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Author(s): John T. Williams and Brian K. Collins

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*The Political Economy of Corporate Taxation**

John T. Williams, *Indiana University*

Brian K. Collins, *Indiana University*

Theory: We propose a theory of corporate taxation in the United States that builds on dynamic optimal taxation models. The theory is consistent with structural dependence theories (Lindblom 1977) in that expectations by investors of future tax policy limit policy maker options, primarily because corporate tax policy is time inconsistent. This theory contrasts with pluralistic models of corporate taxation because it recognizes the collective action problem facing business.

Hypotheses: We offer three propositions. First, effective corporate tax rates will be exogenous to aggregate business interests, and instead should cause the organization and activity of business. Second, a shock in effective tax rates will reduce relative levels of investment. Third, effective corporate tax rates will be exogenous to real income and real investment.

Methods: Exogeneity tests and the moving average representation from several vector autoregressions are used to evaluate the propositions.

Results: All three propositions are supported. Dynamics in the effective corporate tax policy are consistent with an optimal model of taxation, at least for the period 1977–94.

That business has power over public policy is not controversial; however, the strength and mechanisms of business influence have been a continuing normative concern of democratic theorists and an empirical puzzle to social scientists. Business as a single, distinct interest does not effectively exercise influence through typical interest group politics; however, the collective interest of business does constrain policy makers in democratic political economies. Our argument and results are consistent with Lindblom's (1977) argument that business has a preferred position in capitalist democracies.

The exact nature and role of capital in a democratic polity has, quite frankly, given democratic theorists fits (Dahl 1986, 7–24; Freeman 1989, ix–x). Pundits, politicians, and scholars often express concern about the

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growing influence of business interests, especially in relation to other collective interests such as consumers or labor.¹ Classical pluralism does not suggest any problem of overrepresentation or inordinate influence because many groups will organize to promote many conflicting interests (Truman 1953). Critiques of pluralism recognize that organizing latent groups is difficult, but critical, to obtaining and exercising influence (Olson 1965). Unlike most groups, however, business can marshal enormous resources and organize to pressure policy makers for preferred policies (Schlozman and Tierney 1986).² Superior organization, information and financial resources should enable business to capture the loyalty of important policy makers in the bureaucracy and Congress who then forge policy that is consistent with the general interest of business as opposed to consumer or labor interests. Business political power may be exercised through class groups, political parties, and interests groups; yet, the empirical evidence is mixed and contradictory regarding the strength of business as an organized political actor (Bowles, Gordon, and Weisskopf 1989; Hall and Wayman 1990; Jacobs 1988; Quinn and Shapiro 1991a; Swank 1992; Vogel 1989).

An alternative to the pluralist approach is Charles Lindblom's (1977) classic argument that business holds a "privileged position" in democratic policy making. The structure of capitalist economies limits the policy options that elected officials can adopt without fear of voter reprisal. Policy makers and business want to perpetuate a social and political order that will insure continued capital accumulation for the capitalists and continued electoral success for politicians. A dilemma arises in liberal democracies because the authority to make economic decisions ultimately rests with private firms, except in extraordinary circumstances such as war. If investment declines, the economy stagnates, and consumers threaten the political viability of elected officials. Therefore, elected officials are politically dependent upon private investors to maintain enough investment to sustain economic growth. Even though individual enterprises do not consciously pressure for changes in policy, the tacit threat of disinvestment constrains elected officials to pursue policies consistent with profitable investment. In other words, government policy makers must induce firms to invest in the economy. Failure to do so risks economic stagnation and political reprisal (Lindblom 1977, chap. 13). Therefore, firms need not exert overt, organized

¹Schattschneider (1960) makes the argument that the interest group system has an upper class and pro-business bias which when coupled with campaign contributions and inside connections influences public policy. Schlozman and Tierney (1986) find that business interests are much more likely to be organized than other social interests (see also Berry 1989).

²Grier, Munger, and Roberts (1994) explicitly identify factors facilitating political organization of firms at the industry level. Their findings corroborate our suggestion that firms face severe collective action problems.

political pressure to influence policy. Like the pluralist approach, however, empirical evidence of the linkage between investment and changes in public policy has been mixed (Jacobs 1988; Quinn 1988; Quinn and Shapiro 1991a; Swank 1992).

We suggest that the mixed results from empirical investigations of interest group theories and the structural interpretation of business influence are consequences of two problems. First, business as a political actor has been mischaracterized. When social scientists speak of “business,” many do so in the context of an aggregate or collective interest common to all firms. In short, business is ostensibly the group or universe of firms, their owners, and managers concerned with profit making. This conceptualization of business leads to empirical and theoretical problems in specifying the extent and mechanisms of business influence. We use firms to denote members of “business” as a latent group who share an interest in profit making, but often have conflicting particularistic interests in economic policy preferences. Firms may also be organized into intermediate groups known as industries or sectors, which have shared and conflicting interests with other industries (Grier, Munger, and Roberts 1994).

The second problem with the literature is that many policies business seeks to influence are subject to time inconsistency problems. Time inconsistent policies are not subject to optimal planning because an optimal trajectory in one period will not be optimal in the future. Time inconsistency means that government plans will not be credible because policy makers will have an incentive to change policy once the private sector expects the plan to be carried out. Thus, time inconsistent policies lead to policy announcements that are not credible, and government policy must focus on policy solutions other than optimal ones. Corporate tax policy is an important example because the government cannot credibly commit to optimal taxation policies. Consequently, the tax system becomes ripe for distributive conflict because policy makers, in seeking a variety of supporting coalitions, may favor some firms and industries at the expense of others in order to maintain reasonable economic performance (Williams, Collins, and Lichbach 1995).

We argue that business does not directly influence aggregate effective corporate tax rates (ECTRs). Because business is not a unitary interest, individual businesses are more concerned with their own rate than the aggregate rate. When confronting changes to the tax code, firms organize to protect their particular interest, not the interests of business as a whole. Thus, we argue that changes in corporate tax policy motivate the political organization of firms, but political organization in the form of political action committees (PACs) does not affect the aggregate effective corporate tax rate (*contra* Quinn and Shapiro 1991a). We provide statistical analysis

supporting the hypothesis that corporate taxes are not influenced by the strength of business as measured by corporate PACS.

