part-time legislatures, where 1 corresponds to a part-time "citizen" legislature, and 5 corresponds to a full-time professional legislature	National Conference of State Legislatures
Shut_down $_{i}$	Dummy variable equal to 1 if the state law dictates a shutdown of state government activities in the event of a late budget	National Conference of State Legislatures
Census_response_rate $_{i}$	Response rate in the 1990 U.S. Census	U.S. Census Bureau
Deadline_soft $_{i}$	Dummy variable equal to 1 if 1) the legislature is mandated by constitution or statute to end its regular session at a date prior to the end of the fiscal year, and 2) the deadline is *either* not clearly specified in calendar terms *or* the legislature has leeway to extend it.	State legislatures' websites

Table A2. Variable definitions and sources (continued)

Deadline_hard $_i$	Dummy variable equal to 1 if 1) the legislature is mandated by constitution or statute to end its regular session at a date prior to the end of the fiscal year, and 2) the deadline is clearly specified in calendar terms *and* the legislature has no leeway to extend it.	State legislatures' websites
Endbalance $_{i,t}$	End-of-year balances in the general fund and stabilization fund, as projected in executive budget proposal. Measured in percent of proposed general fund expenditure	National Association of State Budget Officers: *The Fiscal Survey of States* , various editions
Kids $_{i,t}$	Percentage of population aged 5 to 17	U.S. Census Bureau
Aged $_{i,t}$	Percentage of population aged 65 or older	U.S. Census Bureau
Dem_gov $_{i,t}$	Dummy variable equal to 1 if the governor is a Democrat	Klarner (????) [Vi mangler en ordentlig reference]
Gov_experience $_{i,t}$	Number of years since the incumbent governor took office	Authors' own calculations based on information from the National Governors Association
New_gov $_{i,t}$	Dummy variable equal to 1 if the the current budget adoption process is the first to be led by the incumbent governor	Authors' own calculations based on information from the National Governors Association
Term_limited $_{i,t}$	Dummy variable equal to 1 if the governor is subject to a binding term limit	????
No_carry $_i$	Dummy variable equal to 1 if the state law does not allow a budget deficit to be carried over to the next fiscal year	Bohn and Inman (1996)
Line_item_veto $_i$	Dummy variable equal to 1 if the the governor has line item veto powers	Bohn and Inman (1996)
Supermajority $_i$	Dummy variable equal to 1 if a supermajority vote is required to pass each budget	National Conference of State Legislatures
Proportion_black $_i$	Average of the proportion of black people in the population in 1978 and the corresponding proportion in 1997	fra david datasæt davidsep23.dta
Proportion_college $_i$	Average of the proportion of college graduates in the population in 1990 and the corresponding proportion in 1999	fra et david datasæt om inequality and corruption
Rev_shock $_{i,t}$	Percentage deviation of actual general fund revenue from original projections, net of the effect of within-year tax changes	Data provided by Kim Rueben. See Poterba and Rueben (2001)
Rev_shock_neg $_{i,t}$	= -1 x *Rev_shock* $_{i,t}$ if *Rev_shock* $_{i,t} < 0$, otherwise zero	Poterba and Rueben (2001)
Rev_shock_neg $_{i,t}$	= *Rev_shock* $_{i,t}$ if *Rev_shock* $_{i,t} > 0$, otherwise zero	Poterba and Rueben (2001)
Split_branch $_{i,t}$	Dummy variable equal to 1 if both legislative chambers are controlled by another party than the governor's	Klarner (????) [Vi mangler en ordentlig reference]
Split_legislature $_{i,t}$	Dummy variable equal to 1 if the two legislative chambers are controlled by different parties	Klarner (????) [Vi mangler en ordentlig reference]
Stab_fund $_{i,t}$	Dummy variable equal to 1 if the state has a budget stabilization fund in year *t*	Wagner and Elder (2005), Fatás and Mihov (2006)
Deposit_rule1 $_{i,t}$	Dummy variable equal to 1 if deposits into stabilization fund are made by legislative appropriation	Wagner and Elder (2005), Fatás and Mihov (2006)

Table A2. Variable definitions and sources (continued)

Deposit_rule2 $_{i,t}$	Dummy variable equal to 1 if deposits into stabilization fund are required in the event of a budget surplus	Wagner and Elder (2005), Fatás and Mihov (2006)
Deposit_rule3 $_{i,t}$	Dummy variable equal to 1 if deposits into stabilization fund are required when revenue growth is positive	Wagner and Elder (2005), Fatás and Mihov (2006)
Deposit_rule4 $_{i,t}$	Dummy variable equal to 1 if deposits into stabilization fund follow a mathematical formula	Wagner and Elder (2005), Fatás and Mihov (2006)
Withdraw_rule1 $_{i,t}$	Dummy variable equal to 1 if withdrawals from stabilization fund are made by legislative appropriation	Wagner and Elder (2005), Fatás and Mihov (2006)
Withdraw_rule2 $_{i,t}$	Dummy variable equal to 1 if withdrawals from stabilization fund are allowed in the event of a budget deficit	Wagner and Elder (2005), Fatás and Mihov (2006)
Withdraw_rule3 $_{i,t}$	Dummy variable equal to 1 if withdrawals from stabilization fund require a supermajority legislative approval	Wagner and Elder (2005), Fatás and Mihov (2006)
Withdraw_rule4 $_{i,t}$	Dummy variable equal to 1 if withdrawals from stabilization fund follow a mathematical formula	Wagner and Elder (2005), Fatás and Mihov (2006)

Table A3. Alternative late budget definitions, 1988-2007

	delayed_ budget	days_delayed	days_delayed_cens		delayed_ budget_FY	days_delayed _FY	days_delayed_cens_FY	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Unempl _increase$_{i,t}$	0.612*	10.794***	16.454**	22.235***	0.453	10.255***	13.468*	9.557
	(0.338)	(2.528)	(6.563)	(7.102)	(0.398)	(2.597)	(7.212)	(10.698)
Unempl _drop$_{i,t}$	0.307	1.562	-1.009	-13.414	0.903**	0.941	0.299	-48.421**
	(0.396)	(2.642)	(8.419)	(13.034)	(0.450)	(3.446)	(8.806)	(22.390)
Divided _Gov$_{i,t}$	1.214***	13.471***	36.980***	43.227***	1.258***	14.379***	29.846***	58.990***
	(0.290)	(3.385)	(6.338)	(12.823)	(0.404)	(3.341)	(7.769)	(17.815)
Estimator	FE logit	FE	Tobit	Panel Tobit	FE logit	FE	Tobit	Panel Tobit
Time dummies	5-year	5-year	5-year	5-year	5-year	5-year	5-year	5-year
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	488	716	716	716	328	716	716	716

Notes:

(1) Std. errors in parantheses. Robust Std. errors in column (2) and (6)

*(2) ***,**,* denote significance on the 1%,5% and 10% levels, respectively.*

(3) A constant is included in all estimations.

(4) Same control variables as in standard specification included in all columns.

Chapter 4

Fiscal Governance and Electoral Accountability: Evidence from Late Budgets

Fiscal Governance and Electoral Accountability: Evidence from Late Budgets*

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Abstract

Do voters hold politicians accountable for bad governance? Using a unique panel data set on late budgets in US state governments, we investigate whether voters react to bad fiscal governance by penalizing political actors involved in the budgetary process at election day. We find that legislatures face significant negative electoral consequences of not finishing a budget on time, while governors are penalized only under unified governments. In general, electoral penalties are larger where clarity of responsibility, affected by divided government, supermajority requirements and seat share margins, is higher, consistent with models of retrospective voting.

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"Good government is [...] more than a forum for competing viewpoints or a sounding board for complaints; it actually gets things done." Robert D. Putnam, *Making Democracy Work*, p. 63.

"*It is everybody's fault - every single elected and appointed official in Indianapolis - and voters ought to consider kicking every one of them out just to drive the message home: The budget is the most important job you have. It is unbelievable that you let the regular session end without approving one. It is unconscionable that you are still bungling it in the special session and risking shutting the state down June 30."* Editorial, *The News-Sentinel*, Fort Wayne, IN, June 23, 1994.

"Why is our legislature so unbelievably incompetent? One of their biggest, and arguably most important, jobs is to pass a budget. They can't even do that. I am so utterly disappointed in my state. It makes me sick to my stomach." 'Danny' in comments on *New York Times'* website, May 4, 2010.

1 Introduction

Good governance has in the last twenty years emerged as a catchphrase for the principles for how well-functioning democratic governments should go about their business. Good governance is associated with a wealth of desirable outcomes, and a large literature has investigated its causes and correlates. One central component of good governance is good fiscal governance. Fiscal governance relates to the set of rules, institutions, policy processes and internal practices relating to the design and implementation of the government budget. If fiscal governance is well-functioning, what are the forces that make it so? If fiscal governance is imperfect, can voters improve on it?

The goal of this paper is to investigate empirically whether voters hold politicians accountable for bad governance outcomes. Our measure of governance is whether the government budget is completed in a timely fashion. Budget promptness is one of the original indicators of institutional performance suggested by Putnam (1993). We collect data on budget deadlines and actual budget completion dates for US state governments over a period of twenty years to construct measures of budget lateness.

Not having a budget completed on time has very visible consequences for citizens: First, while some states pass temporary budgets allowing state appropriations for a limited time, day-to-day government operations are in many cases in jeopardy. In extreme cases, the government may shut down all non-essential services or may not be able to meet its financial obligations, including payments to employees or state vendors and contractors. Second, the lack of a budget has consequences for downstream budgeting at every level from state agencies to school districts,

leading to delayed budget adoptions with resulting inefficiencies. Third, state government creditworthiness can suffer, leading to substantial interest rate premiums (Andersen, Lassen and Nielsen, 2010b).

We employ our measures of late budgets in an empirical investigation of whether actors in the budgetary process, including both the executive and the legislative branches of government, are held accountable for late budgets by voters. We carry out three sets of analyses: First, we estimate the impact of late budgets on the vote share of the incumbent governor's party in gubernatorial elections. Second, we estimate the effect on the share of lower-house seats won in state legislative elections by the party that held control of the lower house before the election. Both of these analyses focus on the role of late budgets in determining the relative electoral performances of political *parties* in different branches of state government. In our third and final set of analyses, we shift our focus to the level of individual lawmakers in state legislatures. Here we study how late budgets affect the probability that incumbent lower-house legislators are re-elected for another term. Throughout, we explore the extent to which voters assign responsibility conditional on clarity of responsiblity (Paldam, 1991; Powell and Whitten, 1993; Norpoth, 2001), which is affected by divided government, supermajority rules, and legislative majority status.

A large literature on retrospective voting and electoral accountability examines the extent to which voters hold politicians accountable for policy choices and outcomes; in our context of the US states, this literature includes studies of voter responses to public finance outcomes, e.g. Peltzman (1992) and Lowry, Alt and Ferree (1998), and broader state level economic outcomes, e.g. Besley and Case (1995, 2003). These studies generally explore accountability with respect to position issues such as government policies or policy outcomes over which citizens may hold very different views. In contrast, the quality of governance is a valence issue, as defined by Stokes (1963, p. 372), characterized by the preferences of "both parties and all voters [being] located at a single point - the position of virtue in government." Budget timeliness, we believe, clearly lives up to this characterization; late budgets benefit no-one, while hurting many, and are so unnecessarily counterproductive that avoiding them is in the interest of all voters, regardless of ideological preferences.

The literature on electoral accountability and governance, interpreted here as good government, is not large, owing, we believe, partly to the difficulties involved in operationalizing the concept of good governance for empirical analysis.[1] One branch of this literature considers voter response to scandals and charges of corruption, that is, illegal acts involving the abuse of public office, as one particular measure of governance. Peters and Welch (1980) show a sig-

[1] A large literature, including Knack (2002) examines the correlates of good governance, but this literature is less focused on how good governance comes about in practice. A different literature, surveyed by Besley (2005), looks at candidate quality.

nificant voter response in the case of congressional races, a finding confirmed in other contexts (e.g. Jacobson and Dimock, 1995, on scandals) and other countries (e.g. Ferraz and Finan (2008) on Brazil, and Chang et al. (2010) and Nannicini et al. (2010) on Italy). However, while corruption definitely is a major problem for government and governing, it is, if one sees governance as a continuous variable from good to bad governance, located at one extreme. In contrast, the vast majority of day-to-day governing in most advanced democracies takes place in environments characterized by good, inadequate and even bad levels of governance. But even the latter is still far away from corrupt practices.[2]

One study which is particularly related to the analysis presented in this paper is Binder's (2003) analysis of legislative gridlock at the level of the federal government in the US. She studies the effect of the number of legislative gridlocks, defined as the number of failed agenda issues to the number of total agenda issues for each Congress, on the electoral fortunes of House members, but finds no statistically significant evidence for a relationship in a sample of 22 congresses. She concludes that "[v]oters at election time hold neither the majority party nor incumbents individually accountable for the collective policy performance of Congress." Our results, based on our performance measure of timely budgets in state governments, are in stark contrast to this conclusion.

We find strong and substantial evidence that political actors who do not deliver a budget on time are punished at the polls. While governors are punished only when part of a unified government, legislatures are (almost) always punished. The estimated effects are large: Governors in unified governments lose 9% of the vote if every budget enacted during a gubernatorial term is late, while the majority party in the legislature loses 2-3% of its seat share in the lower house. Our empirical evidence also suggests that voters are sophisticated in their attribution of blame: Supermajority requirements to pass the budget make it less clear who is responsible for budget delays, and voter reactions are weaker when such requirements are present. Also, electoral consequences are larger the stronger is the hold on power for the majority party in the legislature, as measured by the seat share margin to the minority party. Furthermore, states with higher levels of social capital see voters reacting more strongly to legislative delays, a mechanisms consistent with the Putnam's (1993) hypothesis that jurisdictions with higher levels of social capital have better governance. Finally, the electoral punishment for late budgets is weaker when the economy is faltering than when it is booming, consistent with voters allowing legislators more leeway when their task is harder.

Results on reelection rates at the level of individual legislators are consistent with these

[2]Indeed, the occurence of legislative delays and late budgets considered below are not correlated with corruption convictions at the state level in the US: The number of convictions for corruption relative to population, taken from Alt and Lassen (2010) and averaged over the period considered here, is uncorrelated with the occurence of late budgets ($\rho = .00$), while it is in fact negatively correlated with the frequency of legislative delays ($\rho = -.19$).

findings, and provide further insights about the personal political costs of late budgets for state lawmakers: majority and minority members are punished equally under divided governments, but only majority members are punished under unified government, while minority members are shielded from voter anger in this situation.

The paper proceeds as follows: The next section defines and describes our measures of budget lateness. Section 3 lays out our theoretical priors on the impact of late budgets on state electoral outcomes, while section 4 describes our data and estimation methods. Results are presented in section 5. We conclude in section 6.

2 Late budgets: Definition and data

What constitutes a late budget? In practice, budget processes vary considerably across US states. This complicates cross-state comparisons of budget timeliness, as there is no obvious, universal definition of when a budget is late. The answer to when a budget is late obviously depends on two things, namely 1) the criteria for the budget process to be considered completed, and 2) the definition of the appropriate deadline by which this completion is supposed to be achieved. This is further complicated by the fact that the two main actors in the budget process, the legislature and the governor, in many cases face different deadlines, and it can often be argued that they complete their respective parts of the budget negotiations at different points in time.

