Are Two Heads Always Better than One?

Redundancy, Competition, and Task Performance Quality in Public Bureaus*

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Abstract

It is commonly accepted among organizational theorists within the social sciences that agency competition, in the form of parallel redundancy, results in improving the task performance quality of public bureaus. We argue that this assertion is not unequivocally valid. Specifically, redundancy–based competition might fail to improve the initial bureau's performance when its task outcomes reflect adverse reputational herding vis–a–vis a redundant bureau. Using postwar data on U.S. tax revenue and budget outlay projections generated by presidential and congressional support fiscal agencies, the statistical evidence supports our theory. Our empirical results not only call into question the commonly held view that bureaucratic redundancy–based competition necessarily results in better agency performance, but also has broader implications for the unabridged growth in the organizational size and scope of institutions over the past several decades in industrialized democracies.

1. Introduction

If task performance matters, then organizational effectiveness is perhaps the penultimate normative goal that motivates a considerable portion of governmental behavior within a political system. Failure to attain this goal can result in pathologies associated with democratic governance ranging from administrative inefficiencies to outright policy failures. Organizational effectiveness is typically thought to be motivated by certain structures as providing better choices than others, and thus producing variations in bureaucratic performance (Moe 1990). While organizational structures clearly do matter, they might matter for reasons that differ from accepted wisdom. In the presence of a "friendly" political principal, for instance, parallel systems might yield observationally equivalent, or perhaps, inferior outcomes (Ting 2003).

This less sanguine view of redundancy–based competition among public organizations differs from accepted scholarly wisdom on this topic. Specifically, scholars widely agree that competition among public bureaus yields more reliable and effective governance structures. For instance, public choice economists maintain that competition among bureaus can mitigate the monopoly power of a single provider of a public good or service by improving governmental performance (Niskanen 1971: 197–199; Tullock 1965). Relatedly, sociologists emphasize how improved reliability through duplication–oriented redundancies can provide greater consistency with respect to a bureau's production of organizational outputs (Hannan and Freeman 1984). The importance attached to organizational effectiveness has taken on greater significance in public administration research within the political science discipline, especially as it relates to bureaucratic performance. Anthony Downs (1967: 200) claims that "....when faced with a threat from functional competitors, a bureau is more likely both to invent better ways of performing its functions and to attack its competitors." Martin Landau (1969) extended insights into the advantages of bureau competition via redundant (or parallel) systems which entail duplication of task activities. The upshot of this body of research is that organizational effectiveness can be enhanced from having competing bureaus engage in the same set of task activities.

We propose a theory of *adverse reputational herding* to explain under what theoretical conditions redundancy–based competition[1] will fail to improve bureaucratic performance. When a parallel (redundant) agency performs at the same or lower level compared to an initial agency did before the former bureau's creation, the initial bureau will play to the level of its competition by either exhibiting no change or a reduction in task performance quality. We maintain that this behavior is accounted for by *reputational herding* (Graham 1999). This phenomenon occurs when these public bureaus' task performance quality are indistinguishable from one another, and also their (shared) private signals are positively correlated.

We test our theory of adverse reputational herding by analyzing the quality of one year ahead tax revenue and budget outlay projections produced by the Bureau of the Budget (BOB)/Office of Management and Budget (OMB) and Congressional Budget Office (CBO) during the postwar era. This empirical laboratory serves as an appropriate natural experiment to examine the effects of redundancy–based agency competition for several reasons. Fiscal projections represent analytic task activities that serve as a vital source of bureaucratic expertise since the information contained in these forecasts are utilized in managing the fiscal policy

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[1] Although competitive structures imply redundancy, the opposite is not necessarily true because of the possibility of non–competitive (i.e., non–duplication) based redundancies (Bendor 1985: 53–55) such as overlapping jurisdictions (Lerner 1986: 336–337). Because our focus is on competition among public bureaus engaged in the same (duplicative) tasks, we often use the terms *competition* and *redundancy* interchangeably throughout this essay. For the most part, we refer to this phenomenon as *redundancy–based competition*.

process within the U.S. federal government (e.g., Penner 1982; Stockman 1986). The original intent underlying the creation of the redundant agency – the Congressional Budget Office (CBO) – has been to provide an institutional check on the executive branch's fiscal policy analysis with a legislative branch support agency engaged in identical tasks, that is also purposefully designed to be more insulated from political pressures (Fox and Hammond 1977: 134; Tomkin 1998: 140; Wilson 1989: 259; Schick 1980: Chapter 5). Analyzing the quality of fiscal projections also allows us to evaluate bureaucratic performance against an objective standard – the actual amount of tax revenues obtained or budget outlays expended by the U.S. federal government. Finally, our chosen empirical laboratory allows us to move beyond a cost–effectiveness criterion for assessing the consequences of bureau competition (Conybeare 1984; Downs 1967; Niskanen 1971; Miller and Moe 1983). This departure is especially important given that cost–effectiveness does not always provide insight into product quality generated by public bureaus.

The outline of this essay proceeds as follows. Next, we discuss why bureaucratic competition yields positive effects for organizational effectiveness, and its underlying assumptions. In the third section, we set forth a theory of adverse reputational herding that jointly predicts two distinct types of mimicking behavior on the part of administrative agencies as well as a failure of the initial bureau to improve its task performance quality within a parallel system. We discuss BOB/OMB fiscal projections for the postwar era as an appropriate natural experiment to test our theoretical propositions. Our theory of adverse reputational herding is subsequently tested in the next two sections. We conclude by summarizing our findings and discussing its implications for the design of both public agencies and political institutions.

2. The Positive Consequences of Redundancy–Based Bureaucratic Competition

Redundancy in organizational systems was originally viewed as running counter to the principles of scientific management grounded in functional specialization and division of labor (Weber 1946). This perspective was grounded in the maintenance of managerial control (Gulick and Urwick 1937; see also Hammond 1986; Meier and Bohte 2000). Beginning with Tullock (1965), however, agency competition has been viewed more favorably by scholars. This is because competition among bureaus is thought to enhance organizational reliability and performance by providing incentives to agencies to improve their operations in order to distinguish itself from others (Gortner, Mahler, and Nicholson 1987: 170). William Niskanen (1971: 111) notes that "...competition in a bureaucracy is as important a condition for social efficiency as it is among profit–seeking firms." Competitive pressures induced by multiple agencies engaged in a common set of task activities can also result in greater functional innovations than if only a single agency performs those tasks (Downs 1967: 199). Downs (1967: 200–202) claims that enhanced organizational effectiveness arising from competition occurs when (1) both the initial and redundant bureaus obtain resources from the same budgetary authority; and also that (2) rival bureaus must be sufficiently distant from one another so that (i) threat of retribution in each agency is low since they are not likely to be members in the competing agency in the (near) future, and (ii) do not exhibit strong loyalty to the same higher bureau.[2]

[2] The first assumption is valid when studying any public bureau that does not have budgetary independence from the legislatures, unlike a central bank or government corporation whose funds come from outside the governmental budgetary process. Satisfying the second assumption is more tenuous for analyzing intraorganizational units within an agency compared to interorganizational analyses across agencies. For example, independent regulatory commissions and executive bureaus in the United States do not share the same institutional loyalties given that the former has legislative and budgetary clearance

This competition results in duplication–based redundancy when two or more bureaus engage in the same set of tasks, thus comprising a parallel system.[3] Such a system of "over–engineering" enhances effective governance and organizational performance (Landau 1969). Specifically, the enhanced performance attributable to a parallel system is due to both competitive pressures as well as increased reliability in performing tasks since additional check points can detect problems such as human errors, abuse of power, or outright administrative failure (Bendor 1985; Chisholm 1989; Heimann 1993, 1997; Landau 1969, 1991; Meier 1987; Osborne and Gaebler 1993; Whitford 2003). The performance enhancement effects associated with organizational redundancy are nontrivial. For instance, positive net benefits will accrue even when rival bureaus have success probabilities exhibiting positive contagion – i.e., when the success of one agency is positively correlated to others (Bendor 1985). Simulation results from a computational model set forth by Whitford (2003) uncovers how organizational competition can breed imitation, and thus lead to enhanced agency performance. These enhancements to task performance, however, come at the cost of increased agency instability and a punishment strategy that sanctions the underperforming agency.

The empirical evidence to date supports these theoretical claims. Jonathan Bendor (1985), for example, demonstrates that competition between the branches of the armed services

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authority from OMB, while the latter do not have such autonomy and are formally part of the executive branch. Nonetheless, much of the theory and evidence supporting the benefits of redundancy–based bureau competition has been applied to intraorganizational settings, and thus appears to be robust for less conducive situations where one or both of Downs' assumptions are violated.

[3] Parallel systems refer to two or more organizations engaged in the same set of tasks, while serial systems represent organizations working on non–overlapping tasks that represent contingent points in a sequence (Heimann 1993: 424). As a result, serial systems are more prone to failure than parallel ones (Bendor 1985; Chisholm 1989; Landau 1969, 1991).

has resulted in a redundant nuclear weapons system that has been proven to be particularly reliable as a deterrent. Similarly, Donald Chisholm (1989) finds that the decentralized nature of the San Francisco Bay area's transit system has resulted in some inefficiencies, but that they have been more than offset by increased reliability. C.F. Larry Heimann (1993, 1997) has shown that the *Challenger* disaster was in large part due to changes in NASA's organizational structure that eliminated redundant systems designed to block decision errors that would result in unsafe launches. Finally, Rowan Miranda and Allan Lerner's (1995) study of local and municipal governments reveals that redundancy–based competition not only yields improved service delivery, but also reduces information asymmetries experienced by political principals.

Redundant systems are only capable of producing enhanced control and performance when agencies exhibit two characteristics – total overlap or duplication by organizations for a given function or set of tasks; and a lack of excessive restrictions that can inhibit agency performance (Meier 1987: 230). Even in the presence of these requisite conditions being met, it remains possible for redundancy–based competition to produce no improvement in bureaucratic performance. We advance a theory of adverse reputational herding to explain the conditions in which redundancy–based bureau competition will fail to bring about positive performance effects that are commonly accepted wisdom in the literature on public organizations dating back to Tullock (1965), Downs (1967), and Landau (1969), respectively.

3. Why Redundancy–Based Competition Fails to Improve Task Performance in Public Bureaus? A Theory of Adverse Reputational Herding

So far, we have explained the positive effects of redundancy–based competition on public bureaus' performance. Under certain circumstances, however, this type of competition can fail to improve agency performance. In such instances, excess resources are utilized at zero or negative net benefit to the agency's performance. We advance a theory of *adverse reputational herding* to explain this phenomenon. Theoretical models of this type of herding behavior differ from conventional reputational herding insofar that the former implies an absence of improvement attributable to competitive effects, while the latter is more general and does not exclude the possibility of enhanced agent performance (Graham 1999; Scharfstein and Stein 1990; Prendergast and Stole 1996; Trueman 1994; Zwiebel 1995).

Our use of the term *adverse* pertains to a lack of an increase in task performance quality since duplication without improvement yields the costs of bureaucratic inefficiencies, while both duplication and performance costs are incurred if task quality deteriorates. Put simply, when the duplication of tasks do not yield improved organizational performance, then it is not worth the costs of undertaking a parallel system since social welfare losses will be incurred. Moreover, we expect that the motivation underlying this type of herding behavior to have its roots in the priority that administrative agencies place on maintaining a favorable reputation with their political superiors (Carpenter 2001; Rourke 1984; Wilson 1989).