In the next section we provide a sketch of business as a political actor. We then provide, based on the behavior of businesses and government actors, what we call an equilibrium theory of corporate taxation that is consistent with all relevant actors' incentive structures. We offer an optimal tax model to provide the structural foundation of tax policy, and we evaluate three propositions using vector autoregression.

Business as a Political Actor

To understand how business influences public policy and taxation, we must straddle micro and macro levels of analysis. Models of the structural relationship of business and the state are useful for understanding inherent characteristics of democratic capitalism. Micro-level analyses allow an understanding of the interaction of firms with government policy makers and a richer specification of the dynamics of policy, especially the importance of expectations of future tax rates on profit expectations and, thus, investment. Hence, micro-foundations can provide an explanation for what are often portrayed as macro-level phenomena. Macro-analysis is important, however, because political economists are interested in how processes aggregate in the same way as macroeconomists are interested in analyzing aggregate unemployment rates, for example. Failure to consider both the micro and macro levels is seen in many pluralist theories of business influence.

Some pluralist analyses use a problematic conception of business as a group in competition with other groups like consumers or labor. This class-oriented conception suggests firms coalesce around a common set of concerns and more often than not successfully pursue policies contrary to consumer or labor interests (but see Martin 1991). This universal, unitary conception of "business" ignores a significant collective action problem that undermines the ability of firms to organize into any subgroup, including the intermediate industry level (Grier, Munger, and Roberts 1994), or competing groups (Martin 1991). Jacobs (1988) argues that the business class will effectively influence policy only when constituent groups overcome the problem of collective action. When capital is concentrated among a small number of firms, the possible benefits of cooperating to influence tax policy are sufficient to overcome the collective action problem. He finds empirical support for the hypothesis that an increase in the concentration of capital assets is associated with a decrease in effective corporate tax rates; however, neither the means of overcoming the collective action problem nor the mechanism of influence is theoretically specified.

Quinn and Shapiro (1991a) revisit Jacobs' study, but do not find sup-

porting evidence that business influence stems from high asset concentration. Instead, they suggest that partisanship and the organization and activity of corporate PACs strongly influence corporate tax policy. Consistent with the pluralist position, corporate PACs are in competition with other PACs. As the number of corporate PACs increases in proportion to the total number of PACs, business should exhibit greater influence and thus effective corporate tax rates should decline. Changes in tax policy can be traced to the increased pressure of business in relation to the weakening pressure of competing groups. In this approach, changes in policy are a function of the relative size of organized interests, but little attention is given to the collective action problem facing latent groups.

Political parties that represent ideologically distinct groups present another twist on the pluralist theme and identify another possible mechanism of influence. Candidates from parties seek election to implement policies favoring particular socioeconomic groups (Hibbs 1987; Quinn and Shapiro 1991b). Partisanship is significant because Democratic presidents are associated with increases in effective tax rates for corporations (Quinn and Shapiro 1991a, 1991b). In this sense, the pluralistic competition between pro-business (Republicans) and anti-business groups (Democrats) is played out in the arena of electoral politics, especially presidential elections (see also Alesina and Sachs 1988; King 1983; Swank 1992 for parliamentary governments).

For an aggregate business group to exist, however, firms would have to solve a difficult collective action problem. Thus, any reference to monolithic and coherent business interest as an approach to explaining corporate tax policy requires ample justification. Not only are there standard difficulties for even small groups to organize for collective action, but the opportunity costs of organizing are particularly high for firms. For example, Vogel (1989) challenges the idea that political conflict over economic policy is waged between pro- and anti-business groups. There is no monolithic business position on taxation or any other issues because business interests are divided along the lines of size and economic sectors (see also Martin 1991).

Our argument has three important parts. One, we are examining the implications of micro-level political-economic behavior on macro-level political-economic outcomes. We suggest that firms are willing to compete for particularistic benefits from government rather than cooperating to lower the overall tax rate. Thus, firms, or even industries, face a collective action problem that is the same as those faced by oligopolists, and it is well established that cooperation is very difficult when there are a high number of firms in an industry (Friedman 1983, chap. 8). Even if firms solve this problem at the industry level, it is highly unlikely that the problem will be solved across industries. Thus, business is not a unitary interest,

and we conceive business as comprising conflicting interests that compete for particularistic benefits, unless the problem of collective action is resolved. This conception is markedly different from that of other analysts who model the influence of business on the ECTR. We also enrich the previous empirical studies that focused solely on macro-level determinants of ECTRs by recognizing micro-level foundations of business behavior.

Two, our theory suggests and proposes to test the direction of the relationship between the ECTR and both the political and economic behavior of businesses. Previous structural models, either explicitly or implicitly, exclude the proposition that corporate taxes have any impact on the political or economic behavior of firms. To remedy this we incorporate business expectations as a key mechanism of business influence. Previous studies test the implications of structural dependence with investment variables, but this misses an important dynamic interaction between business and policy makers.

Three, we argue that tax policy is subject to time inconsistency problems, and therefore, the ECTR will be exogenous to economic activities. We offer a stylized dynamic model to show that tax policies are by necessity time inconsistent because optimal fiscal plans under rational expectations will necessarily not depend on investment levels. The ECTR will be exogenous to aggregate indicators of business power because policy makers will attempt to keep tax rates at more or less the same levels. Thus, gains made by some industries will be offset by losses to others.

We analyze data on the ECTR, real income, real investment, and business PAC strength. Using exogeneity testing and moving average responses from a vector autoregression, the data analysis strongly supports our claims. The ECTR is clearly exogenous to both investment and business political influence, as indicated by corporate PAC activity. Furthermore, dynamic analysis indicates that business PAC strength, as measured by the number of corporate PACs as a percentage of total PACs, responds positively to a positive shock in the ECTR.