We define a budget to be *late* if it is finally enacted, typically by the governor signing the budget, after the beginning of the new fiscal year.[3] For the case of the legislature, we define a *legislative delay* as a situation in which the budget receives final legislative approval after the state legislature's deadline for passing the budget. In some states, this deadline coincides with the end of the fiscal year. Other states have earlier deadlines for the state legislature to pass the budget, however. For example, many state legislatures are required by constitution or statute to end their regular session by a certain date, and such requirements effectively constitute a deadline for all legislative activity, including passage of the budget. In our analyses below, we use the ratio of late budgets or legislative delays to the actual number of budgets in the period

[3] There are a number of exceptions to this general definition: for example, if the governor vetoes the entire budget, the legislature can in most states override the veto by some super majority vote in both chambers, and the budget then becomes law without the governor's signature; alternatively, governors may in some states let the budget become law without signing it, simply by letting the deadline for gubernatorial vetoes run out.

Our measurement is further complicated by the fact that some states do not pass a single, all-encompassing budget bill. Instead, their budgets consist of several individual appropriation bills. In such cases we do not consider the budget fully enacted until the last appropriation bill for state operations has been enacted. Also, state governments sometimes react to unexpected developments in state government finances by passing within-fiscal year supplementary appropriation bills. We do not view such supplementary budget bills as part of the budget adoption process that we are interested in, however, and we therefore restrict our attention to the budgets as originally enacted. See Andersen et al. (2010a) for a thorough discussion of these and other related issues.

since the previous election for the institutional actor in question.

The data for the budget enactment dates were collected from three sources: (i) State legislatures' websites; (ii) Archived newspaper articles; and (iii) a survey sent to state budget officers. Some state legislatures' websites have detailed information on the status and histories of all bills enacted in previous legislative sessions, including the budget bill(s). However, most state legislatures' bill tracking tools only cover the most recent legislative sessions, if any. We therefore supplemented with information from archived newspaper articles accessed via Newslibrary.com.[4] Finally, we also sent a survey to state budget officers asking them to confirm the data we had collected ourselves as well as provide us with the information that we had not been able to find via any of the other sources. Out of the 48 mainland states, 19 responded to our survey. When overlapping, the data they reported were virtually identical to the data we collected ourselves.[5]

For the years 1988-2007 we have recorded 167 cases where the budget was signed into law after the beginning of the new fiscal year. This amounts to 23 percent of the budgets for which we have data. Correspondingly, 190 budgets (26%) received legislative passage after the legislature's state-specific deadline, while 119 (17%) were finally passed by the legislature after the beginning of the new fiscal year. Figures 1a and 1b show the distribution of legislative delays and late budgets, respectively, across states for the period that we have data.

<**Figures 1a and 1b about here.** [state means of legislative delays and late budgets over time, 48 states]>

A majority of states have at least once experienced that the state legislature did not meet its deadline for legislative passage of the budget, while 22 states have experienced a budget enacted after the beginning of the new fiscal year in the time period considered here. New York, North Carolina, California, Oregon and Wisconsin score high on both measures of budget lateness. The causes of such delays are analyzed in depths in Andersen et al. (2010a).

3 Fiscal governance and voter attribution of responsibility

Our basic hypothesis is that voters dislike bad (fiscal) governance, here exemplified by not having a budget in place before deadline. There are, however, good reasons to be sceptical of finding strong and unconditional voter responses to state budget delays: First, the large number

[4] Newslibrary.com is an online newspaper archive that covers more than 2,500 news sources across the United States. We also used The New York Times online archive on several occasions to access relevant news articles. In many cases, these newspaper accounts contained additional information helpful in handling uncertain cases. All articles used in constructing the data set is on file with the authors.

[5] The instructions for the survey are available from the authors upon request. Table A1 in Andersen et al. (2010a) gives details on the source of information on late budgets for each state.

of players involved in the budget process, ranging from the executive branch to majority as well as minority members in both chambers of the legislature, presumably makes it hard for voters to decipher who is to blame for a stalemate. Naturally, experienced politicians do what they can to exploit this lack of clarity of responsibility by blaming their opponents for all mishappenings. Second, dissatisfaction with a particular branch of government does not necessarily translate into voting behavior. In federal US politics, the so-called "Fenno paradox" (Fenno 1978) posits that constituents may disapprove strongly of Congress as a whole, which is a well-established empirical fact, and yet still support their own member. Binder (2003) finds that legislative gridlock in Congress lowers Congressional approval ratings but has no significant impact on actual election outcomes. She attributes this to the Fenno paradox. If a similar "paradox" applies to state legislatures, this will work against us finding an effect of state budget delays on state election outcomes.

The problem of lack of clarity of responsibility is likely to be much more pronounced if different branches of state government are controlled by different parties than if one party controls the executive branch as well as the legislative branch. Lowry, Alt and Ferree (1998) find that voters react more strongly to state fiscal policy outcomes under unified government than under divided government. We expect, noting that budget delays and late budgets are much more likely to occur under divided government in the first place (Andersen et al. 2010a), a similar pattern for voter responses to late state budgets. Furthermore, clarity of responsibility in the legislature is also likely to be greater when the majority party has a considerable margin in the number of seats held relative to the minority party; owing to comparatively limited party discipline in US political system, a simple majority does not always guarantee the ability to pass a budget due to the possibility of defections. On the other hand, supermajority requirements to pass the budget, present in a handful of states, gives power to the minority party and is therefore likely to dilute clarity of responsibility even under a unified government.

Finally, late budgets are more likely when the economy is weak. As shown by Andersen et al. (2010a), increasing unemployment is a strong predictor of both legislative delays and late budgets. To the extent that voters recognize or simply believe that reaching an agreement on the budget is harder when the economy is faltering, we would expect a weaker electoral response to delayed budgets when unemployment is increasing, while voters would react more strongly to budget delays when the economy is strong and the impasse can be attributed largely to political maneuverings.

As described above, governors and legislatures often operate under different deadlines; this is likely to have consequences for voter responses. In many states, legislatures have a deadline for passing the budget well before the new fiscal year, and we expect that voters focus on whether the legislature passes the budget relative to this deadline, as also exemplified by the editorial cited in the introduction. The governor's deadline, in contrast, is the beginning of the

new fiscal year; in general, governors, while typically formulating the initial budget proposal, have to wait for legislative passage in order to finally sign the budget into law, possibly after a process of (line-item) vetos or back-and-forth between the governor and the legislature. Thus, the relevant benchmark for the governor is whether the budget is late, relative to the beginning of the new fiscal year.

Finally, we also briefly investigate the role of social capital. Social capital is frequently attributed a role in assuring good governance (Putnam, 1993; Knack, 2002), and, indeed, Andersen et al. (2010a, table 2) show that higher levels of social capital are associated with a significantly reduced likelihood for observing late budgets. It is less clear how high(er) levels of social capital are actually transmitted into better governance outcomes. One such possible channel from social capital to governance goes through retrospective voting. For example, Ferejohn (1986) shows that retrospective voting in models of the electoral process based on the idea of political agency breaks down under group-specific transfers; what is needed for retrospective voting to function is some coordination or cooperation among voters on standards for electing politicians.[6] We hypothesize that higher levels of social capital imply a greater consideration for the public good and, as a consequence, an increased willingness to engage in aggregate retrospective voting despite the possiblity of group specific transfers. In turn, this willingness manifests itself in larger electoral penalties for bad governance.

4 Specification and data

We study state election outcomes in the 48 continental US states. Nebraska and Mississippi are omitted in the analyses of legislative elections, due to the unicameral, non-partisan legislature in the former and insufficient data on late budgets in the latter.[7] Our data set covers the years 1988-2007 for gubernatorial elections, 1988-2006 for legislative elections and 1988-2003 for individual legislator reelection outcomes, but lack of information on budget enactment dates implies that the available time series is considerably shorter for some states, making our data set an unbalanced panel. Since we always include the state's history of late budgets during at least the two years leading up to the election, the earliest elections included in our analyses are from 1989.

[6] In the parlance of the economic voting literature, sociotropic, rather than egotropic, voting is needed.

[7] We do have enough data for Mississippi to include it in the analysis of gubernatorial elections. This is because our sample in this case covers 2007, for which we have late budget information for all states. Since 2007 was an election year in Mississippi, this produces one more observation, which allows us to include Mississippi in the estimations.

4.1 Empirical models and dependent variables

Our generic specification models the electoral support for a party or individual that held control of a particular state government branch or office before the election. We shall generally refer to this party or individual as "the incumbent party" or simply "the incumbent." Thus, in the party-based analyses, the term "incumbent" refers to a party, and the identity of this party in a given state in a given year depends on which branch is being analyzed: In our analyses of gubernatorial elections, it refers to the incumbent governor's party. In the analyses of lower-house elections, it refers to the party that controlled the lower house in the legislature prior to the election, irrespective of whether this is also the party that the governor belongs to. Finally, in the analyses of individual state lawmakers' reelection prospects, the term "incumbent" always refers to the person running for re-election.

4.1.1 Gubernatorial elections

The dependent variable in the analyses of gubernatorial elections is the vote share of the incumbent party. The source is the Statistical Abstract of the United States, various years, supplemented with information from the US Election Atlas (www.uselectionatlas.org). We restrict our sample to elections in which the incumbent governor belongs to one of the two major parties. The regressions we estimate can be written as

$$vote\_share_{it} = \beta \cdot late_{it}^{G} + \boldsymbol{\lambda}'\mathbf{z}_{it}^{G} \cdot late_{it}^{G} + \boldsymbol{\delta}'\mathbf{x}_{it}^{G} + \eta_{i}^{G} + \gamma_{t}^{G} + \varepsilon_{it}^{G}$$

where $vote\_share_{it}$ is the incumbent party's share of the vote in the gubernatorial election in state i in year t, $late_{it}^{G}$ is some measure of the state's history of budget lateness since the previous gubernatorial election, $\mathbf{z}_{it}^{G}$ is a vector of contextual variables that may influence the marginal effect of budget delays on vote shares, and $\mathbf{x}_{it}^{G}$ is a vector of control variables. All right-hand-side variables, including the key variable $late_{it}^{G}$, are described below. The variables η_{i}^{G} and γ_{t}^{G} are state- and year fixed *incumbency* effects (as opposed to party-specific fixed effects); these are included to capture permanent differences in incumbency advantage across states and nation-wide shocks to incumbent popularity, respectively. The former could be driven by for example differences in term length, organization of primary elections, size and structure of the legislature, or media coverage of state politics, while the latter could reflect events on the national scene that change voters' attitudes towards incumbents at large, such as political scandals, national crises etc.

We estimate the model using standard panel data fixed effects methods. Standard errors are robust to heteroskedasticity and within-state serial correlation in the error term.

4.1.2 Legislative seat shares

In the analysis of party seat shares in lower-house legislative elections, we use the seat share *after* the election for the incumbent party, i.e. the party that held a majority in the lower house *before* the election. Party seat shares are computed from Klarner's (2007) data set on partisan balances in state legislatures. This data set contains information on the number of Democrats, Republicans, non-major party legislators, vacancies, and total number of seats in state legislatures in each year between 1959 and 2007. Our approach has a small drawback in that it relies on seat shares from the legislative session in the year following the election, rather than on actual election results. If shifts in partisan balances occur between the time of the election and the subsequent legislative session, due to for example legislators switching from one party to another or being replaced with opposite-party candidates, this will lead to measurement error in our computed seat shares. However, such shifts are infrequent.

We model the seat share obtained by the incumbent party in state i in a year t legislative election as follows:

$$seat\_share_{it} = \beta \cdot late_{it}^{L} \; + \boldsymbol{\lambda}' \mathbf{z}_{it}^{L} \cdot late_{it}^{L} + \boldsymbol{\delta}' \mathbf{x}_{it}^{L} + \eta_i^{L} + \gamma_t^{L} + \varepsilon_{it}^{L}$$

The superscripts L on the right-hand side variables reflect that these variables are adapted to legislative elections, rather than gubernatorial elections. For example, $late_{it}^{L}$ measures the state's history of budget lateness since the previous *legislative* election.

As explained below, the vector of control variables $\mathbf{x}_{it}^{L}$ always includes the incumbent party's vote share in a same-year gubernatorial election. This is an endogenous variable if the error term in the seat share equation is correlated with the error term in the equation for the concurrent gubernatorial election. To deal with this problem we instrument the gubernatorial election vote share with a dummy variable for whether the incumbent governor runs for re-election. The equation for party seat shares is then estimated by the fixed effects 2SLS estimator.

4.1.3 Individual legislator re-election

For the analysis of individual state representatives' re-election prospects, we use the ICPSR data set on state legislative returns (Carsey et al., 2008). This data set contains information on 259,000 candidates who ran for state legislative office from 1967 through 2003. Unfortunately, no information is available for more recent years, which limits the size of our sample. In each lower-house election year between 1990 and 2003 in each state, we identify all individuals in the data set that won a seat in the lower house of the state legislature. We then track the electoral fates of these incumbents in the next lower-house election to determine whether they ran for re-election, and if so, whether they succeeded. In each case, the information in the data set also allows us to determine whether the incumbent was facing a binding term limit, and

whether the incumbent ran for the state senate instead of the lower house. For each eligible incumbent in each year, we then code our binary dependent variable as 1 if the incumbent was re-elected, and zero otherwise. "Eligible" here means those incumbents that were neither term limited, nor running for the state senate.[8] This produces a sample size of roughly 22,800 observations.

Given the binary nature of the dependent variable, we employ the following probit model:

$$\Pr(reelection_{jit} = 1 | late^L_{it}, \mathbf{z}^L_{it}, \mathbf{x}^L_{it}, \mathbf{w}_{jit}, \eta^I_i, \gamma^I_t) = \Phi(\beta \cdot late^L_{it} + \boldsymbol{\lambda}' \mathbf{z}^L_{jit} \cdot late^L_{it} + \boldsymbol{\delta}' \mathbf{x}^L_{it} + \boldsymbol{\sigma}' \mathbf{w}_{jit} + \eta^I_i + \gamma^I_t)$$

where Φ denotes the standard normal cumulative distribution function. The subscript j denotes the identity of an individual incumbent legislator, while the usual subscripts i and t denote state and year, respectively. In addition to the state-level control variables included in the analyses of legislative seat shares, we now also include some incumbent-specific characteristics in the vector $\mathbf{w}_{jit}$. Note also that the vector of interaction variables, $\mathbf{z}_{jit}$, now contains state-level variables as well as incumbent-specific variables (hence the subscript j).

As in the analyses of legislative seat shares, the vector $\mathbf{x}^L_{it}$ includes the vote share obtained by the individual incumbent's party in concurrent gubernatorial elections. We therefore estimate the model by conditional maximum likelihood IV-probit, where the vote share in concurrent gubernatorial elections is again instrumented with a dummy variable for whether the incumbent governor runs for re-election.

The presence of state fixed incumbency effects is handled by including a full set of state dummy variables. Note that this does not give rise to the usual incidental parameters problem associated with probit on panel data with a fixed effect for each individual. The reason is that an "individual" in our sample is an incumbent (subscript j), and not a state (subscript i). In terms of asymptotics, we think of the number of incumbents going to infinity, while keeping the number of states (and thereby the number of parameters to be estimated) fixed.