Adverse reputational herding means that the initial agency will perform at the level of the redundant agency, and that the entrance of the redundant agency fails to improve upon task performance compared to when such duplication did not occur. Such behavior can occur in a negative redundant system where the redundant bureau commits judgmental errors which are systematically biased, and thus "...two heads do not perform better than one" (Felsenthal and Fuchs 1976: 475; Felsenthal 1980: 248–249). Therefore, the lack of improvement in the initial bureau's performance within a parallel system is due to its mimicking behavior of the redundant bureau and also both bureaus' private information signals being positively correlated.[4]

Reputational herding behavior might occur in public organizations when redundancy–based competition results in such mimicking behavior within organizations as inferior units try to emulate superior ones. For example, March (1988: 342) states that "Human action is often less a matter of choice than a matter of imitating the actions of others, learning from experience, and matching rules and situations on the basis of appropriateness."; and that "Norms and practices diffuse from one actor to another...... Knowledge developed in one organization spreads to another. This appropriation of knowledge makes a difference."(March 1999: 47). Brehm and Gates (1997: 157) uncover convergent shirking by police officers within the same city as a means of coping with uncertainty in their task environment. In addition, we expect that redundancy– based competition will provide fertile territory for private information, even if subsequent task performance quality fails to improve. This is because Miller and Moe (1983) demonstrate that reduction of information costs is the main benefit associated with bureau competition. It is thus reasonable to surmise that one might expect greater abundance of both

[4] Reputational herding is logically similar to informational cascades insofar that agents discount private information and place a premium on public information when making decisions. The major difference between them is that informational cascades occur because participant actors trust the *initial* or *observed* actions of others (in this case competing bureaus) more than they trust their own private information. Informational cascades do not preclude agents from employing their private information to at least some extent. This type of herding behavior assumes that private signals are independently distributed – i.e., orthogonal to other agents (e.g., Banerjee 1992; Bikchandani, Hirshleifer, and Welch 1992; Welch 1992). Conversely, reputational herding suggests that positive reputation–based externalities can be obtained through herding behavior (Graham 1999: 238). In other words, "...reputation and herding on the leader (sic "superior" agent) are ceteris paribus positively correlated distinguishes the reputational model from the general class of herding models." (Graham 1999: 249). In other words, an "inferior" bureau will seek to produce results that mimic those ensuing from a "superior" bureau based on each organization's private information. Hence, their private signals will be positively correlated.

public and private information in a redundancy–based competitive (public) market consisting of multiple agencies compared to that of a single agency possessing monopoly authority over task activities.

For a two bureau system, reputational herding occurs when a (perceived) “inferior” agency mimicking the actions of the (perceived) “superior” agency, and also the private signals between these bureaus are positively related. In the limiting case when both conditions are perfectly met, each agency’s behavior will be identical. Reputational herding behavior implies that the “inferior” agency behaves in a risk–averse fashion when it comes to performing task activities because poor performance will be harder to sanction by politicians if it closely mirrors that of the “superior” agency, than if it diverges from the latter. In other words, if the “superior” agency fails in performing a task, and thus fails to improve upon what is done by the “inferior” agency, then it becomes more difficult to blame the “inferior” agency for arriving at the same outcome. If, however, the “superior” agency performs at a high level and the “inferior” agency chooses to act solely on its own private information, then its relatively poorer performance will be more easily discerned by politicians than if it were to share such signals and respond in the same direction. Therefore, the extent to which the “inferior” agency’s reputation is tarnished will be related to whether they explicitly and/or implicitly mimic the “superior” agency’s behavior.

Adverse reputational herding behavior predicts that a redundant bureau cannot spur improvement in the initial bureau’s post–redundancy performance level since it performs at either an equivalent or inferior level to that of the initial bureau’s pre–redundancy performance level. In other words, the initial bureau plays at or down to the level of its competitor. Three testable implications must be jointly satisfied for our theory to be empirically substantiated:

> *H_1 : The initial bureau's task performance quality will fail to improve following the introduction of the redundant bureau into the administrative system.*
>
> *H_2 : The initial bureau's task performance quality cannot be distinguished from the redundant bureau once the latter is introduced into the administrative system.*
>
> *H_3 : Private signals between the initial and redundant bureaus will be positively correlated.*

The first hypothesis states that redundancy–based competition within an administrative system will not have its intended consequence of enhancing agency effectiveness. The second hypothesis pertains to demonstrating that agent quality cannot be distinguished in a manner that is logically analogous to a pooling equilibrium, and thus exhibits herding behavior. The third hypothesis differentiates an informational cascade from reputational herding since the former assumes private signals among bureaus will be orthogonal as discussed in Note 3. Although we cannot directly observe bureaus' private signals per se, we can however infer this information from the bureaus' contemporaneous performance shocks. Specifically, positively correlated performance shocks that contemporaneously transpire between the initial and redundant bureaus are indicative that each organization is responsive to unanticipated behavior emanating from one another in the same direction.[5] Adverse reputational herding theory can be rejected when at least one of these hypotheses are rejected by the data.

An important advantage of our theory is that competing explanations are nested within it. We can thus distinguish between our theory and alternative explanations for understanding the

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[5] Similarly, Williams and McGinnis (1988: 980) rational expectations arms race (REAR) model treats unanticipated behavior in the form of correlated shocks as indicative of private information sharing by maintaining that "In short, contemporaneous correlation of innovations is the *direct manifestation of the intimate linkage* (emphasis in *italics*) between the behavior of two rival states."

consequences of redundancy–based bureau competition on task performance quality. For instance, Ting (2003) analytically demonstrates that duplication is less helpful for improving organizational effectiveness when an agent (public bureau) has preferences that are relatively close to mirroring those held by their principal (political institution). Bureaus that possess a friendly relationship with their political principal will incur collective action problems that produce lower effort (performance) levels which may cause multiple agents to be less effective than a unitary agent (Ting 2003: 276). Although this "friendly principal" problem is consistent with our hypothesis involving the initial bureau's task performance failing to improve with the introduction of a redundant bureau into the administrative system (H_3), it does not necessarily imply adverse reputational herding since mimicking behavior on the part of initial and redundant bureaus consistent with H_1 and H_2 is independent of this particular theoretical prediction. Our theory is thus capable of encompassing Ting's (2003) theoretical prediction insofar that we can obtain statistical evidence that is *completely* consistent with this "friendly principal" problem only under the conditions where both H_2 and H_3 are refuted by the data, and H_1 is supported by the data. Our theory also allows for an informational cascade to be empirically valid if H_2 is supported and both H_1 and H_3 are rejected. Finally, we can also whether the initial bureau's performance improves in response to a parallel system. Support for this perspective would translate into rejection of H_1.[6] Next, we discuss the natural experiment used to test our theory.

[6] Another possible alternative explanation why we might observe a lack of improvement in organizational effectiveness resulting from competition among bureaus is that the initial bureau is already performing at an optimal manner, and thus its performance cannot be improved upon. This scenario is rather unlikely in most public organizations because public firms, unlike private counterparts, do not operate under a clear profit maximizing motive consistent with the neoclassical theory of the firm (March and Simon 1958; Cyert and March 1963). Moreover, administrative operations necessarily exhibit some degree of friction or inefficiencies due to procedural rules that embody "red tape" that is more pervasive in public organizations than in private firms (Kaufman 1977; March, Schulz, and Zhou 2000; Meier 1987:

A Natural Experiment with Presidential and Congressional Fiscal Support Agencies

We test our theory of adverse reputational herding by examining presidential and congressional support agencies responsible for conducting fiscal policy projections – the Bureau of the Budget/Office of Management and Budget (BOB/OMB) and the Congressional Budget Office (CBO). Until CBO's creation via the Congressional Budget and Impoundment Act of 1974[7], BOB/OMB had no institutional rival that served as a legitimate competitor in the policy process. The intention underlying CBO's creation was to create a level playing field where the quality of fiscal policy analysis would improve due to competitive pressures (Schick 1980; Wilson 1989: 258). Since Congress established "....its own independent source objective, expert, and nonpoliticized budget estimates and economic projections." this meant that ".......Congress would no longer be dependent on OMB for such information." (Tomkin 1998: 141). BOB/OMB thus serves as the initial bureau, while CBO represents the redundant bureau.

We also view BOB/OMB as the "inferior" bureau and CBO as the "superior" bureau. This is because *a priori* we expect that BOB/OMB will produce more biased and less accurate fiscal projections than CBO since the former bureau is less insulated from political influence than the latter bureau based on their respective institutional designs. Specifically, BOB/OMB is a presidential support agency under the aegis of the Executive Office of the President (EOP) who serves as a surrogate for administration policy goals (e.g., Burke 1992; Moe 1985). This agency

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134–137; Wilson 1989: 317–320). Even so, an absence of improvement in task performance quality displayed by the initial bureau is sufficient to show that the redundancy–based competition provides no additional benefits. Therefore, a redundant bureau constitutes an inefficient use of scarce resources, and thus is indicative of net social welfare losses being incurred.

[7] It did not, however, begin performing official fiscal projections until late 1975/early 1976 for fiscal year 1977 (Fox and Hammond 1977: 134).

is thought to exercise little flexibility in exercising independent judgment from the White House because its political support is derived from a single source – the president (Meltsner 1976; Schick 2000: 87). Because of its institutional design and diverse constituency, CBO is relatively more insulated from political pressures compared to BOB/OMB. This bureau's structural design reflects an "artful compromise" between the Senate's desire for a neutral, politically insulated agency and the House's preference for a responsive agency similar to what the presidency had with BOB/OMB (Schick 1980: 152). Although "CBO is an independent organization that has responsibilities to the Whole Congress." (Schick 1980: 139), this agency only has partial autonomy since it does not possess budgetary independence, and the CBO director is appointed to four year terms by the House Speaker and the President Pro Tempore of the Senate.

In addition, CBO was created as an institutional response by Congress to offset the increased politicization of the presidential branch bureaucracy attributable to the conversion of BOB into OMB (Berman 1979: ix; Wilson 1989: 258). During the legislative debate involving passage of the Congressional Budget and Impoundment Control Act, members complained about the low quality of information sometimes provided by BOB/OMB, and argued for the creation of a professional legislative office that would give Congress access to "accurate fiscal data." (Congressional Record 1973: 39346– 39352, 39713–39716). The establishment of CBO as a competing bureau was expected to motivate executive branch analysts to produce higher quality policy information (Williams 1974: 20–21). In fact, the creation of CBO did force BOB/OMB to be wary of how its reputation would be affected if its projections proved to be less accurate than its new competitor's (Wildavsky and Caiden 2001:108; Tomkin 1998: 176, 270–272). Because its projections are commonly believed to be more tainted by political influence, both biases and inaccuracies in BOB/OMB's numbers have damaged the agency's credibility with both Congress and the public even when those numbers were not much different than CBO's (Tomkin 1998: 272). A skeptic might argue that CBO, as the less experienced agency, would seek to imitate BOB/OMB. This, however, is unlikely given both BOB/OMB's reputation as a heavily politicized presidential support agency and Congress' original statutory intention for CBO.