We present an equilibrium approach that bridges several theoretical gaps and makes more realistic assumptions than other approaches about the political and economic behavior of firms. For example, an important difference between our approach and others is the assumption that economic expectations influence the making of economic policy and its impact on key economic variables (Barro 1989; Barro and Gordon 1983a, 1983b). Most models in political science assume that the economic behavior of firms does not vary in response to, or anticipation of, changes in macroeconomic policy. Our point of departure suggests that firms do not ignore predictable changes in policy and that this has consequences for empirical analysis.

An Equilibrium Theory of Corporate Tax Policy

We place the interaction of interest groups and government within an equilibrium political-economic context. Of course, an equilibrium model is only one way to conceptualize the complex behavior in an open political-economic system, but it provides many solutions to the problems already noted. We will present a simple formal model in this paper that allows us to make predictions about the dynamics of the effective corporate tax rate and whether these dynamics are conditioned on key political variables. We provide empirical support for an alternative theoretical view that the ECTR will largely be exogenous to the political power of an aggregate business interest.

We will first digress on the meaning of an equilibrium model. In using the concept of equilibrium, political and economic agents will make decisions that they believe will make them better off than would other decisions. In equilibrium, individuals will not have any reason to change their decisions unilaterally. Furthermore, individuals have an incentive to use information that will make them better off. In a dynamic context, this means that they have an incentive to make predictions about important future variables. An equilibrium theory must assume that individuals form rational expectations about the future. This means that economic agents will, on average, be correct in their predictions of important variables.³

An equilibrium theory requires that investment be a function of expected future taxes on capital because investments are a function of future expected after-tax profits. Thus, policy makers are limited in their ability to freely adjust corporate tax policy without acknowledging its impact on economic activity. In addition, an equilibrium theory requires that the political organization of firms, industries, and business be linked to the benefits that each firm receives from policy changes. Firms will no more invest in political action that has no reward than they will invest in economic activity that has no reward. Third, the interests of the state must be viewed within the context of a decentralized market and political structure. That is, the market is not usefully represented as business versus consumer or labor. Elected officials receive support from many groups and supporting coalitions are shifting (see Martin 1991).

Assuming businesses desire to lower or prevent an increase in their tax liabilities, they may allocate resources to reduce or maintain the aggregate ECTR or reduce or maintain their own ECTR. We argue that specific firms

³The rational expectations assumption simply means that economic agents are able to form unbiased forecasts of variables, like future tax rates, that influence the agent's decision behavior.

want their own tax rate to be low, and they are much less concerned about the aggregate ECTR because corporate tax policy has significant distributive components that exacerbate the already severe collective action problems.⁴ Past research at the macro level suggests variance in the aggregate ECTR is a function of some collective business interest, but this explanation is problematic for several reasons.

Many changes in the corporate tax code have a significant distributive component.⁵ Accelerated depreciation schedules and investment tax credits are two policies regularly changed to benefit particular business sectors and firms, and thus ECTRs typically vary significantly across sectors (Pechman 1987). The tax code itself is structured to favor some businesses, such as financial institutions or insurance providers, with tax laws that are very different from other profit making corporations. Since the costs of these policies can be distributed over other corporate and noncorporate tax bases, they are more prevalent than policies to increase or reduce nominal corporate taxation. We acknowledge that occasionally the tax code is changed for redistributive purposes, but these changes will be largely made on the basis of electoral politics (Quinn and Shapiro 1991b), not the influence of a collective business interest.⁶

We suggest that a decline in the aggregate ECTR is a function of firms or small groups (industries) acting in their own interest, but not part of a collective interest necessarily. For example, in the Economic Recovery Tax Act of 1981, business was favored as a collective group, but there was more in the package for industries, such as real estate, than there was for business in some holistic sense. In other words, business as a whole gained absolutely, but the relative benefits to industries and firms varied signifi-

⁴In a personal communication, Dennis Quinn indicated that business may care about the overall tax burden on corporations because suppliers are concerned with buyers and taxes reduce aggregate demand for products. We argue that even if this is the case, business still faces a collective action problem because individual firms will merely let others pursue this policy agenda and nevertheless reap the benefits.

⁵Lowi (1979, 46–8) argues that so-called liberal-conservative principles are irrelevant for understanding the income tax even though many consider it to be progressive.

⁶We are, of course, assuming that corporations bear some of the corporate tax burden. If corporations can pass additional taxation costs to consumers, they would be disinterested in the policy. Congress could then set rates at any level. Depending on the elasticity of demand for products and the nature of capital supply, many different scenarios are possible, in theory. Empirical evidence is mixed, but theory indicates that as long as the supply of capital is elastic, the incidence of the corporate tax falls on all capital (Kiesling 1992). We argue that the most reasonable assumption is that tax incidence falls on both consumers/labor and corporations. Any argument to the contrary requires assumptions about product and capital markets that are extreme.

cantly (Fisher 1985). Therefore, we should and do see many changes in the corporate tax code to help firms and industries, but few large changes in the aggregate ECTR (Pechman 1987).⁷

Even if the 1981 tax cut demonstrates the ability of firms to overcome collective action problems, the Tax Equity and Fiscal Responsibility Act of 1982 demonstrates the instability of a business coalition. When President Reagan asked Congress to close loopholes and impose a minimum corporate tax, business unity quickly fractured. Although firms agreed that tax increases should be avoided in general, the Chamber of Commerce, National Federation of Independent Firms, and American Business Conference all eventually supported tax bills that increased taxes, but protected their constituents (Vogel 1989).