Allowing state level variables to affect individual level outcomes opens up the possibility that individual level error terms ε_{jit} are correlated within states, which can result in standard errors being underestimated. This suggests correcting for clustering at the state level. On the other hand, given that estimation by a probit model necessarily entails specific assumptions about the error structure that are inconsistent with the clustering correction, we carry out our

[8] Note that this approach treats elections in which the incumbent did not run (unless term limited or running for state senate) as incumbent defeats. The data set only contains entries for candidates that did actually run, and an incumbent not running for re-election will therefore be absent in the data set in what would have been the year of re-election. Unfortunately, the data set is for some states in some years plagued by missing observations. Therefore, the absence of a data entry for an incumbent does not necessarily imply that the incumbent did not run. To address this problem, we always check whether we can identify a winning candidate in the incumbent's district. If another winner is identified, we assume that the incumbent did in fact not run for re-election and treat the election outcome as an incumbent defeat. If not, we treat it as missing information and omit it from the analysis.

regressions without such corrections; in practice, however, our results are largely unaffected by correcting for clustering in various ways.

4.2 Explanatory variables

This subsection describes the explanatory variables used in the analyses and our motives for including them in the regressions below. More detailed descriptions of all variables, including their sources, can be found in the data appendix.

4.2.1 *Late budgets*

Our main explanatory variable of interest in the analyses of gubernatorial elections is the number of late budgets since the previous election. To allow comparisons between states with two-year electoral cycles and states with four-year electoral cycles, and between states with annual budget enactment and states with biennial budgeting, we normalize by the total number of budgets enacted since the previous election.[9] For legislative elections we also employ an alternative measure, namely the (normalized) number of legislative budget delays since the previous election, i.e. the number of times that the legislature exceeded its deadline for passage of the budget, as described in section 2. This is arguably a more accurate indicator of the level of gridlock in the legislature.

For both gubernatorial and legislative elections, we only include those years in which the current incumbent party was in control. For example, if the majority in a legislative chamber shifts from one party to the other in the middle of an electoral term, due to for instance a legislator switching party, the relevant period over which we calculate the average number of late budgets (or legislative delays) is from the time of the shift in partisan balance until the next election. The reason for this is that voters are less likely to hold the current incumbent party accountable for budget delays that occurred while another party was in charge.

4.2.2 *Interaction terms*

We condition the effect of late budgets on a range of covariates by including interaction terms between these covariates and our late budget variable. First, we allow different slopes for unified vs. divided governments in the equations for both gubernatorial and legislative elections. A unified government is here defined as a situation in which the same party controls the executive branch as well as both chambers in the legislature. Divided government is defined as any other combination of partisan control. We also allow for a level effect of divided government

[9] We have also experimented with alternative time horizons. One approach is to use a dummy for whether the most recently enacted budget was late. Another is to use number of late budgets over the two most recent years only. The latter coincides with our preferred measure when elections take place every other year. In general, the results do not hinge on the exact choice of time horizon.

by including its dummy variable directly with no interaction. Second, we examine whether supermajority requirements to pass the budget dilute the clarity of responsibility obtained under unified government. We do this by further refining the model, allowing separate slopes on the late budget variable for unified governments with no supermajority requirements, unified governments with supermajority requirements, and divided governments.

Third, in the analyses of legislative elections we interact our late budget variable with the incumbent party's margin to the minority party, defined as the difference in seat shares between the two parties. Fourth, we interact late budgets with the 12-months change in the state unemployment rate. Fifth, we allow the impact of late budgets to depend on the level of social capital, measured by the census response rate. As argued by Knack (2002), census response is a public good at the state level, as census counts affect federal funding and the size of congressional delegations. Since an individual's possibility of affecting such outcomes is small, "census response is [...] a reasonable proxy for socially cooperative attitudes." The minimum value in our sample is attained by South Carolina (58 percent), while maximum values of 75 and 76 percent are found in Minnesota, Wisconsin and Iowa.

Finally, in the analyses on individual legislators' re-election prospects we allow budget delays to have different effects for members of the majority party in the legislature versus members of the minority party. To conserve degrees of freedom we generally do not include all of these interaction terms at once. Instead we take a step-by-step approach and include them one by one in separate regressions.

4.2.3 *State economic outcomes and fiscal policy*

To capture state economic conditions we include the change in the state unemployment rate from October in the year prior to the election to October in the year of the election. We also control for the real growth in housing prices since the year before the election. As noted by Wolfers (2002), housing prices is a potentially important control variable, because it captures a forward-looking, market-based evaluation of a broad array of state characteristics that are influenced by government policies, such as infrastructure, job opportunities and public safety.[10]

To control for changes in the size of government we include the change in the ratio of state government expenditures to GDP since the previous election. Tax increases enacted since the previous election, measured in percent of total general fund revenue, are also included. Finally, to control for fiscal balance we include the state government budget surplus in the year of the election. The surplus is calculated as the difference between general revenue and general

[10] We also experimented with including other state economic indicators, such as the average yearly state inflation rate and the average yearly growth rate of real state GDP per capita, both since the year of the previous election. The estimated coefficients were statistically insignificant, however, so we omit them in the results reported here.

expenditure and measured in percent of state GDP. Negative values of the surplus variable correspond to a state government budget deficit.

4.2.4 *Incumbency advantage and persistence in voting*

It is well known that incumbent candidates in US elections enjoy considerable advantages over their challengers (see, e.g., Ansolabehere and Snyder, 2003 for a recent review). Further, voting behavior may display a substantial amount of persistence even when the incumbent politician (the person, not the party) does not run for re-election; that is, voters may stick with the party they voted for in the previous election simply out of habit. To capture such effects, we include the election result in the previous election for the current incumbent party or individual. That is, for gubernatorial elections we include the vote share of the incumbent governor's party in the previous gubernatorial election. We also include a dummy variable that takes the value one if the incumbent governor ran for re-election, and zero otherwise. In the analyses of party seat shares in lower-house legislative elections, we include the seat share won in the previous lower-house election by the party that held a majority immediately prior to the current election. Finally, in the analyses of individual legislators' reelection prospects we include the current incumbent's share of the district vote in the previous election.[11]

4.2.5 *Coattails and national events*

Previous studies have found state election outcomes to be affected by concurrent elections for higher office (Chubb 1988; Alt, Lowry and Ferree 1998). To address this issue we always include the share of the major party vote in the state captured by the presidential candidate who belongs to the same party as the incumbent party/individual. In our models of legislative elections we also include the vote share of the incumbent party in the same-year gubernatorial election. In years with no gubernatorial election we replace this variable with zeros. A dummy variable for gubernatorial election year is then included to avoid problems of shifting the intercept in such years.[12] The inclusion of gubernatorial election vote shares raises issues of endogeneity and necessitates estimation with instrumental variables, as explained above.

Of course, voters' partisan attitudes in state elections may also be affected by events on the national scene in non-election years. To proxy for national shifts in partisan sentiments we construct a job approval rating index for the president at the time of the state election. The index is constructed as the percentage of respondents in nation-wide Gallup polls who

[11] Note that this is in none of the cases equivalent to including a lagged dependent variable. In the analyses of vote/seat shares, the variables included coincide with the lagged dependent variables if the party currently in control was also in control before the previous election, but this is of course not always the case.

[12] Similarly, we replace the presidential vote shares with zeros in years with no presidential election. The fact that we also include a full set of time dummies renders the inclusion of a time dummy for presidential election year superfluous.

approve of the president's performance, minus the percentage that disapproves. We interact this variable with a dummy variable that takes the value one if the president belongs to the incumbent party, and minus one otherwise. The latter variable is also included directly with no other interactions. We also control for nation-wide shocks to incumbency advantage by including a full set of year dummies, as represented by the γ_t's in the equations above.

4.2.6 *Individual legislator characteristics*

In the probit analyses of individual legislators' reelection prospects, we include the following individual characteristics (represented in the vector $\mathbf{w}_{jit}$ above): whether the incumbent belongs to the majority party in the legislature, the number of times the incumbent has previously run for office, as well as the square of the latter.

5 Results

5.1 Gubernatorial elections

Results for gubernatorial elections are reported in Table 1, where each column shows results for the effect of late budgets conditioned on different (sets of) covariates. Control variables are the same across all columns, as are the estimated effects of the controls, which we briefly review before turning to the results on late budgets.

The macroeconomic control variables do not have much explanatory power. The coefficient on the change in the unemployment rate has the expected negative sign, whereas the coefficient on real growth in housing prices is surprisingly also negative. Both coefficients are small and statistically insignificant, however. The results for the fiscal policy variables are stronger. A tax increase of 1 percent of general fund revenue lowers the governor's party's vote share by 0.25 percentage points. Voters also strongly punish governors for budget deficits but reward them for surpluses: A 1 percentage point increase in the surplus to GDP-ratio is rewarded with a 4-5 percentage points increase in vote share.[13] These results are statistically significant at the five percent level, or even lower. In contrast, we do not find any significant effect of increases in the size of government, as measured by the ratio of spending to GDP.

While the incumbent party's vote share in the previous election does not appear to have any independent effect on current vote shares, we do find a strong incumbency effect on vote shares: Incumbent governors seeking re-election can expect to score 8 percentage points higher than candidates who hope to replace a retiring governor from their own party. We find no direct effect of divided government on incumbent party vote shares.

[13] In results not reported, we allowed a different slope for positive and negative values of the surplus variable. The data did not reject the null hypothesis of equal coefficients on the deficit- and surplus variables.

National events play an important role in gubernatorial elections: Presidential coattails are substantial and statistically significant, with the incumbent party gaining between 0.4 and 0.5 percentage points for every 1 percentage point increase in the vote share of their presidential candidate. Incumbents from the president's party can generally expect to do worse than incumbents belonging to the national opposition party, but the difference is smaller when the president enjoys high approval ratings. When the president is extremely popular (percentage of people approving must be at least 30 points in excess of percentage of people disapproving), incumbents from the president's party may have an advantage.

We now turn to the variable of primary interest, the late budget variables. Column 1 presents an estimate of an unconditional effect of late budgets on the incumbent party's vote share. As we suspected, the data reveal no such unconditional effect: The estimated coefficient is virtually zero and statistically insignificant. The regression presented in column 2 conditions the effect of late budgets on the partisan control of state government branches. The results are now remarkably different: For divided governments, we find a positive but statistically insignificant coefficient on the normalized number of late budgets. For unified governments, on the other hand, the coefficient is negative, numerically large and statistically significant. The point estimate suggests that if every budget enacted during a gubernatorial term period is late, a party that controls both the executive and the legislative branch during that term can expect a punishment from voters in the order of 9 percent of the votes in the following gubernatorial election. With a median margin of victory of 13.1 percentage points for the gubernatorial races in our sample, this is a very large effect. The statistical uncertainty is sizeable, however: A 95 percent confidence interval suggests that the effect could be between 0.02 and 18.1 percent of the votes.

In column 3 we refine the model by distinguishing between two types of unified governments: Those that face supermajority requirements to pass the budget in the legislature, and those that do not. We find a noticeable difference in the effect of late budgets: Incumbent parties in a unified government with no supermajority requirements are significantly punished for late budgets, whereas unified governments that operate under a supermajority requirement, which strongly increases the likelihood the the opposition party has influence, are not. The difference is statistically significant at the 1 percent level; in fact, the effect of late budgets under the latter type of unified government is statistically indistinguishable from the effect under a divided government, which is consistent with the argument that voters take into account the institutional setting when attributing responsibility for fiscal governance outcomes.

[Table 1 about here]

5.2 Legislative elections

5.2.1 Party seat shares

Table 2 shows results for our estimations of seat shares for the incumbent party in lower house legislative elections. Starting with the control variables, we again find no significant effect from changes in the state unemployment rate, but the incumbent party in the legislature is more successful when housing prices are rising. For the fiscal policy variables, the estimated coefficients generally have the signs we would expect, but, in contrast to the results for gubernatorial elections, none of them are statistically significant. This is consistent with previous findings that it is primarily the governor who is held accountable for the economy (Niemi et al. 1995; Lowry et al. 1998).

We find a strong persistency in lower house seat shares, as can be seen from the sizeable and highly significant coefficient on the incumbent party's seat share in the previous election. As in gubernatorial elections, we find a considerable influence from presidential politics: The president casts a long shadow, and members of his own party generally do worse in state legislative elections unless the president enjoys very favorable approval ratings. Finally, we find evidence of coattails from gubernatorial elections. With a one percentage point increase in the seat share in the legislature for every 8-10 percent of votes won in a concurrent gubernatorial race, the effect is about one third of the effect from presidential elections. It is statistically significant at the five percent level in 6 out of 8 regressions.[14]

In column 1 we include the normalized number of late budgets since the previous election with no interactions terms. In contrast to the results for gubernatorial elections, we now in fact find an unconditional, negative and statistically significant effect of late budgets on the electoral support for the incumbent party. The point estimate of the coefficient on late budgets suggests that producing a "perfect record" of late budgets triggers a decline in the seat share of the incumbent party of 2.2 percentage points. Taking statistical uncertainty into account, the effect could be between 0.2 and 4.3 percentage points.[15] Unlike in the case of gubernatorial elections, this appears to be the case no matter who controls the different branches of state government. In particular, allowing different slope coefficients under unified government and divided government, respectively, does not suggest any difference in the effect of late budgets between these two regimes, as seen in column 2. The two coefficients are of similar size and the difference between them is statistically insignificant. The only difference is that the coefficient for unified governments is less precisely estimated than its divided government counterpart.

In columns 3-8 we study the effect of legislative budget delays on legislative election out-

[14] As described above, the concurrent gubernatorial vote share is instrumented by an indicator variable for whether the governor runs for reelection; this is a strong instrument, with the first stage F-test statistic equal to 102.8 for the regression reported in column 3.

[15] As suggested by a 95 percent confidence interval for the coefficient on the normalized number of late budgets.

comes. We generally find stronger effects and more precise estimates when using this variable instead of the number of late budgets. Column 3 shows a highly significant unconditional effect of legislative delays on the seat share of the incumbent party. The results in columns 4 and 5 elaborate on this point: Voters appear to hold the majority party in the lower house of the legislature accountable for delays in the legislative budget process, no matter whether that party has unified control over state government or not. In column 5, the numerically smaller coefficient for unified governments that operate under a supermajority requirement to pass the budget suggests that voters do respond less aggressively when such requirements are present, but the difference to the coefficient for unified government without supermajority requirements is statistically insignificant.

In column 6 we allow the impact of such delays to depend on the incumbent party's seat share margin to the minority party. The resulting coefficient on the interaction term between legislative delays and the seat share margin is negative and statistically significant at the 10 percent level. Thus, the larger the majority party is relative to the minority party, the stronger are the consequences for its electoral support when it fails to deliver a state budget within the intended time frame. This is consistent with the clarity-of-responsibility hypothesis, but also with other hypotheses, as we shall explain in the next section.

In column 7 we investigate a frequently mentioned cause of good governance: Social capital. We interact legislative budget delays with our social capital measure: The final response rate in the 2000 Census. The results show that a state with the minimum level of social capital, which in our sample corresponds to a census response rate of 58 percent, sees no response at all to late budgets, while legislatures in states with maximum social capital see support for the incumbent party decreasing by 5.1 percentage points. Consistent with such a penalty, Andersen et al. (2010a) find that late budgets do indeed occur significantly less frequently in states with high social capital.