Our selection of presidential and congressional branch support agency fiscal projections is of substantive interest because of its policy importance. The numbers produced in these agencies' estimates frame the policy debate and influence the fiscal outcomes by setting parameters within which bargaining takes place. Additionally, the quality of the projections plays a large role in enabling Congress and the president to understand the fiscal implications of their various policy initiatives, and therefore affects the policy positions that they take (Schick 2000). These fiscal support agencies provide us with a conservative test of our theory since one expects that the introduction of competition, in the form of a redundant bureau, will be likely to enhance task performance quality of the initial bureau. This is because Downs' (1967: 200–202) first– order conditions presumes that the positive benefits of redundancy–based competition should be greater across bureaus representing different political branches than it will be for investigating either two different agencies within a single branch of government or two separate units within a given bureau, ceteris paribus. This is because the initial and redundant bureaus will be most (organizationally) distant from one another, yet obtain resources from the same budgetary authority – Congress, subject to presidential approval. The use of BOB/OMB and CBO is skewed towards refuting our theory and supporting conventional wisdom that redundancy–based competition does indeed improve agency performance (i.e., rejection of H_1). This point is also germane to reputational herding behavior for these particular agencies, especially H_3 since (shared) correlated private information signals are less likely to be observed in inter–institutional settings than within a given branch (inter–organizational) or bureau (intra-organizational).

Still a skeptic might contend that the observability of both bureau's policy outputs will falsely skew our statistical evidence toward showing support for H_2. We cannot assume *a priori* that the transparency of BOB/OMB and CBO task activities will necessarily result in herding behavior for these reasons. After all, gamesmanship in policy advising might result from such competitive pressures. This is because politicians have an incentive to bias their forecasts in an effort to pull opponents closer to their most preferred outcome given that budget outcomes are often heavily influenced by which assumptions are adopted (Penner 1982; Schick 2000). This is especially true when each branch perceives fiscal projections generated by the opposing branch of government will undermine its policy agenda. To handle this dilemma, each institution will encourage its own respective support agency to produce information that portrays its policy preferences in a more favorable light. Presidents, for example, in order to gain needed votes in Congress, have not been afraid to instruct OMB to develop forecasts that make presidential policy initiatives appear more plausible (e.g., Schick 2000: 55; Stockman 1986: 353). This has involved institutional differences regarding the economic assumptions used to construct fiscal policy projections (Palazzolo 1999: 62–63; Schick 2000: 50–51) as well as Congress moving closer to OMB's forecasts while moving away from CBO forecasts when adopting its numbers for the budget resolution (Penner and Abramson 1988: 99, 102; Rubin 2003: 109; White and

Wildavsky 1989: 126). Therefore, we are confident that our natural experimental setting provides a sound empirical test of adverse reputational herding behavior.

Testing H_1: Does Redundancy–Based Competition Improve Task Performance Quality by the Initial Bureau?

Our first objective is to determine whether the introduction of redundancy–based competition, in the form of CBO, has resulted in enhancing the quality of BOB's/OMB's fiscal projections. Because the BOB/OMB is a presidential support agency, if we can demonstrate that its task performance quality has not improved since the inception of CBO as a redundant bureau, then we will obtain support for Ting's (2003) "friendly principal" problem. In addition, such a finding will also be compatible with our theory of adverse reputational herding since it indicates that the consequences of this administrative innovation is to increase bureaucratic inefficiency at a minimum, and perhaps declining task performance quality.

We employ data on BOB/OMB and CBO constant dollar adjusted actual and projected values for total federal revenues and total federal outlays.[8] Data for the BOB/OMB projections are taken from the *Budget of the United States Government* for years FY1947–FY2001. CBO projections are derived from two sources: the *Five Year Budget Projections* for FY1977–FY1981; and *The Budget and Economic Outlook* for FY1982–FY2001. Projections are made approximately nine months prior to the fiscal year being forecast and are released by OMB and CBO in late January/early February. Actual values are taken from the December issues of the *Economic Indicators* (1948–2002) prepared by the Council of Economic Advisors for the Joint

[8] All constant dollar government fiscal measures are deflated by the government consumption expenditures implicit price deflator (1996 = 100). That can be obtained from the Federal Reserve Bank of St. Louis' web site at http://research.stlouisfed.org/fred2/series/GDPDEF/21.

Economic Committee. The December issue is used because it provides a more up-to-date revision of the actual values than are available earlier in the year when the budget documents are released by BOB/OMB and CBO.[9]

In order to test H_1, we analyze the quality of BOB/OMB tax revenue and budget outlay projections for the FY1947 – FY 2001 period. Because our purpose is to examine a single agency over a lengthy period of time, we standardize the fiscal projection error and projection error adjustment gap by dividing the constant dollar actual value of the fiscal variable in question.[10] We test for bias in BOB/OMB fiscal projections by regressing the standardized projection error on the standardized projection error adjustment gap, a binary dummy variable termed Competition that equals zero during the pre–CBO era (FY1947 – FY1976) and one

[9] Key members of OMB (Hugh T. Connelly, personal communication with second author, 2–06–03), CBO (John Peterson, personal communication with second author, 2–06–03), and the Fed (Matthew Luecke, personal communication with second author, 2–21–03) confirmed that the December actual values were more accurate than actual values listed earlier in the year. Both Messrs. Connelly and Peterson also indicated that historical tables are inappropriate sources of actual values because each year's data within such tables are updated to reflect current measurement practices and techniques. Therefore, they are not comparable to the real–time forecast data listed in the budget documents.

[10] This transformation is important for this portion of the empirical analysis for two reasons. First, a $10 billion constant dollar projection error might be relatively more alarming in 1953 compared to the same magnitude of error occurring in 1998 because the former will constitute a greater percentage error in relation to the fiscal variable. In addition, our aim here is not to make contemporaneous relative comparisons across bureaus for the same time period as we do in the next section when testing for reputational herding effects, but rather we are concerned with relative assessments for a single bureau over a lengthier period of time. Thus, we standardize both measures using the following formulae: $y_t - \tilde{y}_t = \left(\frac{Y_t - \tilde{Y}_t}{Y_t} \right) \times 100$ for the projection error dependent variables and $\tilde{y}_t - y_{t-1} = \left(\frac{\tilde{Y}_t - Y_{t-1}}{Y_t} \right) \times 100$ for the projection error adjustment gap independent variables. In supplementary analysis (see Supplementary Tables 1–4), we provide corroborative empirical support for H_1 when these variables are treated as unstandardized measures.

henceforth, the interaction between these two independent variables, plus a vector of control variables employed in the previous section (see Data Appendix for more details), and a random disturbance term. This takes the following form of:

$$y_t - \tilde{y}_t = \alpha + \beta_1 \left(\tilde{y}_t - y_{t-1} \right) + \beta_2 \left[\left(\tilde{y}_t - y_{t-1} \right) \times Competition_{\,t} \right] \\ + \beta_3\, Competition_{\,t} + \delta_k\, X_{k,\,t-i} + \varepsilon_t \quad , \qquad (1)$$

where the current standardized fiscal projection error is given by $y_t - \tilde{y}_t$ (tildes denote projection values) and the standardized projection adjustment gap reflecting information known to the agency when they are conducting current projections denoted by $\tilde{y}_t - y_{t-1}$. The Competition variable is simply a binary indicator that equals 1 once CBO effectively became a redundant bureau in FY 1977, and zero otherwise. The remaining independent variables represent a set of statistical controls denoted by $X_{k,\,t\text{–}i}$ and a corresponding parameter vector δ_k. Finally, the stochastic disturbance term is denoted by ϵ_t.

Failure to reject systematic bias in BOB/OMB fiscal projections during the pre–CBO era occurs when we jointly fail to reject an absence of drift ($\alpha = 0$) and deviations of the current projection from the previous actual value does not predict the current projection error ($\beta_1 = 0$). This unbiasedness–efficiency condition holds for the CBO (post FY1977) era when $\alpha = 0$, $\beta_1 + \beta_2 = 0$ and $\alpha = 0$, $\beta_1 = 0$ in the preceding era (pre FY1977). The first hypothesis (H_1) associated with our theory is refuted if the unbiasedness–efficiency joint condition for BOB/OMB fiscal projection quality only holds for the CBO era, or the quality of these tasks during the CBO era yields a significant reduction in projection bias for the initial bureau (BOB/OMB) compared to the time preceding agency duplication – i.e., $\beta_1 < \beta_1 + \beta_2 \leq 0$ or $0 \geq \beta_1 + \beta_2 > \beta_1$. In other words, when $\beta_1 < 0$ ($\beta_1 > 0$), then $\beta_2 > 0$ ($\beta_2 < 0$) for H_1 to be rejected by the data.

We also inspect task performance quality based on projection accuracy by analyzing standardized absolute projection errors for the given model specification:

$$\left| y_t - \tilde{y}_t \right| = \alpha + \gamma_1 \left(\left| \tilde{y}_t - y_{t-1} \right| \right) + \gamma_2 \left[\left(\left| \tilde{y}_t - y_{t-1} \right| \right) \times Competition_t \right] + \gamma_3 \, Competition_t + \delta_k \, X_{k,\, t-i} + \varepsilon_t , \qquad (2)$$

where random errors involving projection accuracy under the pre–CBO era are supported if $\alpha = 0$, $\gamma_1 = 0$, and the same condition is satisfied during the CBO era if $\alpha = 0$, $\gamma_1 + \gamma_2 = 0$. In this context, H_3 is refuted by the data if the accuracy–efficiency joint condition only holds for the CBO era, or the post–CBO era results in an improvement in projection accuracy such that $0 \leq \gamma_1 + \gamma_2 < \gamma_1$ – i.e., $\gamma_1 > 0$ and $\gamma_2 < 0$.

The statistical results for analyzing projection error bias and accuracy involving BOB/ OMB tax revenues appear in **Tables 1** and **2**.[11] The statistical results in Table 1 uncover the presence of systematic bias in OMB tax revenue projections preceding the introduction of CBO into the administrative system in FY 1977. This empirical finding holds in every instance since we can reject the null hypothesis of $\alpha = 0$, $\beta_1 = 0$ at $p \leq 0.026$. Moreover, this coefficient is significantly different from minus unity (i.e., $\beta_1 = -1$) at $p \leq 0.034$ which means that this bureau's tax revenue projections significantly predict actual tax revenues, but do so in a way that is less than proportional to corresponding variations involving tax revenue realizations.[12] Once

[11] For purposes of brevity, we limit our discussion of the statistical results to the primary theoretical variables of interest throughout this investigation.

[12] Note that $\beta_1 = \left(\lambda_1 - 1\right)$, where $\lambda_1 = 0$ when fiscal realizations are orthogonal to fiscal projections (i.e., perfectly inelastic relationship) and $\lambda_1 = 1$ when variations in fiscal realizations and related projections are of the same exact magnitude (i.e., unit–elastic relationship). Once CBO has been

CBO becomes a functional competitor engaged in these same set of task activities, we find that this projection bias remains ($\alpha = 0$, $\beta_1 + \beta_2 = 0$ is rejected at $p \leq 0.001$), and also becomes significantly more biased. This is evident not only from the significant and negative coefficient sign on the interaction term represented by β_2 in the Gridlock Interval Distance specifications (Models 1 & 2), but more importantly these projections no longer exert a positive impact on tax revenue realizations since $\beta_1 + \beta_2 = -1$ cannot be rejected at conventional levels of significance in all four model specifications based on the Wald coefficient restriction tests.