We assume that congressional policy makers have incentives to provide particularistic benefits to certain firms and industries, rather than business interests as a whole. Policy makers must supply enough revenue to provide government services and thus want to keep the overall revenues from corporate taxation as high as possible, especially during more recent periods in which the budget deficit is a major problem.⁸ However, these same policy makers can gain political support from businesses requesting specific or general tax relief. Given these incentives, we assume at the micro level that congressional policy makers have an incentive to provide ECTRs to specific sectors and firms. Offering more general tax benefits to business can create a reality or perception of allowing “big business” to get more than its fair share, at the expense of nonbusiness interests (Arnold 1990; Conlan, Wrightson, and Beam 1990). Thus, congressional policy makers might maintain high nominal corporate rates, with additional tax breaks targeted to keep the ECTR down for preferred sectors. Or conversely, policy makers might lower nominal rates, but remove some tax breaks to maintain the aggregate ECTR and government revenues.⁹ In doing this, policy

⁷The 1981–82 tax law changes provide anecdotal support for this proposition. In 1981 representatives from major business associations met to propose a general tax cut for business. In an exceptional show of unity, the “Carlton Group” proposed the “10:5:3” depreciation schedule. According to Vogel (1989), one participant compared this agreement to the Paris peace talks. Undoubtedly, business unity made Congress more amenable to reducing taxes. Yet, even in this environment conducive to overall reductions in corporate taxation, some industries, like energy, benefited significantly more than others.

⁸For theoretical precision, we could invoke the Leviathan assumption that the state has an interest in maximizing revenues (see Brennan and Buchanan 1980), but we feel such an abstraction is not necessary. Rather, we make our case on more substantive grounds.

⁹One reviewer suggested that corporate tax burden rather than tax rate is the most appropriate dependent variable. We disagree, because we would predict that corporate tax burdens would decline over time even when tax rates remain stable. This happens because government expenditures, largely a function of entitlements, have increased over time, and

makers can avoid shifting all the burden to individual income tax payers.

So far we assume that members of Congress want to provide some firms with particularistic benefits, while keeping revenues from corporate taxation as high as possible. Together, this means that some firms will win and some will lose. We assume that who loses and gains will probably be a function of more micro-level (firm or industry) indicators of power (see Grier, Munger, and Roberts 1994). At least in the context of tax policy, business as a unitary interest group is inappropriate even though all firms want lower taxes (Lindblom and Woodhouse 1993; Martin 1991; Vogel 1989). Therefore, from these assumptions we hypothesize that the ECTR will not respond to any indicator of business political power in the aggregate; for example, the ECTR will be exogenous to aggregate indicators of business political strength. Following Quinn and Shapiro (1991a) we use the aggregate number corporate political action committees (PACs) relative to other PACs as an indicator of business political influence. In contrast, we expect that aggregate business influence (via PACs) will be endogenous to the ECTR because as the tax rate increases, there are additional incentives for firms to organize and protect their interests (Grier, Munger, and Roberts 1994). We will state this argument as:

Proposition 1: The ECTR will be exogenous to the political strength of business interests in the aggregate. Rather, an increase in the ECTR will lead to an increase in business political organizational activity.¹⁰

However, if firms are not capable of solving their collective action problem and forcing Congress to lower the ECTR, why do the rates remain at relatively low levels?¹¹ That is, why does Congress not tax corporations at extremely high rates, given that these revenues could be redistributed to a majority of individuals who would then reward members of Congress with reelection? If our equilibrium theory explains corporate tax policy, then the answer can be found in Lindblom's argument that private firms have a preferred position in a capitalist democracy because they can withdraw investment. This does not, however, imply that business must directly organize a capital strike; collective disinvestment is usually unnecessary. Thus, structural dependence theory is difficult to test because of limited

our theory indicates that the government is constrained in being able to increase the ECTR but has not been constrained in producing higher budget deficits and increasing social security taxes. Thus, a model of tax burden would be different from a model of the ECTR.

¹⁰We will test this proposition, but note that our theory suggests the overall impact of business interests on corporate tax policy will primarily be evidenced at a micro level, not at the macro level. This conjecture will be addressed in further research, but proposition one will face empirical scrutiny in this research.

¹¹Steinmo (1993) argues that the United States is hyper-pluralist, resulting in high nominal corporate tax rates coupled with low revenue yields.

variation, and mixed findings based on limited variance are not surprising (Jacobs 1988; Quinn and Shapiro 1991a; Swank 1992).

Our second proposition below relies on a standard economic mechanism: expected profitability will decline in response to shocks in corporate taxation, thus resulting in less investment. The market limits politics as Lindblom suggests. We do not expect to find a positive causal relationship in which declining investment motivates a lower ECTR because the ECTR influences levels of investment through altering expectations of future after-tax profits. Firms act upon these expectations to take account of projected tax policies.¹² Therefore, we propose the following:

Proposition 2: Investment is sensitive to the ECTR; a shock in effective tax rates will reduce levels of investment.

Empirical analyses of Lindblom's theory typically test the hypothesis that decreased investment is associated with decreased tax rates (Jacobs 1988; Quinn and Shapiro 1991a, 1991b; Swank 1992). In adopting structural models that specify investment as an explanatory variable for taxation, the reciprocal influence of corporate taxation over aggregate investment is omitted and thus eliminates the expectational implications of Lindblom's structural dependence argument. If researchers resort to explaining low ECTR as a function of inordinate business power through the mechanism of disinvestment, they violate important exogeneity assumptions. For example, Quinn and Shapiro's (1991a) test of the structural dependency theory is built on the assumptions of an IS-LM economic model. In using the static IS-LM model, they explicitly reject the possibility that business can act according to rational, or any other, expectations. The implication of this omission is that tax policy has no causal influence over the political or economic behavior of firms.¹³ In short, Quinn and Shapiro's (1991a) structural model does not allow corporate tax policy to feed back and cause

¹²Przeworski and Wallerstein (1988) develop a formal model of structural dependence in which both business and wage earners are trying to maximize profits and consumption, respectively. The state must manage the conflicting goals while providing services to both the wage earner and business. In their static model, a tax increase does not substantially affect investment because the noncapital sources of investment increase to offset any decline in business investment. In their dynamic model, however, when business anticipated tax increases, investment declined substantially. After the tax policy was initiated, investment returned to prior levels. Thus, the difference in dynamic versus static analysis is crucial for a political economy of corporate tax policy.