Finally, column 8 examines whether voter responses to legislative budget delays depend on the shape of the state economy, as measured by the change in the state unemployment rate. The results indicate that voter responses to legislative delays are sharper when the economy is gaining momentum but milder when it is slowing down. This is consistent with the interpretation that voters perceive a weak economy as a valid excuse for failing to pass a budget in time, while no such excuse exists when the economy is strong.[16]

[Table 2 about here]

[16] In regressions not reported we allowed a different interaction effect depending on whether the change in the unemployment rate was positive or negative. The results revealed no significant difference, but the standard errors on the interaction terms were somewhat higher than in the specification presented here.

5.2.2 Individual incumbent reelection prospects

The results in the previous section showed that the majority party in the lower house of the legislature loses seats after a legislative term plagued by late budgets. From the point of view of political *parties,* this means that late budgets hurt the party currently holding power. The minority party, on the other hand, is actually likely to gain from budgetary delays. It is tempting to extend this conclusion to individual majority- and minority party members in the legislature. The results on seat shares are consistent with two widely different stories for individual legislators, however: First, the results could indicate that voters react to legislative budget delays by exclusively punishing those politicians perceived as responsible for them, namely the members of the ruling majority party. The larger the majority party is compared to the minority party, the clearer is the placement of responsibility, and the harsher will the punishment for the majority party be.

Second, an alternative theory is that voters hold *all* incumbent legislators equally accountable for budget delays, regardless of their partisan affiliation. Budget delays then trigger an anti-incumbent reaction from voters, implying fewer incumbent reelections. And since the current majority party has more incumbents than the minority party to begin with, they can expect to face a larger number of incumbent defeats. If the ousted incumbents are replaced by candidates from the opposite party, this leads to a rise in the seat share of the minority party at the expense of the majority party. Moreover, the effect on seat shares will be increasing in the initial margin between the majority party and the minority party, not because of greater clarity of responsibility, but merely due to an arithmetic fact: The more seats a party has, the more seats can it expect to lose when voter sentiments turn anti-incumbent.[17]

To test which of these interpretations is appropriate, we now take a closer look on the effect of legislative budget delays on the probability of reelection for individual legislators. Table 3 shows results for a range of IV probit models. As in the previous subsections, each model allows the effect of legislative budget delays to depend on the control variables in a different manner. A main purpose of the analyses is to examine whether legislative budget delays has the same effect on reelection prospects for all incumbents across parties. We therefore always allow separate slope coefficients on the number of delays for majority- and minority party members, as well as separate interaction effects. As usual, the set of control variables is the same in all models.[18]

[17] These two interpretations represent two extreme models of voter behavior. Of course, the true model could be somewhere in between, implying that incumbents of all parties are held accountable to some extent, but majority party members more so than minority party members.

[18] In principle, the impact of all control variables could also be different for majority party members vs. minority party members. In results not reported, we estimated a model with separate coefficients on all control variables. We then tested the null hypotheses of equal coefficients for all variables, separately as well as jointly. The null was only rejected for one control variable, namely divided government. We therefore allow separate coefficients on divided government for majority- and minority members in the results reported here, while the

The statistics reported in column (a) of Table 3 are the estimated probabilities that an incumbent will earn reelection after a legislative term with no legislative budget delays. Column (b) reports the discrete changes in this probability that follow from a change in the normalized number of legislative budget delays from zero to one. We condition this effect on various combinations of the control variables. The statistics in column (c) are the differences between the changes in probability reported in column (b) for different values of the control variables, i.e. the difference of differences, or the interaction effects between legislative budget delays and control variables of particular interest. For all of the estimated models, a full set of parameter estimates can be found in appendix Table A.2.

In model (1) we condition the effect of legislative budget delays on only one characteristic, namely whether the incumbent belongs to the majority party or minority party in the legislature. We find that the probability of reelection for a majority party incumbent falls by about 5 percentage points when all state budgets enacted since the previous election were delayed, down from a 79% reelection probability when none were delayed. The effect is highly statistically significant. For members of the minority party, the estimated effect is roughly half as large, and significant at the 10 percent level. Note, however, that we cannot reject the null hypothesis that the effect is equally strong for both types of incumbents.

Model (2) refines these results by conditioning not only on the partisan affiliation of the incumbent, but also on whether the state government is under unified or divided control. This reveals an important difference in the consequences of budget delays for members of the minority party: Under divided government, there is a strong negative effect on the probability of reelection, which in terms of magnitude is equal to the effect for members of the majority party. Under unified government, on the other hand, minority party incumbents are shielded from the effects of legislative budget delays. In contrast, the consequences for majority party incumbents are now harsher.[19]

Model (3) sheds further light on this issue by distinguishing unified governments that operate under a supermajority requirement to pass the budget from unified governments that are not constrained by such a requirement. The results broadly confirm our priors. For majority party members who do not face a supermajority requirement, we now find that the impact of legislative budget delays on their reelection probabilities is significantly stronger under unified government than under divided government. Most notably, the effect of delays is entirely different in legislatures with a supermajority requirement. If anything, majority party mem-

coefficients on the economic and fiscal variables are restricted to be equal for all incumbents.

[19] The estimated effect for majority party incumbents is stronger under unified government than under divided government, as we would expect, but the difference is not statistically significant, as can be seen from the difference-of-difference statistic in column (c). On the other hand, the difference-of-difference between the effects for majority party members and minority members under unified government (not reported in Table 3) is strongly significant (p-value < 0.01). Also not reported in Table 3 is the result that state legislators running for the state senate are also significantly penalized for being in a legislature producing late budgets.

bers appear to *gain* from delays in such states, but the statistical uncertainty of this effect is considerable.

Turning to model (4), we now focus on the interaction between budget delays and the relative sizes of the parties in the legislature. We estimate the impact of legislative budget delays on incumbent reelection probabilities at majority party seat share margins of 3.9% and 39.5%. These numbers correspond to the sample average minus/plus one standard deviation. A larger seat share margin does not seem to imply stronger accountability for individual majority party members as we might have expected based on the results for party seat shares in the previous section. In contrast, the estimated impact of budget delays is larger when the seat share margin is 3.9% than when it is 39.5%, although the difference is statistically insignificant. For minority party members, we find no difference at all. Recall the result found in the previous section that the larger the majority party is relative to the minority party, the more seats does it lose after budget delays. The results here reveal that this does not reflect a stronger accountability mechanism for individual majority party incumbents, as a clarity-of-responsibility interpretation would suggest. Rather, it most likely reflects the fact that the more seats a party has, the more seats can it expect to lose when voters hand out punishments for legislative budget delays.

Finally, model (5) examines the interaction between legislative budget delays and the state's economic shape. Parallelling the results for party seat shares in the previous section, we find a significant difference between good and bad economic times when it comes to the electoral impact of delays. If the unemployment rate has fallen 1 percentage point over the 12 months leading up to the election, we find strong impacts of budget delays on the reelection probabilities for both majority- and minority party members. The point estimates suggest drops in the reelection rates of 8 percentage points and 4.4 percentage points, respectively. If the unemployment rate has risen 1 percentage point, on the other hand, the estimated effects are negligible and statistically insignificant for both majority- and minority party members.

[Table 3 about here]

5.3 Robustness issues

The results presented in tables 1 to 3 are robust to a number of different definitions of variables and empirical specifications. In the analyses, we have used the proportion of late budgets since the last election. If we use the proportion of late budgets from the two most recent years, the results are essentially unchanged; if we consider only the most recent budget, the coefficients continue to be significant but are slightly smaller. This makes sense, we believe, as voters are likely to be more dissatisfied with a situation of permanent delays than with an occasional late budget.

We also explore whether there are systematic differences between states that have and never have experienced legislative delays or late budgets. Restricting the sample to states that have experienced delays at some point in the period we consider, we find unchanged results for the analyses based on legislatures and individual legislators, suggesting that identification comes from variations within this group of states. In the case of gubernatorial elections, the estimated effect of late budgets under unified governments increases, but the estimated standard error also increases, such that the effect just ceases to be significant.

Dropping individual high-profile states such as New York or California (or both), or special cases such as Louisiana with its unique primary runoff system, makes no difference to results; similarly, dropping states with biennial budgeting leaves results unaffected.

Throughout, we have not considered the partisan make-up of the electorate, partly as this is likely to be endogenous with respect to partisan government performance. If, however, we control for self-declared partisan or ideological identification, using data from Wright et al. (n.d.) up to 2003, all estimated coeffcients on delays increase, some substantially, and continue to be significant.[20]

6 Conclusion

Using a unique measure of budgetary delays in US state governments, we find strong and clear evidence that voters hold elected politicians accountable for bad fiscal governance in the form of late budgets, controlling for budget outcomes as well as a wide variety of individual, legislature-level and state-level control variables. While the major part of the literature on electoral accountability and good governance has focused on electoral penalties due to corruption, one of our contributions is to show that voters hold political actors accountable also for less extreme realizations of bad governance, which, arguably, occurs more often than corrupt behavior.

We find that governors are punished for late budgets only under unified governments and that legislatures overall are punished for legislative budget delays under both unified and divided government. Consistent with voter responses being conditional on clarity of responsiblity individual members of the majority party in the legislature face stronger punishments under unified government than under divided government. Minority party members are held accountable for delays under divided government, with magnitudes equal to those observed for majority party members. Our analyses also point to a dilemma for members of the legislative minority: While the minority party in the legislature gains in terms of seat shares from legislative delays, individual minority members are penalized. This is probably due to overall voter fatigue towards the legislature following legislative budget delays, with new minority

[20] The Wright, Erikson and McIver data is a collection, based on a CBS/NYT national survey, of partisan (Republican, Independent, Democrat) and ideological (Liberal, Moderate, Conservative) identification.

party members replacing the unpopular incumbents. Thus, for state legislators with personal political ambitions, obstructing the budget process appears to be a bad recipe for success.

Looking at the overall pattern of results, one intriguing finding is that the available evidence suggests an asymmetric attribution of blame: Governors are subjected to an electoral penalty only under unified government, while legislatures are always held accountable. This can reflect differences in state constitutions and customs regarding who is thought to have the main responsbility for the budget. Furthermore, governors may be more adept at the 'blame game' that sometimes follows failures to finish a budget on time. In on-going research, we are investigating the possilibities for measuring the assignment of popular blame, based on job approval ratings and newspaper accounts of late budget.

If we combine the results obtained here with results on the causes of late budgets as identified by Andersen, Lassen and Nielsen (2010a), we find strong evidence that political actors recognize voter responses: States with higher degrees of social capital punish legislatures more for legislative budget delays, and, indeed, we see fewer delays in states with higher social capital. Voters have a harder time attributing responsiblity for late budgets under divided government and when the economy is slowing down – and this is exactly the cases where we see more late budgets.

Understanding the electoral consequences of budget gridlcoks is key to understanding why such gridlocks occur in the first place. In the end, we believe that the strongest motivation for state lawmakers to finish their business on time is the reaction of their constituents and our results support this. If politicians are punished by voters for bad governance outcomes, it is in their own interest to avoid such outcomes. On the other hand, if the personal costs of bad governance are low, inferior outcomes such as budget delays are more likely to arise, and politicians have little incentive to adopt institutional reforms that could help alleviate the problem.

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7 Appendix

[Table A1 about here]

[Table A2 about here]

Figure 1a: No. of budgets enacted after beginning of fiscal year relative to total no. of enacted budgets, 1988-2007

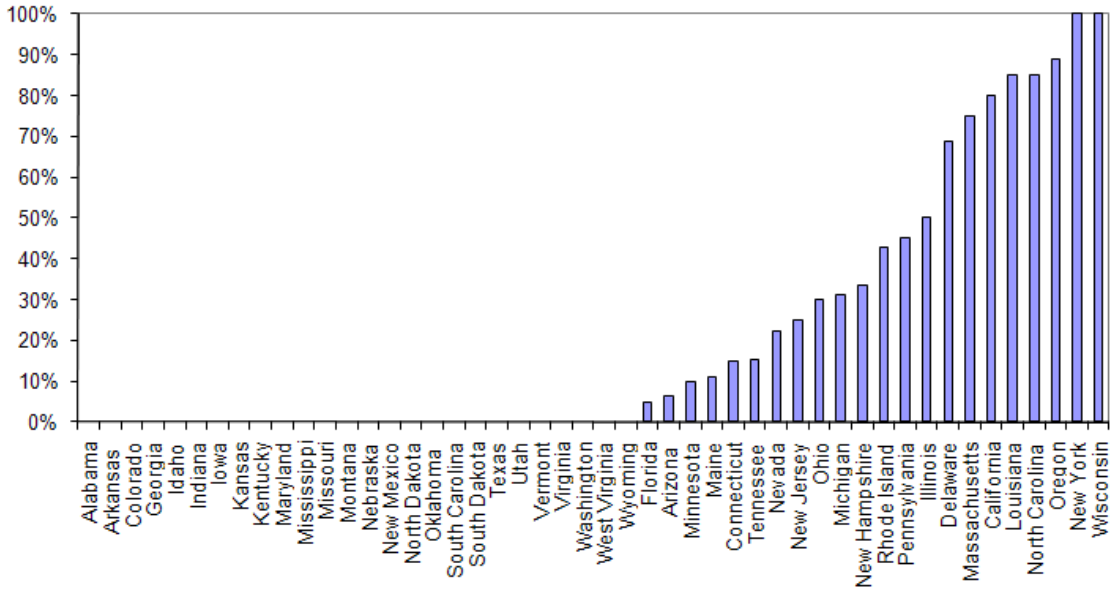

Figure 1b: No. of budgets passed after legislature's deadline relative to total no. of enacted budgets 1988-2007

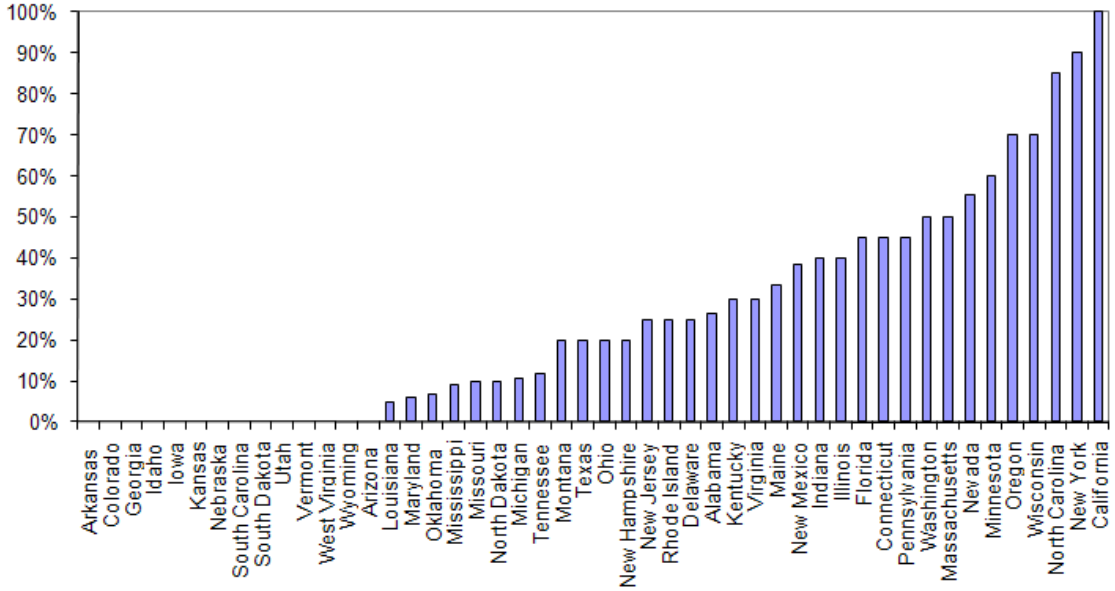

Table 1. Gubernatorial election outcomes and late budgets, 1990-2007.