[Insert Tables 1 & 2 About Here]

Save Model 8, the results appearing in Table 2 reveal that BOB/OMB's tax revenue projections contain only random inaccuracies before the creation of CBO (H_O: $\alpha = 0$, $\gamma_1 = 0$ is not rejected). Once CBO is introduced into the administrative system, OMB's task performance quality deteriorates by a nontrivial amount due to systematic inaccuracies in its tax revenue projections given the fact that $\gamma_2 > 0$ and the joint hypothesis of $\alpha = 0$, $\gamma_1 + \gamma_2 = 0$ can now be rejected by the data at $p \leq 0.020$. This reduction in task quality also translates into a decline from projections being positively related to actual tax revenue collections in a roughly proportional manner during the pre–CBO era given that $\gamma_1 = 0$ and $\gamma_1 \neq 1$ to being unrelated to these fiscal realizations during the CBO era since we fail to reject the hypothesis that $\gamma_1 + \gamma_2 = 1$. In sum, we can conclude from these statistical results that BOB/OMB tax revenue projections have become less accurate since CBO became a redundant bureau in the mid–1970's.

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introduced as a redundant bureau $\beta_1 + \beta_2 = \left(\left[\lambda_1 + \lambda_2\right] - 1\right)$, where $\lambda_1 + \lambda_2 = 0$ implies orthogonality, and $\lambda_1 + \lambda_2 = 1$ represents a unit–elastic relationship. Absence of systematic biases or inaccuracies occur by definition when $\lambda_1 = 1$ (pre–CBO era) and $\lambda_1 + \lambda_2 = 1$ (CBO era) cannot be rejected.

We also empirically test our theory with data on BOB/OMB budget projections for the same postwar time period. The results of this analysis appear in **Tables 3** and **4**. As with tax revenue projections, Table 3 reveals that OMB's policy information is systematically biased during both the pre–CBO and CBO eras at $p \leq 0.002$. Once again, this bias increases once CBO is introduced into the administrative system as budget outlay projection error adjustment gap effect widens – e.g., from $\beta_1 = -0.34$ to $\beta_1 + \beta_2 = -0.72$ in Model 10. Before the creation of CBO, budget outlay realizations respond in a less than proportional manner to BOB/OMB budgetary projections given that $0 < \beta_1 < -1$. Because we cannot reject $\beta_1 + \beta_2 = -1$ yet we do reject $\beta_1 + \beta_2 = 0$ across all model specifications, these data indicate that CBO's presence as a redundant bureau is associated with BOB's/OMB's budgetary projections lacking any useful predictive content for budgetary realizations. This decline in task performance quality supports H_1 and is consistent with our evidence on BOB/ OMB tax revenue projections.

[Insert Tables 3 & 4 About Here]

Our analysis of budget outlay projection accuracy appearing in Table 4 provides additional credence for the H_1 component of our theory. BOB/OMB budget outlay projections are systematically inaccurate when an institutional rival is not present to duplicate these tasks since the null hypothesis that $\alpha = 0$, $\gamma_1 = 0$ are rejected by the data at $p \leq 0.048$. Task quality, however, does not appear to noticeably decline. Inspection of these results reveal a lack of statistical significance associated with the interaction variable captured by the γ_2 coefficient and also the relatively smaller Wald test statistics for the joint accuracy–efficiency hypothesis test after CBO's entrance into the administrative system (H_O: $\alpha = 0$, $\gamma_1 + \gamma_2 = 0$) than beforehand (H_O: $\alpha = 0$, $\gamma_1 = 0$) in Models 13 and 14. This inference must be tempered since the magnitude of BOB/OMB budget outlay projections are significantly related to budgetary realizations before the advent of CBO since $0 < \gamma_1 < 1$, while this relationship is more tenuous once CBO becomes a redundant bureau given that $0 \leq \gamma_1 + \gamma_2 \leq 1$. This latter statistical pattern is suggestive of a decline in task performance quality. In sum, our statistical findings uncover strong empirical evidence supporting H_1. That is, we fail to observe improved task performance quality by BOB/OMB after the CBO is established as a redundant bureau. In most instances, BOB's/ OMB's task performance quality has significantly deteriorated in the presence of CBO as an institutional rival engaged in the provision of fiscal policy expertise. Although we have shown empirical support for the "friendly principal" problem (Ting 2003), we do not yet understand the specific causal mechanism underlying the organizational processes that result in BOB/OMB task performance quality failing to improve since the inception of CBO as a redundant bureau. Next, we address this issue by turning our attention to testing the remaining pair of hypotheses that comprise adverse reputational herding behavior.

Testing H_2 & H_3: Does Redundancy–Based Competition Lead to Reputational Herding Behavior?

In order to test H_2 & H_3, we must pool the BOB/OMB and CBO projections into a two equation system for a common sample period that takes the following general form:

$$\begin{aligned} Y_t^{OMB} - \tilde{Y}_t^{OMB} &= \alpha^{OMB} + \beta^{OMB}\left(\tilde{Y}_t^{OMB} - Y_{t-1}^{OMB}\right) + \delta_k^{OMB} X_{k,t-i}^{OMB} + \varepsilon_t^{OMB} \\ Y_t^{CBO} - \tilde{Y}_t^{CBO} &= \alpha^{CBO} + \beta^{CBO}\left(\tilde{Y}_t^{CBO} - Y_{t-1}^{CBO}\right) + \delta_k^{CBO} X_{k,t-i}^{CBO} + \varepsilon_t^{CBO} \end{aligned} \qquad (3)$$

where the current fiscal projection error is equal to $Y_t - \tilde{Y}_t$, the projection error adjustment gap that represents observable available information for the agency to employ when making current projections can be characterized as $\tilde{Y}_t - Y_{t-1}$, α, β are the key theoretical intercept and slope parameters of interest, $X_{k,\ t-i}$ is a set of statistical controls and δ_k is its corresponding parameter vector for each equation (see Data Appendix for a discussion of these variables), and ϵ_t represents a stochastic disturbance term (with superscripts indicating the bureau in question). If fiscal projections do not contain any systematic biases, then $\alpha = \beta = 0$ by definition. For H_1 to be supported by the data, we must fail to reject the null hypothesis: $\alpha^{OMB} = \alpha^{CBO}$, $\beta^{OMB} = \beta^{CBO}$. In other words, the estimated intercept and projection error adjustment gap slope coefficients from each bureau's projection error equation cannot not be distinguishable from one another. Empirical support for H_2 means that the fiscal projection error (performance) shocks between the OMB and CBO will be positively correlated – i.e., $\rho_{\varepsilon_t^{OMB},\ \varepsilon_t^{CBO}} > 0$.

The regression results appearing in **Tables 5** and **6** are estimated by seemingly unrelated regression technique (Zellner 1962) with a small sample adjustment to the covariance matrix since the common sample period for both political support agencies constitutes annual observations covering the FY 1977 – FY 2001 period.[13] The first table examines reputational herding with respect to projection bias, while the second table considers projection accuracy via an analysis of absolute projection errors. Given that the relevant intercept and slope parameters in each equation found in Table 1 are not jointly equal to zero ($\alpha = \beta = 0$), it is safe to infer that both OMB and CBO exhibit systematic biases in their projections of tax revenues and budget outlays. More importantly, the failure to reject intercept and slope joint equality across bureaus provides direct empirical support for H_2 (i.e., $\alpha^{OMB} = \alpha^{CBO}$, $\beta^{OMB} = \beta^{CBO}$) for both bias and accuracy based SUR model specifications.[14] We can thus conclude that OMB and CBO fiscal

[13] This correction is given by: $\sqrt{\left[n - \left(k^{OMB} + 2\right)\right] \times \left[n - \left(k^{CBO} + 2\right)\right]}$. The effective sample size is n = 23 for Gridlock Interval Distance specifications and n = 24 for Divided Government specifications.

[14] These probability values range between $0.927 \geq p \geq 0.241$.

projection errors are indistinguishable from one another. The reputational aspects of such herding behavior is assessed by inspecting the residual correlation across the pair of estimated equations. In accordance with H_3, positive correlation between these bureaus' contemporaneous performance shocks is indicative of private signals being transmitted between OMB and CBO. The contemporaneous residual correlation is both positive and large in magnitude ($0.455 \leq \hat{\rho}_{\varepsilon_t^{OMB},\ \varepsilon_t^{CBO}} \leq 0.965$), and the Breusch–Pagan test for independence is rejected at $p \leq 0.029$. These results not only support H_3, but in tandem with evidence in favor of H_2, also reject an informational cascade in favor of reputational herding behavior since private signals are not independently distributed between these bureaus. Our findings corroborate Tomkin's (1998: 142) descriptive claim that the introduction of CBO into the administrative system led to a surge in presidential–congressional interchange and communications as OMB and CBO engaged in technical policy issues. Our three hypotheses that constitute our theory of adverse reputational herding are empirically substantiated by the data.

[Insert Tables 5 & 6 About Here]

Discussion

Does redundancy–based competition improve the performance of public organizations? The answer to this question is a resounding yes for scholars studying public organizations over the past four decades (e.g., Bendor 1985; Downs 1967; Heimann 1993, 1997**;** Landau 1969, 1991; Miranda and Lerner 1995; Niskanen 1971; Tullock 1965). A recent pathbreaking theoretical investigation by Ting (2003) provides a direct challenge to this view by demonstrating the conditions, whereby, organizational effectiveness does not improve as a result of task duplication by multiple agents. The adverse reputational herding theory we advance in this study accounts for Ting's (2003) main theoretical prediction concerning the failure of organizational performance to improve once the administrative structure is converted into a parallel system in the presence of a principal whose preferences are similar to that of the initial bureau's. Our theory, however, extends the important insights culled from this recent study by attributing this phenomenon to reputational herding behavior that can be discriminated from this generic form of adverse behavior. This type of mimicking behavior has a substantive and logical basis in the study of organizations (Brehm and Gates 1997; March 1988, 1999; Whitford 2003). Reputational herding behavior in the context of our analysis not only predicts that the task behavior of the initial and redundant bureau(s) will be indistinguishable from one another, but also that their private signals are positively correlated, as captured by their performance shocks.

We test our theory of adverse reputational herding with quantitative data on presidential and congressional fiscal support agencies' tax revenue and budget outlay projections. All three hypotheses that comprise our theory are supported by the data. Specifically, we not only find that the quality of OMB fiscal projections are indistinguishable from CBO's since the mid–1970's, but that their performance shocks are positive and strongly correlated. Furthermore, we find that the task performance of the presidential support agency (BOB/OMB) fails to improve with the introduction of a congressional–based rival to engage in the same set of tasks. This empirical finding supports Ting's (2003) "friendly principal" problem. Not only does the accuracy of BOB/OMB fiscal projections slightly deteriorate in a trivial manner since the advent of CBO as a redundant bureau, but we also show that the systematic bias contained in these projections has significantly risen in a concurrent manner. Our statistical findings are especially persuasive given that we control for relevant economic, political, organizational and policy variables that might affect the quality of agency fiscal projections.