¹³There is a bit of evidence supporting a dynamic ISLM framework (Gali 1992), but most, if not all, macroeconomists have abandoned the static ISLM setup except for expository and teaching purposes. Further, Gali's analysis does not speak to tax or fiscal policy, and our results focus more on tax policy. Our framework has more in common with Gali than Quinn and Shapiro's (1991b) because our setup and Gali's consider expectations to be important.

changes in investment. There is no *a priori* reason to exclude the proposition that investment levels change in response to actual or anticipated changes in corporate tax policy when testing structural political-economic relationships in tax policy (Auerbach and Hines 1988; Chirinko 1988; Fischer 1980).

A Dynamic Model of Tax Policy

We provide two dynamic optimal control models of tax policy to show how our equilibrium model is consistent with rational investment behavior that other theories have not addressed. Propositions one and two are consistent with the model below. The rational expectations model is particularly important for deriving the most important propositions of this paper, namely, that the effective tax rate will be exogenous to economic conditions and the political organization and strength of firms. We assume that the tax system is “mature,” meaning that there is a reasonable amount of information for investors and policy makers to form expectations. We also assume that Congress¹⁴ minimizes function (1), where S^* is the natural log of the desired spending level, I^* is the natural log of desired investment, and S_t and I_t are the logs of the actual levels of investment at time t :

$$\sum_{t=1}^N (S^* - S_t) + (I^* - I_t). \quad [1]$$

We assume Congress wants to spend money to satisfy constituents and firms. Further, Congress desires a spending level that allows members to build distributive coalitions and to supply societal demands. One might question whether there are maximum desired levels for spending and investment. Spending has a ceiling because too much will place too great a pressure on either the deficit or taxes. That is, there is a maximum that is sustainable given a fixed public policy regime. Congress must also be concerned about investment. Too much investment from firms will generate inflation in the short run and recession brought on from bloated inventories in the long run. Successful business cycle management requires that variation around the desired level be minimized.

Minimization of the objective function over any time horizon N is subject to the following constraints.¹⁵

$$S_t = \mu + \lambda_1 S_{t-1} + b_0(r_t - r_{t-1}) + b_1(I_t - I_{t-1}) + e_{1t}. \quad [2]$$

¹⁴For simplicity and presentation we assume that Congress is the policy maker with full budgetary authority.

¹⁵This setup is similar to Sargent's (1987, 454) model for monetary policy.

$$I_t = \mu + \lambda_2 I_{t-1} + \beta_0 (r_t - r_{t-1}) + e_{2t}. \quad [3]$$

The assumption behind the reduced-form constraints is that both spending and investment follow an autoregressive process and respond to a change in the effective tax rate described by b_0 and β_0 . The assumptions are that $b_0 > 0$, b_1 and $\beta_0 < 0$, and the autoregressive parameters (λ_1 and λ_2) are positive. The constant μ represents the growth rate in spending and investment due to productivity increases in the economy. Solving for r_t^* , the optimal tax rate, involves substituting the expected values of S_t and I_t so that each equals S^* and I^* , respectively. Once this substitution is made, r_t^* can be found so that (1) is minimized.

$$r_t^* = \frac{S^*}{b_0} - \frac{\mu}{b_0} - \frac{\lambda_1}{b_0} S_{t-1} - \frac{b_1 \mu}{b_0} - \frac{b_1 \lambda_2}{b_0} I_{t-2} \quad [4]$$

$$+ r_t - \frac{b_1 \beta_0}{b_0} r_{t-1} + \frac{b_1 \beta_0}{b_0} r_{t-2}.$$

This reaction function indicates that Congress will react to the gap between S^* and expected spending and to investment levels two periods in the past. The prediction that the reaction function will include past investment indicates that the effective tax rate will not be strictly exogenous to investment.

Our argument for an equilibrium model criticizes the above approach for having an adaptive, rather than rational, investment sector. Keeping all else the same, but replacing $(r_t - r_{t-1})$ with $(r_t - {}_{t-1}r_t^e)$ in the investment schedule where ${}_{t-1}r_t^e$ is the expected tax rate at time t , produces the following reduced-form for investment:

$$I_t = \mu + I_{t-1} + \beta_0 (r_t - r_t^e) + e_{2t}. \quad [5]$$

This assumption in the model is our proposition two, which states that investment is sensitive to the ECTR.

Rational expectations provides that $E(r_t - r_t^e) = 0$, meaning that on average $r_t^e = r_t$. Also note that λ_2 equals one in this case, because any other value would imply that investors are not acting optimally.¹⁶ Solving for r_t^* after taking expectations of S_t and I_t gives the following optimal policy:

¹⁶If λ_2 equaled .9, for example, then this would imply that what is optimal in time t is not optimal, even given the same context, in time $t + 1$.

$$r_t^* = \frac{S^*}{b_0} - \frac{\mu}{b_0} - \frac{\lambda}{b_0} S_{t-1} + r_{t-1}. \quad [6]$$

While Congress reacts to past spending levels relative to S^* , the optimal tax rate does not depend on the level of investment. If the investment sector knows the optimal rule, then variance in $\sum (I^* - I_t)^2$ will be minimized because there will be no variation around the long term trend in investment. Thus, under this optimal plan, we can derive that the effective tax rate is strictly exogenous to investment.

But this is not the entire story. Notice that firms' expectations in the initial time period determine the level of investment over the entire time horizon. That is, since $E(r_t - r_t^e) = 0$, the initial tax rate will be equal to the expected tax rate. Now suppose Congress announced to investors that its objective function is:

$$\sum_{t=1}^N (I^* - I_t)^2. \quad [7]$$

That is, Congress proposes that it not try to build distributive coalitions using spending, but rather it sets out a course of policy that will focus only on producing the desired level of investment. If we call this policy plan an investment regime and the alternative the spending regime, then the investment regime will provide a larger initial investment if firms consider the announcement from Congress credible. Thus, initial expectations of firms are very important. If they do find the announcement credible, Congress would have an incentive to renege on its pledge, switch to the spending regime, and increase r_t so that it may attain a higher level of future spending than would be feasible if firm expectations were formed under an alternative regime. Another way to see this is that if initial investment is high, a larger value of S^* is feasible. In short, spending will be higher in the long run if Congress can fool investors into investing initially at a greater amount than optimal. This shows that the optimal policy rule described above is time inconsistent because Congress has the incentive to change its plan once firms invest at a level consistent with the investment regime (see Kydland and Prescott 1977).