	Vote share won by incumbent governor's party		
	(1)	(2)	(3)
Late budgets	-0.02		
	(3.69)		
Late budgets x *divided govt.*		3.63	4.66
		(3.49)	(3.56)
Late budgets x *unified govt.*		-9.08**	
		(4.51)	
Late budgets x *unified govt.* x *no supermajority req.*			-9.97**
			(4.46)
Late budgets x *unified govt* . x *supermajority req.*			7.95
			(6.45)
Divided government	0.89	-1.4	-1.18
	(1.71)	(2.10)	(2.11)
Change in unemployment rate	-0.08	-0.36	-0.4
	(1.54)	(1.50)	(1.51)
Real growth in housing prices	-0.65	-0.7	-0.72
	(0.50)	(0.48)	(0.58)
Change in govt. spending-to-GDP ratio	0.54	0.62	0.76
	(0.83)	(0.83)	(0.89)
Enacted tax changes	-0.25**	-0.29***	-0.28**
	(0.10)	(0.11)	(0.11)
State budget surplus	4.84***	4.13***	4.64***
	(1.13)	(1.01)	(0.96)
Vote share in previous election	0.03	0.04	0.03
	(0.09)	(0.09)	(0.09)
incumbent governor running for re-election	8.32***	7.92***	7.95***
	(1.30)	(1.28)	(1.19)
Vote share in presidential election	0.51**	0.42**	0.38**
	(0.20)	(0.19)	(0.17)
President from incumbent party	-3.03***	-3.58***	-3.53***
	(0.80)	(0.81)	(0.79)
Pres. from incumbent party x *pres. approval rating*	0.09***	0.10***	0.10***
	(0.03)	(0.03)	(0.03)
State Fixed Effects	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes
R-squared	0.53	0.56	0.56
Observations	186	186	186

All estimates obtained using the xtreg2 command in Stata 10. Standard errors are robust to heteroskedasticity and clustering at the state level. ***, **, * denote significance on the 1%, 5%, and 10% levels, respectively. A constant is included in all estimations.

Table 2. Party seat shares in state legislative elections and late budgets, 1989-2006.

	Lower house seat share won by incumbent party							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Late budgets	-2.24**							
	(1.09)							
Late budgets x *divided govt.*		-2.16*						
		(1.17)						
Late budgets x *unified govt.*		-2.49						
		(2.00)						
Legislative delays			-2.80***			-1.21	15.83	-2.55***
			(0.77)			(1.14)	(10.45)	(0.79)
Legislative delays x *divided govt.*				-2.73***	-2.67***			
				(0.84)	(0.86)			
Legislative delays x *unified govt.*				-3.00*				
				(1.72)				
Legislative delays x *unified govt.* x *no supermajority req.*					-3.20*			
					(1.88)			
Legislative delays x *unified govt .* *x supermajority req.*					-1.08			
					(1.93)			
Legislative delays x *seat share margin to minority party*						-0.08*		
						(0.04)		
Legislative delays x *census response rate*							-0.28*	
							(0.15)	
Legislative delays x *change in unempl. rate*								1.77*
								(0.92)
Divided government	-0.31	-0.36	0.01	-0.05	-0.06	-0.02	0	0.00
	(0.66)	(0.68)	(0.67)	(0.68)	(0.68)	(0.67)	(0.67)	(0.67)
Change in unemployment rate	0.26	0.27	0.24	0.24	0.24	0.32	0.31	-0.46
	(0.51)	(0.51)	(0.49)	(0.50)	(0.49)	(0.50)	(0.49)	(0.59)
Real growth in housing prices	0.39***	0.39***	0.50***	0.50***	0.49***	0.53***	0.52***	0.48***
	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)
Change in govt. spending-to-GDP ratio	-0.52	-0.52	-0.17	-0.17	-0.18	-0.23	-0.19	-0.15
	(0.42)	(0.42)	(0.43)	(0.43)	(0.43)	(0.43)	(0.43)	(0.43)
Enacted tax changes	-0.07	-0.07	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
	(0.06)	(0.06)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
State budget surplus	0.03	0.02	0.17	0.17	0.18	0.18	0.14	0.23
	(0.52)	(0.52)	(0.49)	(0.49)	(0.49)	(0.49)	(0.49)	(0.49)
Seat share in previous election	0.56***	0.56***	0.56***	0.56***	0.56***	0.59***	0.56***	0.56***
	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)
Vote share in presidential election	0.29***	0.29***	0.31***	0.31***	0.31***	0.30***	0.31***	0.30***
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
President from incumbent party	-2.24***	-2.24***	-1.94***	-1.94***	-1.95***	-1.92***	-1.95***	-1.91***
	(0.37)	(0.37)	(0.37)	(0.37)	(0.37)	(0.37)	(0.37)	(0.37)
Pres. from incumbent party x *pres. approval rating*	0.07***	0.07***	0.07***	0.07***	0.07***	0.07***	0.07***	0.07***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Vote share in gubernatorial election	0.10	0.10	0.12*	0.12*	0.12*	0.12*	0.12**	0.11*
	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)
Gubernatorial election year	-3.63	-3.62	-4.43	-4.47	-4.41	-4.44	-4.43	-3.98
	(3.13)	(3.13)	(2.98)	(3.05)	(3.03)	(3.00)	(2.97)	(2.98)
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1st stage F-stat. for excluded instr.	87.3	86.9	101.9	99.9	100.1	101.5	101.2	96.8
R-squared	0.44	0.44	0.45	0.45	0.45	0.45	0.46	0.45
Observations	370	370	360	360	360	360	360	360

All estimates obtained using the xtivreg2 command in Stata 10. Robust standard errors in parentheses. ***, **, * denote significance on the 1%, 5%, and 10% levels, respectively. A constant is included in all estimations. A dummy variable for whether the incumbent governor ran for re-election is used as an instrument for the majority party's vote share in same-year gubernatorial elections in all columns. F-statistics for exclusion restrictions on the instrument in the first-stage equations are reported in the third row from the bottom.

Table 3. Reelection of incumbent state legislators and legislative budget delays, 1989-2003.

Model	Condition	(a) Probability of incumbent reelection when *Legislative delays* = 0	(b) Change in probability when Δ*Legislative delays* = 1	(c) Difference of difference
(1)	*Majority party member*	0.791 (0.018)	-0.051*** (0.013)	-0.025 (0.015)
	Minority party member	0.786 (0.019)	-0.026* (0.014)	
(2)	*Majority party member, divided govt.*	0.793 (0.018)	-0.043*** (0.014)	0.029 (0.026)
	Majority party member, unified govt.	0.793 (0.019)	-0.073*** (0.024)	
	Minority party member, divided govt.	0.778 (0.019)	-0.046*** (0.016)	-0.077*** (0.029)
	Minority party member, unified govt.	0.775 (0.020)	0.031 (0.025)	
(3)	*Majority party member, divided govt.*	0.794 (0.018)	-0.041*** (0.014)	0.048* (0.027)
	Majority party member, unified govt., no supermajority req.	0.794 (0.019)	-0.089*** (0.025)	-0.186*** (0.055)
	Majority party member, unified govt., supermajority req.	0.794 (0.019)	0.097* (0.050)	
	Minority party member, divided govt.	0.779 (0.019)	-0.044*** (0.016)	-0.080*** (0.029)
	Minority party member, unified govt., no supermajority req.	0.775 (0.020)	0.036 (0.025)	0.061 (0.085)
	Minority party member, unified govt., supermajority req.	0.775 (0.020)	-0.025 (0.083)	
(4)	*Majority party member, seat share margin to minority party = 3.9 %-points*	0.792 (0.018)	-0.065*** (0.017)	-0.029 (0.022)
	Majority party member, seat share margin to minority party = 39.5 %-points	0.792 (0.018)	-0.036** (0.017)	
	Minority party member, seat share margin to minority party = 3.9 %-points	0.786 (0.019)	-0.026 (0.017)	0.002 (0.027)
	Minority party member, seat share margin to minority party = 39.5 %-points	0.786 (0.019)	-0.027 (0.022)	
(5)	*Majority party member, change in unemployment rate = +1 %-point*	0.750 (0.023)	-0.018 (0.019)	0.062** (0.026)
	Majority party member, change in unemployment rate = -1 %-point	0.815 (0.018)	-0.080*** (0.018)	
	Minority party member, change in unemployment rate = +1 %-point	0.744 (0.023)	-0.005 (0.021)	0.039 (0.029)
	Minority party member, change in unemployment rate = -1 %-point	0.810 (0.019)	-0.044** (0.019)	

The statistics in each model are based on the IV probit estimates reported in the column with the corresponding number in appendix table A2. Column (a) shows the predicted probability of reelection when the normalized number of legislative budget delays is zero. Unless specifically noted, all probabilities are evaluated for a hypothetical incumbent legislator who belongs to the same party as the president, serves in a unified government, in a year with both presidential and gubernatorial elections and average support for the incumbent's party in both of these elections. All continuous control variables are evaluated at their sample averages. State- and year fixed effects are evaluated at median estimates (corresponding to Texas and 1996). The statistics reported in column (b) are the discrete changes in the probability of reelection when the normalized number of legislative delays goes from zero to one. The statistics in column (c) are the differences between the changes reported in column (b).

Standard errors in parentheses: ***, **, * denote significance on the 1%, 5%, and 10% levels, respectively. All standard errors are calculated by the delta method, using the predictnl command in Stata 10.

Table A1. Explanatory Variables: Definitions and Sources

Variable	Description	Source
Late budgets	The number of budgets enacted after the end of the fiscal year since the previous election, relative to the total number of enacted budgets since the previous election	Andersen, Lassen and Nielsen (2010a)
Legislative delays	The number of budgets passed by the legislature after the deadline for legislative passage since the previous election, relative to the total number of enacted budgets since the previous election	Andersen, Lassen and Nielsen (2010a)
Divided government	Dummy variable equal to 1 if either *i)* both legislative chambers controlled by other party than governor's, or *ii)* two chambers controlled by different parties	Klarner (2007)
Unified government	Dummy variable equal to 1 if both chambers in the legislature controlled by governor's party	Klarner (2007)
Supermajority req.	Dummy variable equal to 1 if a supermajority vote is required to pass each budget	National Conference of State Legislatures
Seat share margin to minority party	Difference between seat shares for the majority party and the minority party in the lower house in the state legislature	Klarner (2007)
Change in unemployment rate	Change in the seasonally adjusted state unemployment rate from October in the year before the election to October in the year of the election	Bureau of Labor Statistics
Real growth in housing prices	Average annual growth rate in house prices from the fourth quarter of the previous election year to the fourth quarter of the current election year, deflated by the state GDP deflator.	Federal Housing Agency state level repeat-sales index (all transactions)
Change in govt. spending-to-GDP ratio	Change in the ratio of general state government expenditures to state GDP since the previous election year	US Census Bureau (expenditures) and Bureau of Economic Analysis (state GDP)
Enacted tax changes	Net revenue effect, measured in percent of general fund revenue, of tax changes enacted since the previous election	National Association of State Budget Officers, *The Fiscal Survey of States*, various editions
State budget surplus	General revenue minus general expenditure, measured in percent of state GDP	US Census Bureau (revenue and expenditure) and Bureau of Economic Analysis (state GDP)
State GDP	State GDP in current prices	Bureau of Economic Analysis
Real state GDP	State GDP in real (chained 2000) prices	Bureau of Economic Analysis
Inflation	Average yearly percentage change in state GDP deflator since previous election	Bureau of Economic Analysis
Fiscal transparency	Dummy variable equal to 1 if the state scores above the sample median on the transparency index developed in Alt, Lassen and Rose (2006), zero otherwise	Alt, Lassen and Rose (2006)

Table A1 (continued). Explanatory Variables: Definitions and Sources

Census response rate	Final state response rate (in percent) in the 2000 Census	US Census Bureau
Incumbent governor running for re-election	Dummy variable equal to one if the current incumbent governor is running for re-election, zero otherwise	Book of the States, various editions, and Wikipedia.org
Vote/seat share won in previous election	Gubernatorial elections: Vote share won in the previous gubernatorial election by the current incumbent governor's party. Legislative elections, seat shares: Seat share won in the previous legislative election by the current majority party in the lower house of the legislature. Legislative elections, individual legislators: Share of the district vote won in the previous election by the current incumbent legislator	Governors: Statistical Abstract of the United States, various years. Seat shares: Klarner (2007). Individual legislators: Carsey *et al* (2008)
Vote share in presidential election	Share of the major party vote in the state captured by the presidential candidate who belongs to the same party as the incumbent party/individual. Equal to zero in years with no presidential election	uselectionatlas.org
President from incumbent party	Dummy variable that takes the value one if the incumbent party/individual belongs to the same party as the president, and minus one otherwise	Klarner (2007), Carsey *et al* (2008)
Pres. approval rating	Percentage of respondents in nation-wide Gallup polls who approve of the president's performance, minus the percentage that disapproves. We use the Gallup poll on or around November 1st in the year of the relevant state election	Roper Center at the University of Connecticut (http://www.ropercenter.uconn.edu/).
Vote share in gubernatorial election	Vote share in gubernatorial election captured by (a) the majority party in the legislature (seat share analyses), or (b) the incumbent legislator's party (individuals analyses). Equal to zero in years with no gubernatorial election	Statistical Abstract of the United States, various years
Gubernatorial election year	Dummy variable equal to 1 in years with a gubernatorial election, zero otherwise	Book of the States, various editions.
Majority member	Dummy variable equal to one if the incumbent legislator is a member of the majority party in the lower house in the state legislature, zero otherwise	Carsey *et al* (2008), Klarner (2007)
Minority member	Dummy variable equal to one if the incumbent legislator is a member of the minority party in the lower house in the state legislature, zero otherwise	Carsey *et al* (2008)
No. of previous campaigns	Number of times the incumbent legislator has previously run for office in lower house state legislative elections (successful as well as unsuccessful runs included)	Carsey *et al* (2008)

Table A2. Reeletion of incumbent state legislators and legislative budget delays, 1989-2003, parameter estimates

	Incumbent reelected				
	(1)	(2)	(3)	(4)	(5)
Legislative delays x *majority member*	-0.1681***			-0.2201***	-0.1624***
	(0.039)			(0.056)	(0.040)
Legislative delays x *minority member*	-0.0874**			-0.0842	-0.0834*
	(0.044)			(0.060)	(0.044)
Legislative delays x *majority member* x *divided govt.*		-0.1431***	-0.1369***		
		(0.044)	(0.044)		
Legislative delays x *majority member* x *unified govt.*		-0.2328***			
		(0.072)			
Legislative delays x *minority member* x *divided govt.*		-0.1460***	-0.1407***		
		(0.050)	(0.050)		
Legislative delays x *minority member* x *unified govt.*		0.1082			
		(0.089)			
Legislative delays x *majority member* x *unified govt. x no supermajority req.*			-0.2814***		
			(0.074)		
Legislative delays x *majority member* x *unified govt. x supermajority req.*			0.4129		
			(0.263)		
Legislative delays x *minority member* x *unified govt. x no supermajority req.*			0.1263		
			(0.092)		
Legislative delays x *minority member* x *unified govt. x supermajority req.*			-0.0824		
			(0.261)		
Legislative delays x *majority member* x *seat share margin to minority party*				0.0025	
				(0.002)	
Legislative delays x *minority member* x *seat share margin to minority party*				-0.0001	
				(0.002)	
Legislative delays x *majority member* x *change in unempl. rate*					0.1061***
					(0.040)
Legislative delays x *minority member* x *change in unempl. rate*					0.0684
					(0.047)
Member of lower house majority party	0.020	0.0602*	0.0621*	0.020	0.021
	(0.034)	(0.036)	(0.036)	(0.034)	(0.034)
No. of previous campaigns	-0.1186***	-0.1191***	-0.1185***	-0.1187***	-0.1195***
	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
No. of previous campaigns, squared	0.0053***	0.0053***	0.0053***	0.0053***	0.0053***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Divided government x *majority member*	0.0207	0.0007	(0.0003)	0.0231	0.0184
	(0.033)	(0.039)	(0.039)	(0.033)	(0.033)
Divided government x *minority member*	-0.0456	0.0095	0.0118	-0.0451	-0.048
	(0.039)	(0.045)	(0.045)	(0.039)	(0.039)

Table A2 (cont'd). Reeletion of incumbent state legislators and legislative budget delays, 1989-2003, parameter estimates.