The substantive implications of these results for political support agencies engaged in fiscal policy task activities suggest that since CBO has not improved OMB's task performance quality that redundancy–based competition is not a conducive strategy for the design of these particular bureaucratic structures. We contend that the crux of this problem lies with CBO's relative subpar performance as a perceived "superior" agency, due to its greater political insulation, which leads OMB to follow its lead. This type of behavior is rather similar to a negative redundant system insofar that we find empirical evidence that CBO (redundant bureau) commits judgmental errors which are systematically biased (Felsenthal and Fuchs 1976: 475; Felsenthal 1980: 248–249). Our study also raises serious doubts about the perceived high degree of quality associated with CBO fiscal projections that are replete in scholarly and governmental studies on this topic (Wildavsky and Caiden 2001**;** Howard 1987; Schick 2000: 118–121). Moreover, these empirical findings lead us to directly question the validity of the claim that CBO provides an effective institutional check regarding the quality of policy information produced by BOB/OMB (Wildavsky and Caiden 2001: 108; Tomkin 1998: 176, 270–272). Based on a social welfare criterion, defined in terms of cost efficiency savings and the quality of fiscal policy information, the U.S. federal government has historically fared better when BOB/OMB has served as the primary bureau conducting these task activities.

Our theory and corresponding empirical findings has several broader implications for issues of organizational design and structure that political scientists should be concerned about. First, we concur with Ting (2003) that the advantages associated with redundancy in public organizations are not limitless. This means that "two heads are not always better than one" when it comes to duplication and parallel systems in the design of political organizations. We can deduce from our study that a necessary condition for redundancy–based competition to have positive consequences on organizational performance is simple – the redundant bureau must perform at a higher level than the initial bureau's baseline performance that is void of competition or duplication. Otherwise, a risk–averse initial bureau has no incentive to improve the quality of its performance. Second, our findings also possess relevance for those interested in the organizational design of political institutions. For instance, redundancy in the design of White House staff yields benefits by providing additional sources of information (Neustadt 1960). Profligate redundancy, however, comes at a cost. In this case, the decline of the U.S. presidency's domestic policymaking effectiveness over the past fifty years chronicled by Light (1999) has coincided, in no small part, due to the steady growth of the size and scope of the institutional presidency over this historical period (Krause 2003). By no means do we wish to infer that redundancy–based competition is without merit. Parallel systems can have their intended effect of improving organizational reliability and effectiveness via competition as the body of research on this topic from the past forty years indicates. Rather, we feel that practical concerns regarding managerial control and functional specialization originally noted by Weber (1946) and Gulick and Urwick (1937) has been given shortshrift (see Hammond 1986; Meier and Bohte 2000 for notable exceptions), and thus are worthy of greater attention in future scholarship that wishes to analyze the optimal organizational design of political institutions.

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TABLE 1

Testing the Impact of Agency Competition on BOB/OMB Task Performance Quality: Analyzing U.S. Federal Tax Revenue Projection Bias (FY 1947 – FY 2001)

Independent Variables	Full Model (Model 1[a])	Reduced Model (Model 2 [b])	Full Model (Model 3 [b])	Reduced Model (Model 4 [b])
Constant	–18.48 (68.98) [0.790]	3.10 (5.02) [0.790]	–39.30 (60.25) [0.518]	7.09 (3.70) [0.062]
$\tilde{y}_t - y_{t-1}$	–0.54 (0.16) [0.001]	–0.56 (0.19) [0.006]	–0.56 (0.20) [0.008]	–0.57 (0.20) [0.005]
$\tilde{y}_t - y_{t-1}$ × Competition $_t$	–0.70 (0.36) [0.059]	–0.59 (0.31) [0.065]	–0.53 (0.37) [0.162]	–0.45 (0.33) [0.186]
Competition $_t$	3.91 (3.88) [0.319]	2.81 (3.38) [0.411]	2.84 (3.13) [0.370]	1.89 (2.99) [0.530]
Economic Growth Volatility $_{t-2}$	–0.98 (0.54) [0.075]	–0.94 (0.70) [0.183]	–1.32 (0.62) [0.038]	–1.26 (0.60) [0.041]
Budget Deficit $_{t-2}$	0.73 (0.19) [0.000]	0.70 (0.17) [0.000]	0.82 (0.17) [0.000]	0.79 (0.16) [0.000]
President's Party $_{t-1}$	2.96 (1.84) [0.115]	3.45 (1.48) [0.025]	8.44 (4.00) [0.041]	8.46 (3.46) [0.019]
Gridlock Interval Distance $_{t-1}$	0.16 (0.08) [0.068]	0.15 (0.10) [0.133]	____________	____________
Divided Government $_{t-1}$	____________	____________	5.13 (4.21) [0.230]	4.82 (3.77) [0.208]
Ln (Agency Budget $_{t-1}$)	1.29 (4.04) [0.750]	____________	2.76 (3.54) [0.440]	____________
Gramm–Rudman–Hollings $_t$	– 2.87 (3.41) [0.406]	____________	–1.30 (2.82) [0.646]	____________
Time Trend $_{t-1}$	–0.26 (0.17) [0.137]	–0.21 (0.13) [0.091]	–0.37 (0.20) [0.076]	–0.29 (0.14) [0.047]
$H_0: \alpha = 0, \beta_1 = 0$	6.06 [0.005]	4.33 [0.019]	3.98 [0.026]	5.70 [0.006]
$H_0: \alpha = 0, \beta_1 + \beta_2 = 0$	8.46 [0.001]	15.83 [0.000]	10.81 [0.000]	8.35 [0.001]
$H_0: \beta_1 = -1$	8.76 [0.005]	5.41 [0.025]	4.78 [0.034]	4.77 [0.034]
$H_0: \beta_1 + \beta_2 = -1$	0.60 [0.442]	0.40 [0.530]	0.08 [0.777]	0.01 [0.933]
$\bar{R}^2$	0.53	0.54	0.52	0.53
Ljung–Box Q–statistic $\chi^2 \sim (7)$	2.01 [0.960]	1.43 [0.985]	3.98 [0.783]	3.02 [0.883]
White Heteroskedasticity Test	1.60 [0.117]	1.78 [0.079]	4.58 [0.000]	3.74 [0.001]
Wald Exclusion Test	____________	0.45 [0.569]	____________	0.36 [0.701]

Notes: Standard errors are inside parentheses (OLS denoted by "a", heteroskedastic–consistent denoted by "b"), probability values inside brackets.

TABLE 2

Testing the Impact of Agency Competition on BOB/OMB Task Performance Quality: Analyzing U.S. Federal Tax Revenue Projection Accuracy (FY 1947 – FY 2001)

Independent Variables	Full Model (Model 5 [a])	Reduced Model (Model 6 [b])	Full Model (Model 7 [b])	Reduced Model (Model 8 [b])
Constant	36.16 (52.16) [0.492]	–2.93 (2.37) [0.221]	11.07 (48.38) [0.820]	3.45 (1.70) [0.048]
$\left\| \tilde{y}_t - y_{t-1} \right\|$	0.10 (0.17) [0.562]	0.12 (0.16) [0.459]	0.03 (0.15) [0.848]	0.04 (0.15) [0.786]
$\left\| \tilde{y}_t - y_{t-1} \right\|$ × Competition_t	0.60 (0.31) [0.058]	0.61 (0.29) [0.045]	0.73 (0.30) [0.018]	0.67 (0.27) [0.018]
Competition_t	0.51 (3.02) [0.866]	–1.35 (1.76) [0.446]	0.21 (2.90) [0.943]	1.39 (2.14) [0.519]
$\text{Economic Growth Volatility}_{t-2}$	–0.64 (0.40) [0.118]	0.79 (0.38) [0.045]	0.26 (0.45) [0.558]	___________
$\text{Budget Deficit}_{t-2}$	–0.36 (0.14) [0.012]	–0.35 (0.14) [0.012]	–0.26 (0.14) [0.069]	–0.24 (0.13) [0.077]
$\text{President's Party}_{t-1}$	–0.78 (1.43) [0.587]	___________	5.06 (1.69) [0.005]	5.20 (1.52) [0.001]
$\text{Gridlock Interval Distance}_{t-1}$	0.14 (0.06) [0.038]	0.12 (0.05) [0.028]	___________	___________
$\text{Divided Government}_{t-1}$	___________	___________	5.94 (1.51) [0.000]	6.21 (1.44) [0.001]
Ln ($\text{Agency Budget}_{t-1}$)	–2.22 (3.05) [0.469]	___________	–0.53 (2.88) [0.854]	___________
$\text{Gramm–Rudman–Hollings}_t$	–0.11 (2.62) [0.967]	___________	1.08 (1.47) [0.467]	___________
Time Trend_{t-1}	–0.03 (0.13) [0.796]	___________	–0.18 (0.15) [0.226]	–0.24 (0.08) [0.002]
$H_0: \alpha = 0, \gamma_1 = 0$	0.45 [0.640]	1.33 [0.273]	0.04 [0.957]	3.81 [0.029]
$H_0: \alpha = 0, \gamma_1 + \gamma_2 = 0$	4.30 [0.020]	4.65 [0.015]	6.38 [0.004]	8.19 [0.001]
$H_0: \gamma_1 = 1$	27.84 [0.000]	31.55 [0.000]	41.27 [0.000]	40.76 [0.000]
$H_0: \gamma_1 + \gamma_2 = 1$	1.47 [0.232]	1.35 [0.252]	1.10 [0.301]	1.97 [0.167]
$\bar{R}^2$	0.28	0.31	0.39	0.42
Ljung–Box Q–statistic $\chi^2 \sim (7)$	4.05 [0.774]	5.58 [0.590]	4.76 [0.689]	4.10 [0.769]
White Heteroskedasticity Test	1.28 [0.259]	2.03 [0.050]	1.84 [0.063]	3.01 [0.005]
Wald Exclusion Test	___________	0.46 [0.764]	___________	0.23 [0.874]

Notes: Standard errors are inside parentheses (OLS denoted by "a", heteroskedastic–consistent denoted by "b"), probability values inside brackets.

TABLE 3

Testing the Impact of Agency Competition on BOB/OMB Task Performance Quality: Analyzing U.S. Federal Budget Outlay Projection Bias (FY 1947 – FY 2001)

Independent Variables	Full Model (Model 9 [a])	Reduced Model (Model 10 [a])	Full Model (Model 11 [b])	Reduced Model (Model 12 [a])
Constant	–42.80 (54.93) [0.440]	5.52 (2.69) [0.046]	–52.99 (55.46) [0.345]	–30.63 (45.09) [0.500]
$\tilde{y}_t - y_{t-1}$	–0.34 (0.08) [0.003]	–0.34 (0.08) [0.000]	–0.33 (0.08) [0.000]	–0.34 (0.09) [0.000]
$\tilde{y}_t - y_{t-1}$ × Competition $_t$	–0.71 (0.31) [0.027]	–0.72 (0.25) [0.006]	–0.73 (0.18) [0.000]	–0.73 (0.18) [0.000]
Competition $_t$	2.07 (2.84) [0.470]	1.27 (2.35) [0.592]	2.18 (2.25) [0.337]	1.52 (1.79) [0.402]
Economic Growth Volatility $_{t-2}$	–0.88 (0.42) [0.041]	–0.86 (0.39) [0.031]	–1.03 (0.54) [0.061]	–0.89 (0.41) [0.035]
Budget Deficit $_{t-2}$	–0.01 (0.14) [0.930]	————	0.03 (0.17) [0.863]	————
President's Party $_{t-1}$	–0.64 (1.44) [0.661]	————	1.45 (2.61) [0.582]	————
Gridlock Interval Distance $_{t-1}$	0.05 (0.07) [0.462]	————	————	————
Divided Government $_{t-1}$	————	————	2.25 (2.48) [0.368]	————
Ln (Agency Budget $_{t-1}$)	2.77 (3.22) [0.394]	————	3.43 (3.22) [0.293]	2.13 (2.60) [0.416]
Gramm–Rudman–Hollings $_t$	0.68 (2.90) [0.817]	————	1.92 (1.23) [0.459]	————
Time Trend $_{t-1}$	–0.14 (0.14) [0.316]	–0.06 (0.09) [0.546]	–0.19 (0.13) [0.148]	–0.11 (0.07) [0.144]
$H_0: \alpha = 0 , \beta_1 = 0$	8.37 [0.001]	10.54 [0.000]	8.51 [0.001]	10.20 [0.000]
$H_0: \alpha = 0 , \beta_1 + \beta_2 = 0$	7.16 [0.002]	13.14 [0.000]	16.97 [0.000]	10.20 [0.000]
$H_0: \beta_1 = -1$	61.87 [0.000]	75.42 [0.000]	65.90 [0.000]	75.24 [0.000]
$H_0: \beta_1 + \beta_2 = -1$	0.02 [0.880]	0.07 [0.787]	0.11 [0.739]	0.07 [0.788]
$\bar{R}^2$	0.40	0.45	0.42	0.45
Ljung–Box Q–statistic $\chi^2 \sim (7)$	1.94 [0.963]	2.56 [0.923]	2.26 [0.944]	3.21 [0.865]
White Heteroskedasticity Test	0.87 [0.611]	1.56 [0.157]	1.77 [0.076]	1.30 [0.256]
Wald Exclusion Test	————	0.21 [0.955]	————	0.43 [0.783]

Notes: Standard errors are inside parentheses (OLS denoted by "a", heteroskedastic–consistent denoted by "b"), probability values inside brackets.