Time inconsistency implies that tax policy will be exogenous to just those indicators of economic policy that tax policy is supposed to influence. If tax policy is not exogenous to these indicators, then investors will use this information to set future paths of investment. For example, if firms expect tax increases, they will begin moving capital to other uses. Likewise, expected tax breaks mean that firms will increase investment in expectation

of lower effective tax rates. The story becomes more detailed when one realizes that many adjustments are made to tax law each year. This expectational process is established because Congress will often change tax law based on economic events. The same factors that make Congress respond with changes enable firms to predict policy changes and adjust their investment practices. Thus, changes in effective corporate tax rates are not predictable precisely, because firms would be able to predict them. While the political process moves somewhat slowly, there is reason to believe that firm expectations are set somewhere during the design of tax legislation by congressional committees (Collins 1993). One additional proposition may be stated:

Proposition 3: The ECTR will be exogenous to economic conditions, including aggregate real investment and real income.

Proposition one also follows from this model because to minimize investment around its ideal point, Congress must set effective tax rates at their expected value. Since this value is dependent on the initial starting point, it makes sense for Congress to maintain a consistent effective tax rate. All else being equal, Congress is not precluded from distributing tax breaks to particular firms, industries, or sectors of the economy. As stated previously, we expect Congress to distribute tax benefits to some firms, but other firms must pay to maintain effective tax rates at their expected value. Thus, some firms will win and others will lose, but as stated in proposition one, aggregate business influence will be exogenous to the ECTR.

It is important to understand that although our model is very simple, optimal control models with rational expectations generally provide the types of results that we show here. For example, there exists an entire class of optimal taxation models that are time inconsistent (see Sargent 1987, chap. 15). Furthermore, conventional optimal control models generally require that agents being controlled not have the same information as policy makers.

We use this model to show that our criticism of past research is grounded in equilibrium behavior. Optimal control models without rational expectations do not offer a very realistic description of a dynamic process precisely because they do not allow the economic sector to understand the policy process. It is our contention that firms have a definite incentive to forecast future tax rates, and our model with rational expectations is consistent with this fact.

Methods and Data Analysis

Our propositions can be evaluated directly using exogeneity tests and vector autoregression (VAR) dynamic responses. In addition to exogeneity tests, we will estimate a four-variable VAR to analyze the implied dynamics

among key variables measuring the ECTR, real income, real investment, and business PAC strength. We measure PAC strength in terms of the proportion of corporate PACs to all PACs. We also evaluate one alternative measure, the number of corporate PACs. See Appendix 1 for a description of the data.¹⁷

The strength of interest groups obviously extends beyond campaign contributions, so we think, as do Quinn and Shapiro (1991a), that the number of groups is a better indicator of strength. Of course, business can influence policy in a variety of ways, but the resources and capability to organize into a political action committee demonstrates a significant intensity of desire to influence public policy. Since almost all corporate and noncorporate interests do organize PACs, using the ratio of corporate PACs to total PACs measures the existence of interest groups in a way that other measures can not. Quinn and Shapiro (1991a) estimate a time series beginning in 1955, but their equations include PAC measures beginning in 1974. This specification is problematic because it assumes that interest group influence, through the use of campaign organizations, was zero before 1974.¹⁸ We choose to base our analysis on the period 1977–94 because PAC data is available and most reliable.¹⁹ Furthermore, the number of PACs prior to 1977 is measured in yearly units, as are data for expenditures through 1982. Most of our data analysis efforts are focused on the PAC ratio variable,

¹⁷Many measures of the ECTR exist, but no single standard appears in any literature. We use a different measure of the ECTR than Quinn and Shapiro (1991b) because business includes more than manufacturing firms. Our measure includes financial corporations, theirs does not. Since the incidence of corporate taxation falls on all capital, we believe our measure is more appropriate. We checked for robustness of our measure and replicated all analyses using the measure Quinn and Shapiro (1991a) used. Both measures gave approximately equal results.

¹⁸In short, we are measuring business strength, and we do not think it was zero before 1974.

¹⁹The Federal Election Commission (FEC) prior to 1977 lacked the political support, resources, and authority to collect reliable data (Alexander 1992; Congressional Quarterly 1992). Since many of the laws and regulations empowering the FEC were still under litigation prior to 1977, many organizations were political action committees in all but name; yet, they did not report to the FEC. The 1975 “SunPAC” advisory opinion from the FEC and 1976 *Buckley* decision from the Supreme Court clarified the legal status of many political organizations that had operated as PACs without clear legal authorization. Consequently, most did not report to the FEC. With these clarifications came more authority for the FEC and a greater legitimacy for many organizations such as corporate-sponsored groups which began to report. For example, in the six months after the SunPAC decision, the number of corporate PACs doubled (Alexander 1992). Such reporting skews the real number of PACs in existence from 1974 to 1976. Moreover, standard reporting forms were not established until the 1977–78 election cycle. Any precision gained with increased observations would be offset by the known measurement error in the 1974–76 data.

although sensitivity analyses using contributions were checked and are noted.

Sims (1980, 1982) presents arguments in favor of using VAR in macroeconomic applications. Freeman, Williams, and Lin (1989) focus on its use in political science, and Williams (1990) argues that VAR is useful in political economy applications. We will not restate these arguments here. We would like to point out, however, that investment decisions will be made on the basis of expected profitability, and thus rational expectations is a possible complication of any data analysis. VAR is especially suited for data analysis situations in which some unknown expectational mechanism in part determines the path of key variables (Sims 1980; Williams 1990; Williams and McGinnis 1988). Exogeneity tests are quite sensitive to the influence of rational expectations, and it is important to trace out the implied dynamics of a VAR in order to assess potential connections among variables.