Change in unemployment rate	-0.0757***	-0.0757***	-0.0733***	-0.0783***	-0.1111***
	(0.020)	(0.020)	(0.020)	(0.020)	(0.024)
Real growth in housing prices	-0.0128*	-0.0132**	-0.0150**	-0.0146**	-0.0169**
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Change in govt. spending-to-GDP ratio	0.0226	0.0221	0.0204	0.0252	0.0141
	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)
Enacted tax changes	-0.0015	-0.0015	-0.0013	-0.0015	-0.0017
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
State budget surplus	-0.0545	-0.0544	-0.0518	-0.0519	-0.0372
	(0.036)	(0.037)	(0.037)	(0.037)	(0.037)
Vote share won in previous election	0.0068***	0.0068***	0.0068***	0.0068***	0.0068***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Vote share in presidential election	0.0069***	0.0062***	0.0060***	0.0067***	0.0069***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
President from incumbent's party	-0.1142***	-0.1159***	-0.1179***	-0.1138***	-0.1087***
	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)
Pres. from incumbent's party x *pres. approval rating*	0.0021***	0.0022***	0.0022***	0.0021***	0.0021***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Vote share in gubernatorial election	0.0048**	0.0047**	0.0045**	0.0050**	0.0046**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Gubernatorial election year	-0.2561**	-0.2529**	-0.2442**	-0.2668**	-0.2540**
	(0.106)	(0.106)	(0.106)	(0.107)	(0.107)
State Fixed Effects	Yes	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes
Observations	22759	22759	22759	22759	22759

All estimates obtained using the ivprobit command in Stata 10. Standard errors in parentheses. ***, **, * denote significance on the 1%, 5%, and 10% levels, respectively. A constant is included in all estimations. A dummy variable for whether the incumbent governor ran for re-election is used as an instrument for the majority party's vote share in same-year gubernatorial elections in all columns. The F-statistic for an exclusion restriction on the instrument in the first-stage equation is in all cases over 13,000.

Chapter 5

The Consequences of Late Budgets for Government Borrowing Costs

The Consequences of Late Budgets for Government Borrowing Costs*

- Evidence from U.S states

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Abstract

Budgets in the US states are often passed late. If a state budget is not in place by the beginning of a new fiscal year, a range of potential economic consequences arises. We quantify one such consequence, the effect on government bond yields. Using a unique data set on budget enactment dates, we find robust evidence that late budgets are significantly associated with higher state government borrowing costs. Borrowing costs are measured with data on bond yield spreads from the "Chubb Relative Value Survey", which is available for 36 US states in the period 1988 to 1997. We estimate that a budget delay of 30 days has a long run impact on the yield spread in the order of 2 basis point. States with sufficient liquidity, in the form of either large reserves or a budget surplus, face small or no costs from late budgets. On the other hand, states running an average deficit face an impact of about 9 basis points from a 30-day budget delay. During election years, the impact of late budgets on yield spreads increases by an order of 4.

Keywords: Late Budgets; Chubb Relative Value Survey; Debt Cost; Bond Spreads; US States
JEL codes: H72; H61; H63

1 Introduction

In many US states, the negotiations of the state budget often drag on well past the beginning of the new fiscal year. Andersen, Lassen and Nielsen (2010a) document that in the period 1988

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to 2007, 23% of all US state budgets were enacted after the beginning of the new fiscal year. Of these, 31% were more than a month late. Recent experiences with late budgets in California and New York have highlighted the problem of budget gridlock in US states; for example, in 2009, California went 24 days into the new fiscal year before a new state budget was agreed on. During this time the state was forced to issue IOUs to cover payments to local governments, state contractors and taxpayers. In 2010, citizens in New York had to wait 125 days beyond the fiscal year deadline before a new state budget was signed into law. State officials began preparing for the state's first-ever government shutdown, as political gridlock threatened to end the series of emergency budget bills the state relied on to stay in operation.

Without a budget in place by the beginning of the new fiscal year, the legal basis for government spending is jeopardized. Among other things, this can lead to disruptions in debt payments, and uncertainties in relation to government default can arise. As a result, governments may see the cost of financing their debt rise as investors demand a higher premium for holding state debt. In this paper we exploit a unique data set on state budget enactment dates to quantify such costs by estimating the impact of late budgets on the yield of US state government bonds.

During the states' fiscal crisis of 1992, Moody's Investor Services issued a statement with the following message: "[*budget] delays are symptomatic of serious financial imbalances*", continuing, "*[B]udget delays do not automatically lead to a long-term rating revision. But the resulting pressures on a state's short-term liquidity position can trigger a review*".[1] We expect late budgets to affect state borrowing costs through two channels, both of which are reflected in this quote: *1) A liquidity premium on state bonds*: Without a budget in place, states may not have the legal authority to make appropriations towards debt repayments. Although many states actually have special provisions in place to avoid exactly this, and in general make debt payments one of its first priorities, if the budget negotiations drag on for too long, the state might simply find it self out of cash to spend on any provisions, including debt repayments. The risk of this occurring increases for every day that passes by without a new budget in place. As investors observe such late budgets, they will require a higher premium for holding state debt. *2) A market signal*: Bond market participants may not have perfect information about the true fiscal position of the state government. Severe budgets delays are likely to arise when painful adjustments are needed to secure state solvency. Thus, the inability to pass the budget can provide a strong signal to the market about the presence of large unresolved fiscal imbalances, and, perhaps most importantly, that the responsible politicians lack the ability to deal with these problems in an appropriate manner. As such, it is not the immediate consequences of the late budget itself that lead to higher borrowing costs. Rather, it is the fact that it draws the market's attention to the state's fiscal problems, possibly triggering changes in the state's

[1] Quoted from *The Bond Buyer*, July 2, 1992 (http://www.highbeam.com/doc/1G1-12436969.html)

credit rating, that creates a causal link from a late budget to state borrowing costs.

Higher borrowing costs are not the only potential costs of late budgets. As discussed in Andersen, Lassen and Nielsen (2010a), delays in state budgeting can force state governments to withhold payments state vendors and contractors, providers of medicaid as well as school districts and local governments, and, in some states, state government employees. This can lead to distorted policy choices in the form of expensive short-term borrowing, cash-hoarding or hiring freezes at state government agencies and local governments. In extreme cases, the state government may be forced to shut down all "non-essential" services, leading to severe disruptions in state government operations. The mere threat of a shutdown may distort operations in state agencies, who must spend time and effort on determining which services are "essential" and which are not. The scope of these economic costs of late budgets is likely to be substantial.[2] They are also very difficult to quantify, however. We therefore focus on the impact on the costs of debt servicing, since we can measure these much more precisely. As such, our estimates should merely be seen as a lower bound on the overall costs of late budgets.

Comparable cross-state market data on US state government bond spreads are unfortunately not available for a sufficiently long time period. We therefore use the only available source for comparable bond yields across US states; the Chubb Relative Value Survey. Previous papers have used the Chubb survey to study the effect on bond spreads of fiscal institutions (Poterba and Rueben (1997, 2001), Lowry and Alt (2001)), political parties (Lowry and Alt (2001)), fiscal shocks (Poterba and Rueben (2001)) and debt size (Bayoumi, Goldstein and Woglom (1995)). To our knowledge, no previous study has looked at the implication of late budgets on yield spreads.

We use the data in the survey to estimate the impact of late budgets on government bond yield spreads in the years from 1988 to 1997. Our sample period is limited by data availability: Our data set on budget enactment dates (described in detail in Andersen, Lassen and Nielsen, (2010a)) starts in 1988, while the Chubb survey ends in 1997.[3] We find that late budgets significantly increase state government bond yields. In terms of size, we find that a 30-day late budget increases the yield spread by around 2 basis points. These findings are robust to a hoist of other variables such as fiscal institutions, economic and fiscal variables, ideology and credit ratings. Our estimates show that late budgets do in fact have real non-negligible costs. Ultimately, the increase in borrowing costs associated with late budgets will lead to cuts in government services or higher taxes.

[2] As noted in a New York Times editorial in the run up to a possible shutdown in 2010: "[...] *A shutdown would disrupt millions of lives, cost millions of dollars and leave state officials scrambling to operate prisons, the State Police and the Metropolitan Transportation Authority* [...]". (New York Times editorial on June 12, 2010, http://www.nytimes.com/2010/06/12/opinion/12sat1.html?hp)

[3] Our last observation for the Chubb survey is from January 1998, but we include this in our 1997 observation for the bond yield spread (constructed as the average of July 1997 and January 1998, see details below).

The paper proceeds in the following way: The next section describes our data and empirical strategy, while section 3 presents our empirical results and quantitative assesments . Section 4 concludes.

2 Data

2.1 Dependent variable: The Chubb Relative Value Survey

As mentioned above, comparable market data on state bond yields are not readily available. Following Poterba and Rueben (2001) and Lowry and Alt (2001) we instead use data on state government bond yield spreads given from the "Chubb Relative Value Survey". This survey measures the bond yield for 39 states relative to New Jersey by asking roughly 25 sell-side bond traders to estimate the current yield, measured in basis points, on a hypothetical 20-year general obligation bond, relative to comparable bonds issued by the state of New Jersey.[4] Thus, differences in yields should only reflect differences in perceived riskiness of the state's general obligation debt, and not differences in maturity or other bond charachteristics.[5] The survey was conducted about every 6 months from July 1973 to January 1998. From 1976 to 1992, the survey was conducted in June and December.[6] In 1993 it was conducted in June, and beginning in 1994, the survey was done in January and July. Our dependent variable, $Chubb_{i,t}$, is constructed as the average of the summer (June/July) and winter (December/January) Chubb surveys, such that $Cbubb_{i,t}$ reflects survey answers from *after* the budget negotiations in the spring of year t, but before next year's budget negotiations commence. Thus, up to and including 1992, our dependent variable is given as the average of the June and December survey. Our 1993 observation is the average of the surveys from June 1993 and January 1994, and our 1994 observation is the average of the surveys from July 1994 and January 1995. The 1995 to 1997 observations are constructed in a similar manner as the 1994 observation.

2.2 Econometric model and explanatory variables

Following Poterba and Rueben (2001), we can estimate state $i's$ spread to New Jersey (denoted with subscript NJ) in a given year t, $R_{i,t} - R_{NJ,t}$, as:

$$R_{i,t} - R_{NJ,t} = F(X^*_{i,t}, Z^*_{i,t}, Y^*_{i,t}) - F(X^*_{NJ,t}, Z^*_{NJ,t}, Y^*_{NJ,t})$$

[4] States excluded from the Chubb survey are: Arizona, Arkansas, Colorado, Idaho, Indiana, Iowa, Kansas, Nebraska, South Dakota and Wyoming. Since our data set on late budgets does not include Alaska and Hawaii, and since our sample for Montana starts after the end of the Chubb survey, our effective sample consists of a total of 36 states (not counting New Jersey).

[5] See discussion of this in Poterba and Rueben (2001).

[6] The exact time of the survey varied slightly before 1976.

where $X^*_{i,t}$ is a vector of economic and fiscal variables that are likely to affect the states probability of paying current and future interest obligations. We include our measure of late budgets in this category since, as argued above, late budgets are likely to increase the riskiness of interest payments. $Z^*_{i,t}$ is a vector of state fiscal institutions that are likely to affect government spending and its ability to collect revenues. No carry-over rules and tax and expenditure limits are examples of this. $Y^*_{i,t}$ proxies fiscal taste for debt repayment and other relevant political variables. Linearizing the above equation, the bond spread in state i in year t, can be expressed as:

$$R_{i,t} - R_{NJ,t} = \beta_1^{'}(X_{i,t} - X_{NJ,t}) + \beta_2^{'}(Z_{i,t} - Z_{NJ,t}) + \beta_3^{'}(Y_{i,t} - Y_{NJ,t}) + \eta_i + \gamma_t + u_{i,t} - u_{NJ,t} \quad (1)$$

where β_j is $k_j \times 1$ vector of coefficients and $X_{i,t}, Z_{i,t}$ and $Y_{i,t}$ are our observed values of $X^*_{i,t}, Z^*_{i,t}$ and $Y^*_{i,t}$, respectively. η_i is an unobserved state fixed effect and γ_t measures aggregate shocks. $u_{i,t}$ captures omitted variables and errors from approximation. Since bond yields display a great deal of persistence, as noted by Lowry and Alt (2001), we also include lags of the dependent variable, making the model a dynamic panel data model.[7] Including L lags and defining $R_{i,t} - R_{NJ,t} \equiv Chubb_{i,t}$, equation (1) can be written as the following:

$$Chubb_{i,t} = \alpha_1 Chubb_{i,t-1} + ... + \alpha_L Chubb_{i,t-L} + \beta_1^{'} X_{i,t} + \beta_2^{'} Z_{i,t} + \beta_3^{'} Y_{i,t} + \eta_i + \lambda_t + \varepsilon_{i,t} \quad (2)$$

where we use that $\lambda_t \equiv \gamma_t - \beta_1^{'} X_{NJ,t} - \beta_2^{'} Z_{NJ,t} - \beta_3^{'} Y_{NJ,t} - u_{NJ,t}$ is constant across i in year t. We choose a value of L such that the error term, $\varepsilon_{i,t}$, displays iid properties. We estimate this dynamic panel data model using the GMM procedure developed in Arellano and Bond (1991), Arellano and Bover (1995) and Bond and Blundell (1998). However, as robustness checks we also estimate the model using the OLS and Fixed Effect estimators.