TABLE 4

Testing the Impact of Agency Competition on BOB/OMB Task Performance Quality: Analyzing U.S. Federal Budget Outlay Projection Accuracy (FY 1947 – FY 2001)

Independent Variables	Full Model (Model 13 [a])	Reduced Model (Model 14 [a])	Full Model (Model 15 [c])	Reduced Model (Model 16 [c])
Constant	9.47 (41.88) [0.822]	5.35 (2.22) [0.020]	36.34 (28.95) [0.216]	23.80 (22.26) [0.291]
$\left\| \tilde{y}_t - y_{t-1} \right\|$	0.19 (0.08) [0.015]	0.20 (0.07) [0.010]	0.20 (0.04) [0.000]	0.20 (0.04) [0.000]
$\left\| \tilde{y}_t - y_{t-1} \right\|$ × Competition $_t$	0.38 (0.38) [0.325]	0.39 (0.35) [0.261]	0.37 (0.34) [0.282]	0.44 (0.32) [0.170]
Competition $_t$	2.73 (2.30) [0.241]	2.26 (2.11) [0.290]	1.44 (1.44) [0.325]	1.18 (1.18) [0.323]
Economic Growth Volatility $_{t-2}$	–0.42 (0.31) [0.193]	–0.41 (0.30) [0.186]	–0.24 (0.35) [0.497]	________ ________
Budget Deficit $_{t-2}$	–0.31 (0.11) [0.006]	–0.31 (0.10) [0.004]	–0.34 (0.11) [0.003]	–0.35 (0.09) [0.000]
President's Party $_{t-1}$	–1.35 (1.09) [0.221]	–0.99 (0.92) [0.287]	–2.60 (1.22) [0.040]	–2.69 (0.92) [0.005]
Gridlock Interval Distance $_{t-1}$	0.03 (0.05) [0.503]	________	________	________
Divided Government $_{t-1}$	________	________	–2.28 (1.26) [0.077]	–2.25 (0.96) [0.024]
Ln (Agency Budget $_{t-1}$)	–0.29 (2.45) [0.905]	________	–1.81 (1.70) [0.293]	–1.13 (1.28) [0.378]
Gramm–Rudman–Hollings $_t$	3.43 (2.11) [0.112]	3.62 (1.97) [0.073]	3.26 (0.71) [0.000]	3.54 (0.68) [0.000]
Time Trend $_{t-1}$	–0.12 (0.11) [0.270]	–0.11 (0.08) [0.162]	–0.003 (0.09) [0.971]	________
$H_0: \alpha = 0, \gamma_1 = 0$	3.27 [0.048]	10.16 [0.000]	18.25 [0.000]	17.06 [0.000]
$H_0: \alpha = 0, \gamma_1 + \gamma_2 = 0$	1.38 [0.262]	5.16 [0.01]	2.39 [0.103]	2.56 [0.088]
$H_0: \gamma_1 = 1$	110.08 [0.000]	117.34 [0.000]	507.88 [0.000]	505.03 [0.000]
$H_0: \gamma_1 + \gamma_2 = 1$	1.34 [0.254]	1.51 [0.225]	1.50 [0.228]	1.28 [0.265]
$\overline{R}^2$	0.25	0.28	0.30	0.31
Ljung–Box Q–statistic $\chi^2 \sim (7)$	9.55 [0.215]	11.17 [0.131]	16.90 [0.018]	12.10 [0.097]
White Heteroskedasticity Test	1.20 [0.312]	1.59 [0.130]	4.11 [0.000]	4.40 [0.000]
Wald Exclusion Test	________	0.27 [0.763]	________	0.47 [0.626]

Notes: Standard errors are inside parentheses (OLS denoted by "a", heteroskedastic and autocorrelation–consistent denoted by "c"), probability values inside brackets.

TABLE 5

Testing for Reputational Herding in OMB and CBO Task Performance Quality: Projection Bias Models (FY 1977– FY 2001)

	Tax Revenue Projection Errors				Budget Outlay Projection Errors			
Independent Variables	OMB equation	CBO equation	OMB equation	CBO equation	OMB equation	CBO equation	OMB equation	CBO equation
Constant	1846.29 (2996.60) [0.543]	–2144.04 (3644.00) [0.561]	2347.66 (4049.15) [0.566]	–4562.26 (3649.92) [0.221]	403.66 (1158.69) [0.730]	–174.40 (995.63) [0.862]	330.75 (1022.89) [0.749]	–137.37 (839.22) [0.871]
$\widetilde{Y}_t - Y_{t-1}$	–1.02 (0.20) [0.000]	–1.28 (0.28) [0.000]	–0.77 (0.28) [0.010]	–0.76 (0.31) [0.018]	–0.95 (0.09) [0.000]	–0.95 (0.08) [0.000]	–0.95 (0.09) [0.000]	–0.95 (0.08) [0.000]
Economic Growth Volatility $_{t–2}$	6.40 (7.21) [0.383]	9.56 (8.50) [0.270]	6.81 (10.94) [0.538]	5.72 (10.47) [0.589]	–6.31 (6.18) [0.316]	–6.73 (5.81) [0.256]	–6.57 (6.05) [0.286]	–7.20 (5.87) [0.229]
Budget Deficit $_{t–2}$	3.34 (1.91) [0.091]	1.52 (2.38) [0.527]	4.92 (2.95) [0.106]	3.14 (2.89) [0.286]	–1.10 (1.58) [0.493]	–1.01 (1.45) [0.491]	–0.90 (1.50) [0.555]	–0.86 (1.40) [0.544]
President's Party $_{t-1}$ or Congressional Partisan Balance $_{t-1}$	48.00 (29.31) [0.113]	–0.28 (15.55) [0.986]	112.59 (60.06) [0.071]	– 44.04 (20.81) [0.043]	0.53 (8.92) [0.953]	–2.34 (4.92) [0.639]	7.28 (14.78) [0.626]	– 4.11 (6.67) [0.542]
Gridlock Interval Distance $_{t-1}$	1.27 (0.89) [0.163]	1.12 (1.24) [0.374]	———	———	– 0.06 (0.71) [0.931]	–0.16 (0.71) [0.824]	———	———
Divided Government $_{t-1}$	———	———	35.67 (48.78) [0.470]	–78.12 (34.32) [0.030]	———	———	8.74 (18.05) [0.632]	–0.58 (16.35) [0.972]
Ln (Agency Budget $_{t-1}$)	–107.80 (168.64) [0.528]	124.29 (216.67) [0.571]	–136.26 (227.57) [0.554]	–273.09 (216.00) [0.216]	–18.82 (64.83) [0.774]	14.68 (59.34) [0.806]	–15.16 (57.35) [0.793]	12.36 (49.86) [0.806]
Gramm–Rudman–Hollings $_t$	–14.08 (23.87) [0.560]	–19.52 (30.13) [0.522]	10.00 (37.28) [0.790]	43.63 (37.84) [0.258]	20.92 (19.19) [0.285]	22.05 (17.84) [0.227]	21.17 (18.91) [0.272]	22.91 (18.41) [0.223]
Time Trend $_{t-1}$	2.43 (1.70) [0.163]	2.53 (2.15) [0.249]	0.33 (2.71) [0.903]	1.17 (2.43) [0.634]	–1.83 (1.35) [0.186]	–1.93 (1.33) [0.156]	–2.19 (1.21) [0.080]	–2.16 (1.15) [0.070]
$H_0: \alpha_{OMB} = \alpha_{CBO}, \beta_{OMB} = \beta_{CBO}$	0.77 [0.474]	———	1.04 [0.365]	———	0.08 [0.924]	———	0.08 [0.927]	———
$\hat{\rho}_{\varepsilon_t^{OMB}, \varepsilon_t^{CBO}}$ Breusch–Pagan Independence Test: $\chi^2 \sim (1)$	0.683 10.72 [0.001]	———	0.709 12.06 [0.001]	———	0.959 21.14 [0.000]	———	0.965 22.34 [0.000]	———
$H_0: \alpha = \beta = 0$	19.43 [0.000]	13.53 [0.000]	5.31 [0.011]	5.30 [0.011]	66.68 [0.000]	71.98 [0.000]	78.43 [0.000]	81.82 [0.000]
$\overline{R}^2$	0.82	0.71	0.61	0.55	0.76	0.65	0.77	0.67

Notes: Standard errors are inside parentheses, probability values inside brackets. These models were estimated via Seemingly Unrelated Regression technique (Zellner 1962) with a small–sample correction to the covariance matrix of the form: $\sqrt{\left[n-\left(k^{OMB}+2\right)\right]\times\left[n-\left(k^{CBO}+2\right)\right]}$.