Exogeneity tests are useful for evaluating the causal priority of time series (Freeman 1983). A series X is exogenous to series Y if, when controlling for the history of series X , coefficients on series Y are zero. If Y is found not to be exogenous, then X "Granger causes" Y . Many statistical tests are available, and we use F -tests to test the block restrictions on coefficients implied by exogeneity.²⁰

Data Analysis

Before presenting formal tests of the propositions, Figure 1 provides informal evidence that the ECTR remains relatively stable around a long-term mean from 1977 to 1994, which is consistent with proposition one. The 1981–82 period shows a modest impact due to Reagan's policy shifts, but otherwise the ECTR varies relatively randomly around 35 to 40%. Once the Reagan changes were in place, the ECTR fluctuates around 30%.

One formal test that is consistent with Equation five is that the ECTR has a unit root without trend. Table 1 provides unit root tests for the important variables in our analysis, and these tests will not only help provide evidence to support proposition three, but also will provide information about these variables' dynamics important for specifying exogeneity tests. For the period 1977 through 1994, evidence using Dickey-Fuller tests indi-

²⁰We focus on exogeneity or Granger noncausality because exogeneity findings are very robust to specification error (Litterman and Weiss 1985). Thus, our use of two variable VARs should not be of concern and will be based on more information than would tests using a larger VAR. We do check our exogeneity findings within a four variable full VAR, and the results are reinforced. Also, please note that the predictions from our model are that the ECTR will be strongly, as opposed to weakly, exogenous (see Engle, Hendry, and Richard 1983), and requires that no predetermined variables will influence the ECTR.

Figure 1. ECTR, 1953-94

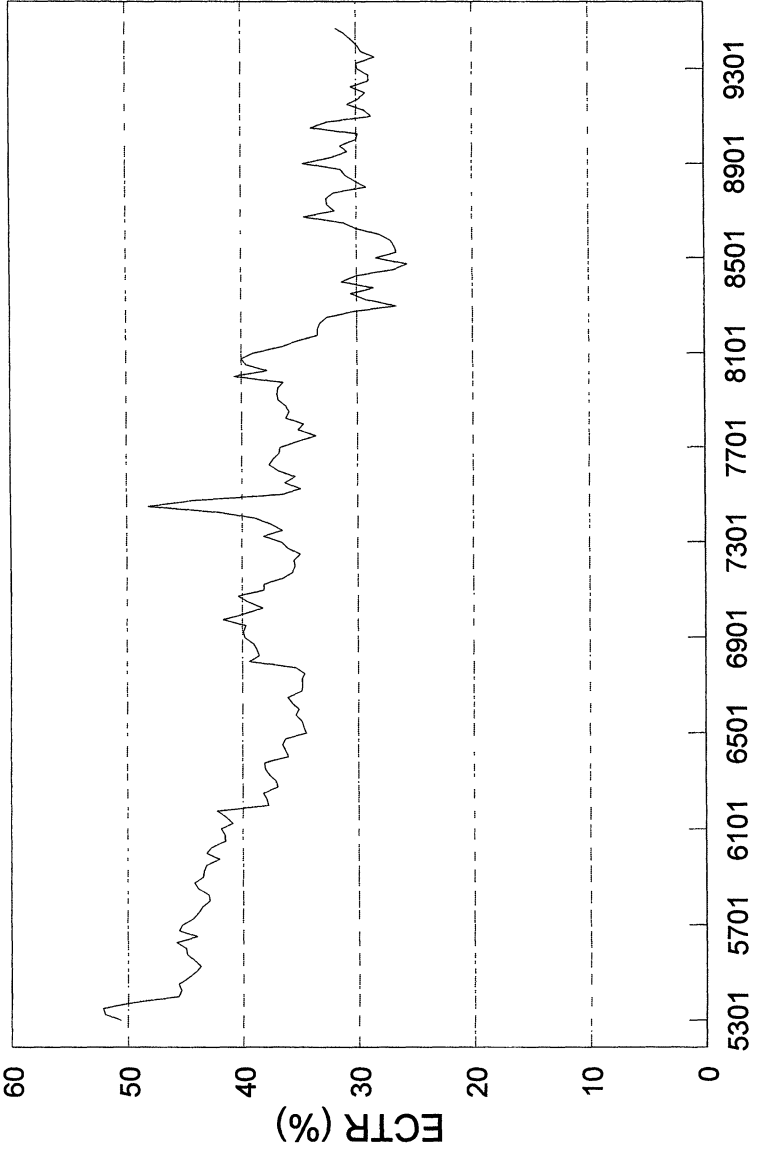


Table 1. Dickey-Fuller Unit Root Tests for the Ratio of Corporate PACs to Total PACs, the Total Number of Corporate PACs, and the ECTR

Variable:	τ	τ^* at .05 level	Decision
1977-94			
PAC ratio of Corporate to Total			
Simple D-F	-2.26	-2.93	accept
Aug. once	-5.11	-2.93	reject
Aug. two times	-3.60	-2.93	reject
Aug. three times	-5.04	-2.93	reject
Number of Corporate PACs:^a			
Simple D-F	-.72	-3.50	accept
Aug. once	-1.89	-3.50	accept
Aug. two times	-1.76	-3.50	accept
Aug. three times	-4.40	-3.50	accept
ECTR:			
Simple D-F	-2.37	-2.93	accept
Aug. once	-2.11	-2.93	accept
Aug. two times	-1.70	-2.93	accept
Aug. three times	-1.68	-2.93	accept
1953-94			
ECTR:^a			
Simple D-F	-2.37	-3.45	accept
Aug. once	-2.11	-3.45	accept
Aug. two times	-1.70	-3.45	accept
Aug. three times	-1.68	-3.45	accept

Note: Entries are for Dickey-Fuller and augmented Dickey-Fuller tests (Dickey and Fuller 1979).