We now turn to the exact content of $X_{i,t}, Z_{i,t}$ and $Y_{i,t}$, the vectors of explanatory variables. For the sake of brevity, we limit ourselves to a short description of the variables here. Precise definitions of all variables and their data sources can be found in the data appendix.

The main explanatory variables of interest are based on the late budget variable $Days\_late_{i,t}$, which is taken from Andersen, Lassen and Nielsen (2010a). This variable measures the number of days from the end of the old fiscal year until the new budget becomes law. Thus, if the budget for the fiscal year that starts in year t is signed into law 5 days after the end of the old fiscal year in state i, $Days\_late_{i,t}$ takes the value 5. If the budget is signed into law 5 days before the end of the old fiscal year, it takes the value -5. The marginal effect on government yield spreads of using another day to finish the budget is likely to change dramatically once the fiscal year deadline is exceeded. To account for this, we separate $Days\_late_{i,t}$ into two

[7] Using the Dicky-Fuller test for unit roots in heterogeneous panels, as proposed by Im, Pesaran and Shin (2003), we can clearly reject the presence of a unit root in our spread variable.

variables: $Days\_late\_neg_{i,t}$, which is equal to $Days\_late_{i,t}$ if $Days\_late_{i,t}$ is negative, and zero otherwise, and the corresponding variable for positive values, $Days\_late\_pos_{i,t}$. We then expect a positive coefficient on $Days\_late\_pos_{i,t}$, while the coefficient on $Days\_late\_neg_{i,t}$ should be smaller, and perhaps zero.

In addition to the late budget variables we include in all estimations the following control variables:

Economic and fiscal variables

An obvious control variable is the level of state government debt. We scale the debt level relative to state GDP, because we want to measure the debt burden relative to the tax base. The state government budget surplus in the old fiscal year, i.e. the fiscal year that ends in year t, is another natural control. As in Lowry and Alt (2001), we therefore include a variable that is equal to zero in case of a deficit and otherwise equal to the (actual) surplus in percent of state GDP. We also include the corresponding variable for the deficit, thus allowing the effect of government net lending to differ depending on whether it is negative or positive. Like Lowry and Alt, we always include an interaction between our deficit variable and a dummy for whether the state has a no carry-over rule in place.

To control for the effect of business cycle fluctuations we include the change in the state unemployment rate as an explanatory variable.[8] Following Poterba and Rueben (2001), we also use the deficit shock variables originally developed in Poterba (1994) to control for fiscal shocks. Unlike Poterba and Rueben, however, we allow the effects of revenue shocks and expenditure shocks to differ by including a separate variable for each type of shock.

Government bond yields are likely to be sensitive to the liquidity position of the state government, and easy access to readily available funds is important for reliable debt service. We therefore include the (projected) end-of-year balance in the state's general fund and stabilization fund as an explanatory variable in our baseline specification.[9]

Finally, we include the change in the state's credit rating since last year as an explanatory variable.[10] We do this for two reasons: First, this may capture new information about the state's future ability to repay its debt obligations, which is known to rating agencies and investors, but unobservable to us (the researchers). Second, the credit rating itself can have an independent effect in an uninformed market if it influences investor sentiments, even if the rating is not based on any fundamentals.

Political variables

Divided partisan control over the state government may potentially work as a check on new

[8] We include the unemployment rate in first differences, but obtain very similar results when using the level of the unemployment rate.

[9] The end-of-year balance is measured in percent of proposed general fund expenditures (see data appendix for more details).

[10] We use the first difference of Moody's rating, where positive values imply an improved rating.

spending initiatives, thereby leading to lower borrowing costs. This is likely to be especially important in the absence of strict balanced budget rules. To account for this, we include a dummy for divided government, as well as its interaction with a dummy for no carry-over rules.

Investor sentiments may also be influenced by the political preferences of the politicians in charge of fiscal policy. As a final control variable, we therefore include a measure of government ideology, taken from Berry et al (1998), where a higher value is associated with more liberal preferences.

2.3 Conditional effects of late budgets

The liquidity premium and market signal channels described above both lead us to expect that the impact of late budgets on government bond yields depends on a number of observable characteristics. First, if a state ended the old fiscal year with a budget deficit and only few cash funds available in the general fund and stabilization fund, then we would expect a larger effect of late budgets through the liquidity premium channel, since such funds provide a safeguard against the risk that the state will run out of cash during a protracted political stalemate over a new budget. Second, a budget delay is likely to send a much more powerful signal about politicians' inability to deal with underlying fiscal imbalances when it is combined with a large deficit and a low end-balance in the fiscal year that just ended: If politicians can't agree on an answer to a state's fiscal problems when they are most pressing, and when the costs of inaction are likely to be highest, it seems unlikely that they ever will.[11]

A similar argument applies to the effect of election years: Andersen, Lassen and Nielsen (2010b) find that voters punish state legislators for late budgets in the upcoming elections. It seems plausible that this potential consequence of budget delays will assume a more prominent place in the minds of state lawmakers in election years than in off-election years. If state politicians are unable to pass a budget on time in an election year, despite the saliency of the potential consequences in such years, it may therefore send a stronger signal to financial markets about the state government's ability to deal with the fiscal challenges facing the state.

We test these hypotheses by estimating alternative versions of (2) that include interaction terms between our late budget variable $days\_late\_pos_{i,t}$ and each of the following: The size of the combined balance in the general fund and the budget stabilization fund at the end of the old fiscal year, the government surplus in the old fiscal year, and a dummy for state general election year. We then expect negatively signed coefficients on the first two interaction terms, and a positive coefficient on the interaction term involving the election year dummy.

[11] The lack of immediately available funds were a major factor leading to California's decision to issue IOUs when faced with a late budget in 2009. In New York in 2010, government workers where given furlough notices as a way of reducing expenditures during a severe budget delay that prevented a more permanent deficit-reducing solution from being implemented. Thus late budgets seem more likely to lead to particularly disruptive outcomes when they occur along with government deficits and low government savings.

3 Results

Table 1 shows the results from our baseline specification. Columns (1)-(3) estimate equation (2) using the OLS, Fixed Effects and GMM estimators, respectively. We include four lags of our dependent variable to account for autocorrelation in the yield spread.[12] The estimated coefficients on the control variables are largely as expected. Larger debt, lower end-of-year balances and deteriorating credit ratings all increase the yield spread, with the effects being significant on a 1% level. Unexpected expenditure shocks also have a significant impact on the yield spread, but we do not find any significant effect from shocks to state revenue. Nor do we find any significant effects from yearly changes in the state unemployment rate.

The impact of the state government's fiscal balance in the old fiscal year depends strongly on whether this balance is positive or negative: Higher surpluses do not seem to affect yield spreads. Deficits, on the other hand, have a strong impact. This is only true for states that allow deficits to be carried over to the next fiscal year, however: States that have a no-carry-over law in place see no effect on the yield spread from deficits, as can be seen by the negative coefficient on $Gov\_deficit\_no\_carry_{i,t}$, which is significant and similar in magnitude to the coefficient on $Gov\_deficit_{i,t}$.[13]

More liberal government seem to pay a higher yield spread, but the effect is only borderline significant. Finally, having divided government seems to lower the yield spread in states that do not have a no-carry over law in place, whereas states with strict no-carry over laws see no effect of divided government.

We now turn to our main variables of interests; $Days\_late\_neg_{i,t}$ and $Days\_late\_pos_{i,t}$. The coefficients on both variables are positive, implying that longer negotiations over the budget are associated with higher yield spreads. The coefficient on $Days\_late\_pos_{i,t}$ is, as expected, highly statistically significant, and much larger than the coefficient on $Days\_late\_neg_{i,t}$, which is very close to zero. We interpret these results as evidence in favor of our priors: Taking an extra day to finish the budget does not affect investors' requirements for state government bond yields as long as the fiscal year deadline is not exceeded. Once across the deadline, however, further delays in the budget process lead to significantly higher borrowing costs. We discuss the quantitative impact below.

[Table 1 about here]

[12] We also tried including a fifth lag, but this was never significant. Our results are not sensitive to the exact number of lags. Testing for autocorrelation in all our GMM estimations revealed no signs of second order or higher autocorrelation, which suggests that the GMM procedure is indeed valid. Note that our sample size is not reduced when introducing more lags of the dependent variable, since we have data for the yield spread available well before 1988.

[13] Using the OLS estimator we actually obtain a positive and significant coefficient on $Gov\_surplus_{i,t}$. We cannot explain this counter intuituve result, but note that controlling for fixed effects renders the coefficient insignificant.

Next, we move on to include interaction terms between our late budget variable and the variables discussed in the previous section. Table 2 shows the results.[14] We start by interacting $Days\_late\_pos_{i,t}$ with the size of the end-of-year balance in the old fiscal year. The coefficient on $Days\_late\_pos_{i,t}$ is positive and significant at a 1% level and almost twice as large as compared to the estimate from column (3) in Table 1. The coefficient on the interaction term with the end-of-year balance is negative and also highly significant. Thus, larger end-of-year balances in the general fund and budget stabilization fund mute the impact of late budgets on state government borrowing costs. A back-of-the-envelope calculation based on the sizes of the estimated coefficients suggests that late budgets only cause yield spreads to rise in states where fund reserves amount to less than 2% of general fund expenditures. This applies to approximately a third of the observations in our sample.

In column (2) we interact $Days\_late\_pos_{i,t}$ with the old fiscal year's government surplus (relative to state GDP).[15] The coefficient on $Days\_late\_pos_{i,t}$ is positive, large and significant, while the coefficient on the interaction term with the government surplus is negative and highly significant. Thus, late budgets have a smaller effect on government yield spreads if they are accompanied by a sufficiently large surplus, but severe if accompanied by a deficit: At a deficit of 1% of general state government spending, the impact of a budget delays is almost three times larger than when the last fiscal year ended in balance ($Gov\_spl_{i,t} = 0$). In column (3), we include both interactions terms simultaneously. The coefficients on the interactions terms decrease slightly compared to columns (1) and (2), but they are both still negative and highly significant.

In column (4), we interact $Days\_late\_pos_{i,t}$ with a dummy for gubernatorial election year. We find that the marginal impact of late budgets in non-election years is around the same as what we found in our baseline specification in Table 1. In contrast, the effect is about four times larger in election years.[16]

To sum up, the results found here broadly confirm our hypotheses about the conditional effects of late budgets on government bond yield spreads: The avalability of previously accumulated reserves dampen the impact of late budgets on state government borrowing costs, while fiscal imbalances and the proximity of upcoming elections magnify it.

[Table 2 about here]

[14] As in the analyses above, the coefficient on $Days\_late\_neg_{i,t}$ is very small in all cases, so for simplicity we impose a zero restriction on it in the analyses presented in this section. Relaxing this restriction does not change the results for the interaction terms involving $Days\_late\_pos_{i,t}$.

[15] We do not separate surpluses from deficits here. Deficits thus appear as negative values.

[16] As shown in column (5) of Table 2, including all three interaction terms simultaneously does not alter the estimated coefficients much compared to when we include them separately, and all coefficients are significant on a 1% level.

3.1 Quantifying the Effect of Late Budgets

How large are the effects of late budgets on state government borrowing costs? In the following, we use our estimates from the previous section to calculate the impact on yield spreads of a hypothetical 30-day budget delay. While delays of this length are in most states not your everyday news, they do occur: Of the 266 budget adoption processes in our sample, 79 were delayed beyond the beginning of the new fiscal year, and 23 of those by 30 days or more.

Using our baseline estimates of the coefficient on $Days\_late\_pos_{i,t}$ from Table 1, we see that that the immediate impact of a 30-day delay is about 1 basis point. That is, for every 10,000 dollars of debt issued, the state must now pay an extra dollar in interest. Taking the persistence in the yield spread into account, we can calculate a "long run" impact on total interest payments. To do this, we consider a thought experiment in which a state issues new debt (or refinances existing debt) for a fixed amount each year. In this situation, the total effect of a late budget, measured in basis points and summed over all future years, can be calculated by multiplying the immediate impact with the long run impact factors reported in the bottom of tables 1 and 2. Our baseline estimates in Table 1 thus suggest that the total long run impact of a 30-day late budget is in the range of 2 basis points (when using the lower bound estimates given by the GMM and Within estimators) and 5 basis points (using the upper bound estimate given by the OLS estimator).[17]

These results suggest that the effect of late budgets, although statistically significant, is only of moderate economic importance. However, the estimates in Table 1 reflect unconditional average effects across all observations in our sample. As shown in Table 2, the impact of late budgets differs substantially depending on the economic and political circumstances under which they occur. In a state where fiscal reserves are approaching zero, our results indicate an immediate impact of 1.4 basis points following a 30-day delay, and a long run impact of 4.2 basis points. Similarly, conditioning on the size of the budget deficit in the old fiscal year reveals a substantial variation in the effect of a 30-day delay: For a state than ran a deficit equal to 0.34% of state GDP (the average deficit among all deficits in our sample), we find immediate- and long run impacts of 3 and 9 basis points, respectively, while the corresponding numbers are 1.8 and 5.6 basis points for a state with a balanced budget, and 0.7 and 1.9 basis points for states with a surplus equal to 0.37% of state GDP (the sample average of all surpluses). Furthermore, the results in column (4) of Table 2 suggest that the impact of a 30-day late budget is more than 4 times larger in election years than in non-election years (the long run

[17] Assume that the state needs to finance a fixed amount X , where X is measured in ten thousands of dollars. A 1-day late budget in year t then gives rise to extra interest costs worth $\beta_L X$ for debt issued in year t, $\alpha_1\beta_L X$ for debt issued in year $t+1$, $(\alpha_1^2+\alpha_2)\beta_L X$ for year $t+2$, etc., where β_L is the coeffcient on $Days\_late\_pos_{i,t}$ and α_i is the coefficient on the i'th lag of the dependent variable. Applying the formula for an infinite geometric series then gives us a long run impact of $(1-\alpha_1-...-\alpha_L)^{-1}\beta_L$, where the first term represents the long run impact factor reported in Table 1 and Table 2.

impact rising from 2.3 to 9.4 basis points). Finally, the coefficient estimates in column (5), where we include all interaction terms simultaneously, show that a 30-day delay has a long run impact of 14.2 basis points when we condition on an end-of-year balance at zero, a deficit at 0.34% of GDP, and a gubernatorial election coming up.[18]

Whether these numbers are "small" or "large" is not obvious. In comparison, the average spread to New Jersey in our sample is 8.5 basis points with a standard deviation of 15 basis points. One way to assess the magnitude of the impact of late budgets is to compare it to the impact of other economic factors. Imagine a state (with does not have a no-carry-over requirement) ending its fiscal year with a budget deficit equal to 0.34% of state GDP (the sample average) and a timely adopted budget for the new fiscal year. In this situation, going from an on-time budget to a 30-day delay has the same impact on the yield spread as a three-fold increase of the deficit, or as a 14% unexpected increase in general fund expenditures (as measured by the deficit shock variable $Exp\_shock_{i,t}$).[19] Thus, when it comes to the impact on state government borrowing costs, lengthy delays in the budget adoption process are comparable to sizeable, adverse fiscal shocks.