TABLE 6

Testing for Reputational Herding in OMB and CBO Task Performance Quality: Projection Accuracy Models (FY 1977– FY 2001)

	Tax Revenue Absolute Projection Errors				Budget Outlay Absolute Projection Errors			
Independent Variables	OMB equation	CBO equation	OMB equation	CBO equation	OMB equation	CBO equation	OMB equation	CBO equation
Constant	–2606.63 (3084.64) [0.405]	2165.48 (2435.90) [0.382]	–3077.15 (2778.50) [0.277]	1497.94 (2488.58) [0.552]	–2513.24 (2905.61) [0.394]	1113.90 (2242.10) [0.623]	–1691.86 (2632.50) [0.525]	– 1706.53 (2160.26) [0.436]
$\left\lvert \tilde{Y}_t - Y_{t-1} \right\rvert$	0.34 (0.24) [0.177]	0.33 (0.23) [0.160]	0.46 (0.22) [0.050]	0.26 (0.24) [0.164]	0.73 (0.36) [0.053]	0.31 (0.15) [0.051]	0.57 (0.27) [0.047]	0.30 (0.16) [0.072]
Economic Growth Volatility $_{t-2}$	– 6.21 (9.51) [0.519]	–12.05 (7.26) [0.108]	– 4.62 (10.07) [0.650]	–13.20 (9.25) [0.164]	0.68 (8.25) [0.935]	–7.22 (5.00) [0.160]	– 0.86 (7.38) [0.908]	–5.05 (5.75) [0.387]
Budget Deficit $_{t-2}$	– 4.75 (2.46) [0.064]	– 3.98 (1.88) [0.044]	– 3.64 (2.62) [0.175]	– 2.88 (2.35) [0.231]	– 3.73 (2.18) [0.098]	– 0.69 (1.25) [0.583]	– 4.26 (2.02) [0.044]	– 2.26 (1.51) [0.143]
President's Party $_{t-1}$ or Congressional Partisan Balance $_{t-1}$	–39.93 (29.87) [0.192]	–12.50 (10.74) [0.254]	27.25 (45.35) [0.552]	–19.69 (15.15) [0.204]	–21.75 (27.02) [0.428]	24.69 (10.27) [0.023]	–51.56 (27.53) [0.071]	17.45 (10.49) [0.107]
Gridlock Interval Distance $_{t-1}$	1.16 (1.16) [0.325]	0.11 (0.99) [0.909]	———	———	– 0.01 (0.76) [0.993]	1.55 (0.75) [0.047]	———	———
Divided Government $_{t-1}$	———	———	90.05 (39.28) [0.029]	10.06 (27.84) [0.720]	———	———	– 34.06 (25.99) [0.200]	17.43 (18.45) [0.352]
Ln (Agency Budget $_{t-1}$)	147.30 (173.52) [0.403]	–125.00 (144.86) [0.396]	172.00 (156.26) [0.280]	–84.32 (147.29) [0.571]	142.67 (163.00) [0.389]	–68.15 (133.80) [0.615]	98.46 (147.48) [0.509]	101.57 (127.94) [0.433]
Gramm–Rudman–Hollings $_t$	–17.24 (31.26) [0.586]	–1.65 (24.29) [0.946]	–2.78 (32.82) [0.933]	0.33 (31.70) [0.992]	71.36 (26.73) [0.013]	–26.38 (16.79) [0.127]	55.99 (24.29) [0.028]	– 20.27 (18.54) [0.283]
Time Trend $_{t-1}$	1.59 (2.21) [0.478]	2.06 (1.74) [0.247]	– 1.56 (2.40) [0.521]	0.02 (1.99) [0.991]	– 0.53 (1.52) [0.729]	0.76 (1.30) [0.565]	1.08 (1.49) [0.476]	0.53 (1.39) [0.706]
$H_0: \alpha_{OMB} = \alpha_{CBO}, \beta_{OMB} = \beta_{CBO}$	0.95 [0.398]	———	1.31 [0.284]	———	1.50 [0.241]	———	0.50 [0.612]	———
$\hat{\rho}_{\varepsilon_t^{OMB}, \varepsilon_t^{CBO}}$ Breusch–Pagan Independence Test: $\chi^2 \sim (1)$	0.808 15.01 [0.000]	———	0.866 18.02 [0.000]	———	0.455 4.76 [0.029]	———	0.538 6.95 [0.008]	———
$H_0: \alpha = \beta = 0$	2.18 [0.132]	1.89 [0.170]	4.16 [0.026]	1.19 [0.317]	3.14 [0.059]	2.18 [0.132]	2.68 [0.085]	2.24 [0.124]
$\bar{R}^2$	0.29	0.51	0.21	0.20	0.26	0.45	0.33	0.31

Notes: Standard errors are inside parentheses, probability values inside brackets. These models were estimated via Seemingly Unrelated Regression technique (Zellner 1962) with a small–sample correction to the covariance matrix of the form: $\sqrt{\left[n-\left(k^{OMB}+2\right)\right]\times\left[n-\left(k^{CBO}+2\right)\right]}$.

Data Appendix

We employ the following statistical controls in order to ensure that our empirical results are not artifacts of economic, political, and organizational/policy variables. **Economic Growth Volatility** is measured as the standard deviation in real GDP annual growth based on a three year moving average that occurs t–2, t–3, t–4 that is observable at time t–1 when the projection is made by BOB/OMB. The volatility of real economic growth is thought to lead to more conservative estimates (i.e., greater underprediction) in terms of bias and less accuracy for both tax and budget outlays if the agency is risk–averse in relation to this form of task uncertainty. These data come from the U.S. Bureau of Economic Analysis' web site at http://www.bea.gov/bea/dn/gdplev.xls. **Budget Deficit** is the actual size of the U.S. federal deficit based on the logged first difference of total federal gross public debt at time t–2 (observed at t–1) as a percentage of GDP. Similar to the economic growth volatility variable, as the relative size of the actual U.S. federal deficit rises, fiscal agencies are expected to become more conservative in their fiscal projections. These data were drawn from the *Historical Tables, Budget of the United States Government, Fiscal Year 2004* (Table 7.1, 116–117). **President's Party** is a binary variable that equals one under Democratic presidents and zero [–1 for interaction terms in order to maintain sign consistency] for Republican administrations and is lagged by one fiscal year to coincide with when the projection is made. We expect that Republican presidents will be more inclined to underpredict tax revenues compared to their Democratic counterparts, since the former exhibit a relatively greater preference for tax cuts and opposition to tax increases. It is unclear whether this will impact budgetary outlay projections in aggregate given different partisan predilections for different types of spending (McCubbins 1991). The **Gridlock Interval Distance** measure accounts for the spatial policy preference differences among the president, and the median House and Senate members at t–1 (we thank Brad Gomez for supplying us with these data). We expect that increased ideological preference divergence will serve as a check against overly optimistic tax revenue projections. Similarly, given the opposite tax policy forces motivating each political party, greater divergence in policy preferences should lead to greater accuracy in tax revenue and budget outlay projections. In contrast, institutional preference divergence might increase uncertainty, and hence, yield less accurate budget outlay projections. **Divided Government** is an alternative measure of ideological preference divergence (see Gridlock Interval Distance above for information on hypothetical relationships) that equals one when the same party fails to possess majoritarian control over both chambers of Congress as well as occupy the White House, and zero in times of unified party government at t–1. **Ln (Agency Budget)** is a measure of economies of scale enjoyed by administrative agencies in performing task activities. If this condition exists for a given fiscal support agency, we should observe the accuracy of its fiscal projection error to be positively related to its bureau size. We account for agency size with a measure that is simply the natural log of BOB/OMB's and CBO's respective actual budget appropriations at t–1. This data come from *The Budget of the United States Government, Fiscal Years 1946–2003.* **Gramm-Rudman-Hollings** (GRH) is a binary variable that equals one for the FY1988–FY1990 period, zero otherwise. We expect that the GRH budget controls will result in more optimistic fiscal projections that are also less accurate in order to meet its fiscal guidelines. Finally, **Time Trend** is merely a linear time counter variable used to capture potential technological enhancements developed over the years that have enabled BOB/OMB to reduce the bias and increase the accuracy of its fiscal projections, ceteris paribus. Its impact on the direction of fiscal projection errors is uncertain since enhanced technologies might yield more conservative estimates since "risk" is better handled, or less conservative estimates because of their greater confidence as this resource improves through time.

DATA APPENDIX TABLE 1

Hypothesized Signs of Coefficients for the Control Variables

Control Variables	Tax Revenue Projection Errors (Bias)	Tax Revenue Projection Errors (Accuracy)	Budget Outlay Projection Errors (Bias)	Budget Outlay Projection Errors (Accuracy)
Economic Growth Volatility $_{t-2}$	+	+	+	+
Budget Deficit $_{t-2}$	+	+	+	+
President's Party $_{t-1}$	+	–	?	?
Gridlock Interval Distance $_{t-1}$	+	–	+	–
Divided Government $_{t-1}$	+	–	+	–
Ln (Agency Budget $_{t-1}$)	?	–	?	–
Gramm–Rudman–Hollings $_{t}$	–	+	+	+
Time Trend $_{t-1}$	?	–	?	–

Note: All projection error dependent variables are defined as actual (objective) values minus predicted (subjective) values.

SUPPLEMENTARY TABLE 1

Testing the Impact of Agency Competition on BOB/OMB Task Performance Quality: Analyzing U.S. Federal Tax Revenue Projection Bias (FY 1947 – FY 2001)

Independent Variables	Full Model (Model 1[a])	Reduced Model (Model 2 [b])	Full Model (Model 3 [b])	Reduced Model (Model 4 [b])
Constant	492.02 (440.9.3) [0..271]	495.74 (434.73) [0.261]	79.11 (547.55) [0.886]	–15.41 (16.71) [0.361]
$\tilde{y}_t - y_{t-1}$	–0.49 (0.25) [0.059]	–0.48 (0.24) [0.051]	–0.47 (0.23) [0.049]	–0.41 (0.25) [0.105]
$\tilde{y}_t - y_{t-1}$ × Competition $_t$	–0.77 (0.31) [0.018]	–0.78 (0.30) [0.013]	–0.51 (0.34) [0.145]	–0.56 (0.33) [0.098]
Competition $_t$	10.53 (23.74) [0.660]	9.47 (21.75) [0.665]	5.23 (25.47) [0.838]	4.83 (20.03) [0.811]
Economic Growth Volatility $_{t-2}$	–0.41 (3.47) [0.906]	___________	–2.51 (3.44) [0.469]	___________
Budget Deficit $_{t-2}$	3.79 (1.18) [0.003]	3.78 (1.16) [0.002]	4.16 (1.17) [0.001]	4.08 (1.20) [0.001]
President's Party $_{t-1}$	28.68 (11.63) [0.018]	28.45 (11.34) [0.016]	52.77 (16.37) [0.002]	52.52 (15.59) [0.002]
Gridlock Interval Distance $_{t-1}$	0.58 (0.54) [0.294]	0.58 (0.54) [0.290]	___________	___________
Divided Government $_{t-1}$	___________	___________	23.57 (15.53) [0.137]	24.51 (15.16) [0.113]
Ln (Agency Budget $_{t-1}$)	–30.53 (25.79) [0.243]	–30.89 (25.32) [0.229]	–4.83 (33.07) [0.884]	___________
Gramm–Rudman–Hollings $_t$	– 29.16 (21.53) [0.183]	–29.15 (21.28) [0.178]	–10.18 (22.84) [0.658]	___________
Time Trend $_{t-1}$	1.46 (1.09) [0.186]	1.54 (0.88) [0.087]	–0.05 (1.67) [0.977]	___________
$H_0 : \alpha = 0 , \beta_1 = 0$	2.53 [0.092]	2.64 [0.083]	2.06 [0.139]	2.18 [0.125]
$H_0 : \alpha = 0 , \beta_1 + \beta_2 = 0$	31.00 [0.000]	31.76 [0.000]	9.85 [0.000]	9.55 [0.000]
$H_0 : \beta_1 = -1$	4.15 [0.048]	4.71 [0.035]	5.21 [0.027]	5.64 [0.021]
$H_0 : \beta_1 + \beta_2 = -1$	2.59 [0.115]	2.66 [0.110]	0.01 [0.939]	0.02 [0.899]
$\overline{R}^2$	0.68	0.68	0.51	0.54
Ljung–Box Q–statistic $\chi^2 \sim (7)$	4.78 [0.687]	4.98 [0.662]	6.60 [0.472]	6.66 [0.465]
White Heteroskedasticity Test	0.86 [0.623]	0.85 [0.620]	2.24 [0.022]	3.81 [0.000]
Wald Exclusion Test	___________	0.01 [0.906]	___________	0.17 [0.954]

Notes: Standard errors are inside parentheses (OLS denoted by "a", heteroskedastic–consistent denoted by "b"), probability values inside brackets.

SUPPLEMENTARY TABLE 2

Testing the Impact of Agency Competition on BOB/OMB Task Performance Quality: Analyzing U.S. Federal Tax Revenue Projection Accuracy (FY 1947 – FY 2001)

Independent Variables	Full Model (Model 5 [a])	Reduced Model (Model 6 [b])	Full Model (Model 7 [b])	Reduced Model (Model 8 [b])
Constant	418.07 (428.40) [0.005]	472.03 (409.16) [0.255]	241.96 (436.02) [0.581]	–16.26 (15.08) [0.287]
$\left\| \tilde{y}_t - y_{t-1} \right\|$	0.19 (0.31) [0.545]	0.11 (0.16) [0.479]	0.16 (0.18) [0.389]	0.17 (0.17) [0.324]
$\left\| \tilde{y}_t - y_{t-1} \right\|$ × Competition $_t$	0.27 (0.36) [0.459]	0.34 (0.24) [0.151]	0.28 (0.27) [0.299]	0.29 (0.22) [0.205]
Competition $_t$	11.90 (23.39) [0.613]	4.32 (18.81) [0.819]	10.99 (24.98) [0.662]	14.33 (14.84) [0.339]
Economic Growth Volatility $_{t-2}$	0.20 (3.26) [0.950]	————	–2.17 (0.3.91 [0.581]	————
Budget Deficit $_{t-2}$	–2.96 (1.14) [0.013]	–2.63 (1.15) [0.027]	–2.06 (1.15) [0.080]	–2.14 (1.12) [0.063]
President's Party $_{t-1}$	–10.77 (11.41) [0.351]	————	23.30 (14.05) [0.105]	24.10 (14.42) [0.102]
Gridlock Interval Distance $_{t-1}$	1.11 (0.53) [0.041]	0.87 (0.48) [0.075]	————	————
Divided Government $_{t-1}$	————	————	33.13 (14.37) [0.026]	36.31 (14.17) [0.014]
Ln (Agency Budget $_{t-1}$)	–27.08 (25.03) [0.286]	–29.86 (24.35) [0.227]	–14.64 (26.65) [0.586]	————
Gramm–Rudman–Hollings $_t$	–23.41 (21.10) [0.274]	–19.66 (12.95) [0.136]	–16.62 (13.26) [0.217]	–13.26 (11.58) [0.258]
Time Trend $_{t-1}$	1.26 (1.06) [0.241]	1.41 (0.96) [0.147]	0.33 (1.53) [0.832]	————
$H_0: \alpha = 0 , \gamma_1 = 0$	0.66 [0.521]	0.80 [0.455]	0.46 [0.633]	0.81 [0.449]
$H_0: \alpha = 0 , \gamma_1 + \gamma_2 = 0$	4.49 [0.017]	5.20 [0.009]	3.98 [0.026]	3.77 [0.030]
$H_0: \gamma_1 = 1$	7.09 [0.011]	30.29 [0.000]	22.41 [0.000]	25.08 [0.000]
$H_0: \gamma_1 + \gamma_2 = 1$	10.18 [0.003]	8.36 [0.006]	9.09 [0.004]	10.33 [0.002]
$\bar{R}^2$	0.34	0.35	0.28	0.31
Ljung–Box Q–statistic $\chi^2 \sim (7)$	5.73 [0.571]	7.63 [0.367]	6.58 [0.474]	8.40 [0.299]
White Heteroskedasticity Test	1.55 [0.135]	2.39 [0.017]	3.48 [0.001]	5.28 [0.000]
Wald Exclusion Test	————	0.45 [0.641]	————	0.43 [0.736]

Notes: Standard errors are inside parentheses (OLS denoted by "a", heteroskedastic–consistent denoted by "b"), probability values inside brackets.

SUPPLEMENTARY TABLE 3

Testing the Impact of Agency Competition on BOB/OMB Task Performance Quality: Analyzing U.S. Federal Budget Outlay Projection Bias (FY 1947 – FY 2001)

Independent Variables	Full Model (Model 9 [a])	Reduced Model (Model 10 [a])	Full Model (Model 11 [b])	Reduced Model (Model 12 [a])
Constant	–538.35 (342.27) [0.123]	–426.87 (309.98) [0.175]	–535.12 (332.13) [0.115]	–426.87 (309.98) [0.175]
$\tilde{y}_t - y_{t-1}$	–0.37 (0.14) [0.012]	–0.36 (0.13) [0.009]	–0.36 (0.14) [0.013]	–0.36 (0.13) [0.009]
$\tilde{y}_t - y_{t-1}$ × Competition_t	–0.61 (0.20) [0.004]	–0.64 (0.18) [0.001]	–0.62 (0.20) [0.003]	–0.64 (0.18) [0.001]
Competition_t	31.06 (17.49) [0.083]	22.28 (15.10) [0.147]	28.89 (16.57) [0.088]	22.28 (15.10) [0.147]
$\text{Economic Growth Volatility}_{t-2}$	–4.95 (2.60) [0.064]	–4.83 (2.45) [0.055]	–5.47 (2.67) [0.047]	–4.83 (2.45) [0.055]
$\text{Budget Deficit}_{t-2}$	–0.63 (0.88) [0.479]	———	–0.45 (0.89) [0.616]	———
$\text{President's Party}_{t-1}$	–5.58 (8.95) [0.536]	———	5.20 (10.83) [0.634]	———
$\text{Gridlock Interval Distance}_{t-1}$	0.36 (0.40) [0.377]	———	———	———
$\text{Divided Government}_{t-1}$	———	———	9.79 (11.12) [0.383]	———
Ln ($\text{Agency Budget}_{t-1}$)	33.01 (20.07) [0.108]	27.09 (18.31) [0.146]	33.28 (19.57) [0.096]	27.09 (18.31) [0.146]
$\text{Gramm–Rudman–Hollings}_t$	22.85 (17.98) [0.211]	20.71 (16.30) [0.210]	23.86 (17.59) [0.143]	20.71 (16.30) [0.210]
Time Trend_{t-1}	–1.22 (0.86) [0.165]	–0.89 (0.73) [0.233]	–1.29 (0.86) [0.143]	–0.88 (0.73) [0.233]
$H_0: \alpha = 0, \beta_1 = 0$	4.62 [0.015]	4.75 [0.013]	4.66 [0.015]	4.75 [0.013]
$H_0: \alpha = 0, \beta_1 + \beta_2 = 0$	32.97 [0.000]	39.31 [0.000]	34.06 [0.000]	39.31 [0.000]
$H_0: \beta_1 = -1$	18.84 [0.000]	23.05 [0.000]	19.88 [0.000]	23.05 [0.000]
$H_0: \beta_1 + \beta_2 = -1$	0.02 [0.892]	0.07 [0.978]	0.01 [0.928]	0.00 [0.978]
$\bar{R}^2$	0.66	0.68	0.67	0.68
Ljung–Box Q–statistic $\chi^2 \sim (7)$	8.825 [0.265]	8.62 [0.281]	10.34 [0.170]	8.62 [0.281]
White Heteroskedasticity Test	1.08 [0.407]	0.80 [0.652]	1.03 [0.451]	0.80 [0.652]
Wald Exclusion Test	———	1.08 [0.742]	———	0.41 [0.743]

Notes: Standard errors are inside parentheses (OLS denoted by "a", heteroskedastic–consistent denoted by "b"), probability values inside brackets.

SUPPLEMENTARY TABLE 4

Testing the Impact of Agency Competition on BOB/OMB Task Performance Quality: Analyzing U.S. Federal Budget Outlay Projection Accuracy (FY 1947 – FY 2001)

Independent Variables	Full Model (Model 13 [a])	Reduced Model (Model 14 [a])	Full Model (Model 15 [c])	Reduced Model (Model 16 [c])
Constant	–347.83 (316.30) [0.278]	–235.41 (288.85) [0.420]	–103.91 (216.89) [0.634]	27.56 (7.72) [0.001]
$\left\| \tilde{y}_t - y_{t-1} \right\|$	0.19 (0.15) [0.220]	0.20 (0.15) [0.187]	0.19 (0.06) [0.003]	0.19 (0.05) [0.001]
$\left\| \tilde{y}_t - y_{t-1} \right\|$ × Competition $_t$	0.53 (0.25) [0.041]	0.48 (0.23) [0.047]	0.48 (0.26) [0.069]	0.47 (0.23) [0.046]
Competition $_t$	21.48 (15.93) [0.185]	17.18 (14.81) [0.252]	12.07 (10.92) [0.275]	12.24 (9.31) [0.195]
Economic Growth Volatility $_{t-2}$	–3.18 (2.32) [0.177]	–2.99 (2.28) [0.196]	–1.94 (1.71) [0.261]	–1.94 (0.93) [0.042]
Budget Deficit $_{t-2}$	–2.46 (0.79) [0.003]	–2.42 (0.77) [0.003]	–2.61 (0.69) [0.001]	–2.57 (0.68) [0.001]
President's Party $_{t-1}$	–9.41 (7.91) [0.241]	–6.01 (6.76) [0.379]	–16.25 (6.81) [0.022]	–16.85 (6.82) [0.017]
Gridlock Interval Distance $_{t-1}$	0.29 (0.36) [0.417]	————	————	————
Divided Government $_{t-1}$	————	————	–14.78 (7.94) [0.070]	–15.66 (7.05) [0.032]
Ln (Agency Budget $_{t-1}$)	21.59 (18.53) [0.251]	15.31 (17.00) [0.373]	7.68 (1.70) [0.556]	————
Gramm–Rudman–Hollings $_t$	56.16 (15.36) [0.001]	54.92 (14.85) [0.001]	53.42 (7.23) [0.000]	51.79 (7.14) [0.000]
Time Trend $_{t-1}$	–1.11 (0.80) [0.172]	–0.73 (0.68) [0.289]	–0.16 (0.66) [0.807]	————
$H_0: \alpha = 0, \gamma_1 = 0$	1.36 [0.268]	1.17 [0.318]	4.91 [0.012]	22.85 [0.000]
$H_0: \alpha = 0, \gamma_1 + \gamma_2 = 0$	7.53 [0.002]	8.08 [0.01]	3.56 [0.037]	10.34 [0.000]
$H_0: \gamma_1 = 1$	29..21 [0.000]	29.33 [0.000]	166.36 [0.000]	242.00 [0.000]
$H_0: \gamma_1 + \gamma_2 = 1$	2.44 [0.126]	3.77 [0.059]	1.68 [0.202]	2.09 [0.155]
$\overline{R}^2$	0.44	0.44	0.46	0.48
Ljung–Box Q–statistic $\chi^2 \sim (7)$	10.35 [0.170]	8.96 [0.176]	12.88 [0.075]	12.83 [0.076]
White Heteroskedasticity Test	0.91 [0.567]	1.00 [0.476]	0.92 [0.559]	1.14 [0.357]
Wald Exclusion Test	————	0.67 [0.417]	————	0.10 [0.905]

Notes: Standard errors are inside parentheses (OLS denoted by "a", heteroskedastic and autocorrelation–consistent denoted by "c"), probability values inside brackets.