3.2 Robustness Analyses

In Table 3 we consider a few robustness issues. Columns (1) to (3) replicate Table 1, but with $Days\_late\_pos_{i,t}$ and $Days\_late\_neg_{i,t}$, our variables of primary interest, replaced with two new variables, $Days\_delayed\_pos_{i,t}$ and $Days\_delayed\_neg_{i,t}$. Rather than counting the number of days from the end of the fiscal year until the budget is signed into law, these variables focus on legislative budget delays by measuring the number of days from the legislature's deadline for passing the budget until the legislature actually passes the budget in its final form (see Andersen, Lassen and Nielsen (2010a) for details). Using these alternative measures does little to change our conclusions, although the estimated effects of budget delays are now somewhat smaller.

A key theme in Poterba and Rueben (2001) is how the effect of fiscal shocks on borrowing costs depends on state fiscal institutions. Our baseline estimation results reported above do not allow for such interactions. We compensate for this in the estimations reported in Table A1 in the appendix. Here we interact dummy variables for no carry-over rules as well as tax- and expenditure limits (TELs) with each of the expenditure shock and revenue shock variables. The results broadly confirm the conclusions found in Poterba and Rueben (2001): Having a no

[18] Using the OLS estimator instead of the GMM estimator, the corresponding number is 28.7 basis points.

[19] These calculations are based on the estimation results of the specification in Table 2, column (2). The estimated coefficients on $Gov\_deficit_{i,t}$ and $Exp\_shock_{i,t}$ (not reported in Table 2) are 4.402 and 0.207, respectively. The implied effects on yield spreads are comparable in size to those found in Lowry and Alt (2001) and Poterba and Rueben (2001).

carry-over rules in place seems to neutralize the impact of expenditure shocks. The same is the case for expenditure limits. There does not seem to be much effect of expenditure limits on the impact of revenue shocks. Tax limits seems to have a clear effect on expenditure shocks but not revenue shocks. But most importantly for our purposes, the inclusion of these interaction terms does in no case change the sign, magnitude or statistical significance of the late budget variable $Days\_late\_pos_{i,t}$.

[Table 3 about here]

4 Conclusion

This paper estimates the impact of late budgets in U.S. states on state government borrowing costs. We find that late budgets significantly increase the yield spread on hypothetical 20-year general obligation bonds. Our results provide clear evidence that bond market investors view late budgets as a reason for concern when it comes to the prospect of uninterrupted repayments on state debt, and they strongly suggest a link between late budgets and higher state borrowing costs.

The average long-run cost of a 30-day late budget is an increase in the yield spread in the order of 2 basis points. The effect varies greatly depending on the state's economic and political situation, however. Easy access to liquidity, for example in the form of previously accumulated reserves, reduces investors' fear of payment disruptions in case of a late budget, thereby lowering the premium paid for budgets delays. In contrast, the impact of a month-long delay is much higher if the state has run out of reserves. Markets also punish late budgets much more harshly if they occur during times of fiscal stress. In such times, a late budget sends a powerful signal about politicians' (lack of) ability to address fiscal imbalances, and investors react more sharply. A related effect is present in election years: When an election is approaching, the personal costs to state politicians of a late budget are presumably higher, and delays in the budget process demonstrate more clearly that politicians are incapable of reaching fiscal compromises. Indeed, our results show that the reaction of bond market participants to late budgets is 4 times stronger in election years than in non-election years.

Our estimates should be seen as a lower bound on the economic costs of late budgets. Costs related to the disruption of state government services and payments, difficulties in fiscal planning in state agencies and local governments, and the uncertainty facing state government employees and citizens are likely to be substantial, but are practically impossible to measure. With the lower bound being positive, our results provide a strong rationale for state governments to avoid lengthy delays in the budget process. And, perhaps more importantly, they provide voters with a rationale for holding their elected politicians accountable when they fail to deliver a state budget on time.

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5 Appendix

[Table A1 about here]

[Table A2 about here]

Table 1. The Effect of Late Budgets on Yields Spred on 20-year GO Debt

	Yield spread vs. New Jersey on 20-year GO debt		
	(1)	(2)	(3)
Days_late_neg $_{i,t}$	0.001	0.003	0.004
	(0.006)	(0.011)	(0.015)
Days_late_pos $_{i,t}$	0.035***	0.025**	0.026***
	(0.008)	(0.009)	(0.009)
Unempl_change $_{i,t}$	0.252	0.051	-0.06
	(0.404)	(0.484)	(0.413)
Endbalance $_{i,t}$	-0.168***	-0.192***	-0.315***
	(0.057)	(0.058)	(0.057)
D_Moodys $_{i,t}$	-5.798***	-6.435***	-6.766***
	(1.509)	(1.760)	(1.639)
Debt $_{i,t}$	0.110**	0.274	0.375***
	(0.044)	(0.274)	(0.143)
Rev_shock $_{i,t}$	-0.038	-0.024	-0.041
	(0.047)	(0.053)	(0.069)
Exp_shock $_{i,t}$	0.196***	0.176**	0.224***
	(0.063)	(0.066)	(0.082)
Gov_surplus $_{i,t}$	1.257**	0.528	0.603
	(0.618)	(0.746)	(1.260)
Gov_deficit $_{i,t}$	7.141***	3.7	4.640**
	(1.624)	(2.492)	(1.878)
Gov_deficit $_{i,t}$ x *No_carry* $_i$	-8.007***	-5.066*	-6.379***
	(1.979)	(2.607)	(1.670)
Divided_gov $_{i,t}$	-0.45	-1.488	-1.721*
	(0.797)	(0.888)	(0.919)
Divided_gov $_{i,t}$ x *No_carry* $_i$	0.239	0.844	1.255*
	(0.487)	(0.520)	(0.653)
Ideology_gov $_{i,t}$	0.006	0.027	0.051
	(0.011)	(0.018)	(0.031)
No_carry $_i$	0.073		
	(0.425)		
Estimator	OLS	FE	GMMSYS
Time dummies	Yes	Yes	Yes
Number of lags of dependent variable	4	4	4
Sample	1988-1997	1988-1997	1988-1997
Long-run impact factor	4.957	2.686	2.925
Number of states	36	36	36
Observations	266	266	266

*** p<0.01, ** p<0.05, * p<0.1

Standard errors reported in parentheses. Cluster adjusted standard errors used in colums (1) and (2). Robust standard errors used in colum (3).

GMMSYS estimates are obtained using the dependent variable lagged twice or more as instruments in the differenced equation. The level equation uses the lagged first difference of the dependent variable as instrument.

See Table A2 for variable description

Table 2. Interacting Late Budget with Endbalances, Government Surplus and Election Dummy

	Yield spread vs. New Jersey on 20-year GO debt				
	(1)	(2)	(3)	(4)	(5)
Days_late_pos $_{i,t}$	0.047***	0.061***	0.066***	0.026***	0.065***
	(0.013)	(0.023)	(0.022)	(0.009)	(0.021)
Days_late_pos $_{i,t}$ x *Endbalance* $_{i,t}$	-0.027***		-0.021**		-0.018***
	(0.010)		(0.008)		(0.007)
Days_late_pos $_{i,t}$ x *Gov_spl* $_{i,t}$		-0.111***	-0.071**		-0.074***
		(0.029)	(0.030)		(0.026)
Days_late_pos $_{i,t}$ x *Elex* $_{i,t}$				0.081***	0.068***
				(0.018)	(0.022)
Estimator	GMMSYS	GMMSYS	GMMSYS	GMMSYS	GMMSYS
Time dummies	Yes	Yes	Yes	Yes	Yes
Number of lags of dependent variable	4	4	4	4	4
Sample	1988-1997	1988-1997	1988-1997	1988-1997	1988-1997
Long-run impact factor	2.965	3.065	2.994	2.939	2.995
Number of states	36	36	36	36	36
Observations	266	266	266	266	266

*** p<0.01, ** p<0.05, * p<0.1

Robust standard errors in parentheses

Same explanatory variables as in Table 1 included in all estimations. See notes in Table 1 for more details.

Table 3. Robustness: Using Legislative Delays as indicator for Late Budgets

	Yield spread vs. New Jersey on 20-year GO debt		
	(1)	(2)	(3)
Days_delayed_neg $_{i,t}$	-0.006	0.012	0.014
	(0.006)	(0.016)	(0.016)
Days_delayed_pos $_{i,t}$	0.027***	0.013	0.028***
	(0.010)	(0.008)	(0.009)
Estimator	OLS	FE	GMMSYS
Time dummies	Yes	Yes	Yes
Number of lags of dependent variable	4	4	4
Sample	1988-1997	1988-1997	1988-1997
Long-run impact factor	4.899	2.709	2.918
Number of states	36	36	36
Observations	262	262	262

*** p<0.01, ** p<0.05, * p<0.1

Robust standard errors in parentheses in colums (2)-(6). Cluster adjusted standard errors used in colum (1)

Same explanatory variables as in Table 1 included in all estimations. See notes in Table 1 for more details.

GMMSYS estimates are obtained using the dependent variable lagged twice or more as instruments in the differenced equation. The level equation uses the lagged first difference of the dependent variable as instrument.

Table A1. The Effect Fiscal Rules on Yield Spreads

	Yield spread vs. New Jersey on 20-year GO debt		
	(1)	(2)	(3)
Days_late_neg $_{i,t}$	0.004	0.005	0.003
	(0.015)	(0.015)	(0.016)
Days_late_pos $_{i,t}$	0.026***	0.026***	0.019*
	(0.010)	(0.009)	(0.010)
Rev_shock $_{i,t}$	-0.155	-0.062	-0.045
	(0.125)	(0.078)	(0.064)
Rev_shock $_{i,t}$ x *No_carry* $_{i}$	0.22		
	(0.148)		
Rev_shock $_{i,t}$ x *Spending_limit* $_{i,t}$		0.167	
		(0.134)	
Rev_shock $_{i,t}$ x *Revenue_limit* $_{i,t}$			-0.043
			(0.160)
Exp_shock $_{i,t}$	0.339***	0.251***	0.011
	(0.122)	(0.089)	(0.078)
Exp_shock $_{i,t}$ x *No_carry* $_{i}$	-0.411**		
	(0.183)		
Exp_shock $_{i,t}$ x *Spending_limit* $_{i,t}$		-0.306	
		(0.198)	
Exp_shock $_{i,t}$ x *Revenue_limit* $_{i,t}$			0.332***
			(0.127)
Estimator	GMMSYS	GMMSYS	GMMSYS
Time dummies	Yes	Yes	Yes
Number of lags of dependent variable	4	4	4
Sample	1988-1997	1988-1997	1988-1997
Long-run impact factor	2.805	2.895	2.929
Number of states	36	36	36
Observations	266	266	266

*** p<0.01, ** p<0.05, * p<0.1

Robust standard errors in parentheses

Same explanatory variables as in Table 1 included in all estimations. See notes in Table 1 for more details.

Table A2. Variable definitions and sources

Variable	Description	Source
Chubb $_{i,t}$	Average of summer and winter observation of the "Chubb Relative Value Survey", given as the surveyed yield spread on 20-year general obligation bond relative to New Jersey	Lowry and Alt (2001) and Poterba and Reuben (2001)
Days_late $_{i,t}$	Number of days from end of fiscal year to budget signed into law	Andersen, Lassen and Nielsen (2010a)
Days_delayed $_{i,t}$	Number of days from legislative deadline to legislative budget passage	Andersen, Lassen and Nielsen (2010a)
Late_budget $_{i,t}$	Dummy variable equal to 1 if budget was signed into law after end of fiscal year	Andersen, Lassen and Nielsen (2010a)
Delayed_budget $_{i,t}$	Dummy variable equal to 1 if budget was passed by legislature after legislative deadline	Andersen, Lassen and Nielsen (2010a)
Days_late_pos $_{i,t}$	Equal to *days_late* $_{i,t}$ x *late_budget* $_{i,t}$	Andersen, Lassen and Nielsen (2010a)
Days_late_neg $_{i,t}$	Equal to *days_late* $_{i,t}$ x (1-*late_budget* $_{i,t}$)	Andersen, Lassen and Nielsen (2010a)
Days_delayed_pos $_{i,t}$	Equal to *days_delayed* $_{i,t}$ x delayed_*budget* $_{i,t}$	Andersen, Lassen and Nielsen (2010a)
Days_delayed_neg $_{i,t}$	Equal to *days_delayed* $_{i,t}$ x (1-delayed_*budget* $_{i,t}$)	Andersen, Lassen and Nielsen (2010a)
Unempl_change $_{i,t}$	Change in unemployment rate since previous year	Bureau of Labor Statistics
Gov_spl $_{i,t}$	General Government surplus relative to GDP	US Census Bureau
Gov_surplus $_{i,t}$	*gov_spl* if *gov_spl* >0, and zero otherwise	US Census Bureau
Gov_deficit $_{i,t}$	-*gov_spl* if *gov_spl* <0 and zero otherwise	US Census Bureau
Debt $_{i,t}$	Debt at the end of fiscal year scaled relative to GDP	US Census Bureau
Moodys $_{i,t}$	Moodys credit rating on 20-year GO bonds, ranging from 4 to 1, where Aaa=4, Aa=3, A=2, Baa=1	Alt and Lowry (2001)
D_Moodys $_{i,t}$	*Moodys* $_{i,t}$ -*Moodys* $_{i,t-1}$	Alt and Lowry (2001)
Divided_gov $_{i,t}$	Dummy variable equal to 1 if either *i)* both legislative chambers controlled by other party than governor's, or *ii)* two chambers controlled by different parties	http://www.ipsr.ku.edu/SPPQ/journal_datasets/klarner.shtml
Elex $_{i,t}$	Dummy variable equal to 1 in years with a gubernatorial election	Book of the States, various editions.
Population $_{i,t}$	State population (in millions of people)	U.S. Census Bureau
GDP $_{i,t}$	State GDP	Bureau of Economic Analysis
Endbalance $_{i,t}$	End-of-year balances in the general fund and stabilization fund, as projected in executive budget proposal. Measured in percent of proposed general fund expenditure	National Association of State Budget Officers: *The Fiscal Survey of States* , various editions
Ideology_gov $_{i,t}$	Score of government (governor and two major party delegations in house and senate) ideology. Ranges from 0 to 100, with 0 being the most conservative value and 100 the most liberal position.	Berry et al (1998)
Supermajority $_{i}$	Dummy variable equal to 1 if a supermajority vote is required to pass each budget	National Conference of State Legislatures
No_carry $_{i}$	Dummy variable equal to 1 if the state law does not allow a budget deficit to be carried over to the next fiscal year	Bohn and Inman (1996)

Table A2. Variable definitions and sources (continued)

Revenue_limit $_{i,t}$	Dummy equal to one if a revenue limit is in place	Poterba and Rueben (2001)
Spending_limit $_{i,t}$	Dummy equal to one if a spending limit is in place	Poterba and Rueben (2001)
Exp_shock $_{i,t}$	Percentage deviation of actual general fund expenditure from original projections, net of the effect of within-year tax changes	Data provided by Kim Rueben. See Poterba and Rueben (2001)
Rev_shock $_{i,t}$	Percentage deviation of actual general fund revenue from original projections, net of the effect of within-year tax changes	Data provided by Kim Rueben. See Poterba and Rueben (2001)