^aThese variables have a deterministic trend.

cates that the ECTR has a unit root. Furthermore, no deterministic trend was evidenced, meaning that the series for the mature tax policy system supports proposition three. Note that the ECTR for the period 1953 through 1994 has a unit root and a negative deterministic trend, meaning that for the entire postwar period, the ECTR series is not consistent with a random walk but rather follows a secular, downward trend. Much of this dynamic stems from the use of corporate taxation to finance the Korean War, although there is a negative trend in the ECTR ending in the late 1960s.

For the other key variables, the preponderance of evidence supports the hypothesis that the ratio of corporate PACs to all PACs does not have a unit root, while the number of business PACs has a unit root and deterministic trend. This analysis indicates that both PAC variables cannot share a

Table 2. Exogeneity Tests for Effective Tax Rate and Corporate Political Action Committees, 1977–94^a

Hypothesized Exogenous Variables:	Block Coefficients Restricted:	F-statistic	P-value
<i>Four Quarter Lag</i>			
<i>Structure Results^b</i>			
Δ ECTR	Δ Number of Corporate PACs	.42	.79
Δ Number of Corporate PACs	Δ ECTR	.44	.78
Δ ECTR	Ratio of Corporate PACs to all PACs	.36	.84
Ratio of Corporate PACs to all PACs	Δ ECTR	.35	.84
ECTR	Number of Corporate PACs	2.01	.10
Number of Corporate PACs	ECTR	.21	.93
ECTR	Ratio of Corporate PACs to all PACs	.40	.81
Ratio of Corporate PACs to all PACs	ECTR	9.50	>.001
<i>Six Quarter Lag</i>			
<i>Structure Results</i>			
Δ ECTR	Δ Number of Corporate PACs	.84	.54
Δ Number of Corporate PACs	Δ ECTR	.21	.97
Δ ECTR	Ratio of Corporate PACs to all PACs	.83	.55
Ratio of Corporate PACs to all PACs	Δ ECTR	1.44	.22
ECTR	Number of Corporate PACs	.97	.45
Number of Corporate PACs	ECTR	.50	.80
ECTR	Ratio of Corporate PACs to all PACs	1.86	.11
Ratio of Corporate PACs to all PACs	ECTR	1.79	.12

^aResults are from two variable vector autoregressions.

^bThe four quarter lag structure is determined by the Akaike information criterion.

deterministic or stochastic trend with the ECTR since the long-term dynamics of each are different. Thus, there is no evidence that the variables are cointegrated and exogeneity tests in differences will not discard useful information.

We first present exogeneity test results before moving on to VAR dynamic response analysis.²¹ Table 2 presents the results from exogeneity tests

²¹We use two lag-lengths for the exogeneity tests, six and a lag-length selected using the Akaike information criterion. The lag-length six is chosen because many economic series measured at quarterly intervals require six lags to encompass residual seasonality in the data.

between the ECTR and two variables measuring the size and strength of corporate PACs. We also include exogeneity tests using the first difference of the PAC variables for those variables that show evidence they are integrated order one.

Results indicate that the ECTR is exogenous to measures of corporate PAC strength no matter how strength is measured. In addition, exogeneity results hold up whether the variables are differenced or not.²² In all cases, the ECTR is exogenous to the ratio of corporate PACs to total PACs and the total number of corporate PACs when using the .05 significance level. In only two cases does the p-value even approach statistical significance, and one is the case where the total number of business PACs is used in its levels. It is well-known that exogeneity tests are biased against the null when variables have unit roots, so this finding is of little concern (Hamilton 1994, 554). The p-value of .11 for the six-quarter test using the ratio of business PACs to total PACs is no cause for concern because the coefficients on the ratio variables sum up to a positive number, meaning that to treat the ratio variable as explanatory would provide dynamics inconsistent with Quinn and Shapiro's (1991a) argument.

Turning the causation around, the ECTR does Granger cause the ratio of corporate PACs to total PACs. This clearly supports proposition one, and is evidence that the literature has obtained spurious results from regression analysis (Quinn and Shapiro 1991a). That the ECTR does not explain the total number of business PACs is probably due to the independent growth in PACs through time. Using the ratio in effect controls for this secular growth and other more general influences.

Table 3 presents results from exogeneity tests for the ECTR and logged values of real investment and real income. Evidence from exogeneity tests for three different historical periods using levels and differences clearly support proposition three that the ECTR is exogenous to investment and real income.²³

In order to evaluate the actual dynamics of the ECTR, we estimate a

²²Differencing can create a problem if variables are nearly cointegrated because differencing removes any shared long-term components in two time series. The usual Granger causality tests lose their standard, asymptotic distributions if variables with unit roots are left undifferenced (Hamilton 1994, chap. 18), but the test statistic nevertheless describes the behavior of the likelihood and so we present these (Sims 1988). Furthermore, estimates in levels have the usual asymptotic properties (Hamilton 1994, 549–57). For these reasons, we choose to provide exogeneity tests in levels and differences even though there is no evidence from statistical tests of cointegration.

²³We do not test proposition two, that the ECTR causes investment, within the two-variable VAR because it is well-known that spurious results are likely in testing causality as opposed to exogeneity.

Table 3. Exogeneity Tests for Effective Corporate Tax Rate, Real Investment and Real Income: 1953–94, 1960–94, 1977–94^a

Hypothesized Exogenous Variables:	Block Coefficients Restricted:	Four Quarter Lag Structure Results: ^b		Six Quarter Lag Structure Results:	
		F-stat	P-value	F-stat	P-value
1953–94					
Effective Tax Rate	Real Investment ^c	1.15	.33	1.05	.40
Effective Tax Rate	Real Income ^c	1.82	.08	1.44	.20
Δ Effective Tax Rate	Δ Real Investment	1.02	.42	1.12	.35
Δ Effective Tax Rate	Δ Real Income	1.98	.05	1.59	.15
1960–94					
Effective Tax Rate	Real Investment ^c	.95	.47	.82	.56
Effective Tax Rate	Real Income ^c	1.66	.11	1.24	.29
Δ Effective Tax Rate	Δ Real Investment	.76	.63	.96	.45
Δ Effective Tax Rate	Δ Real Income	1.69	.11	1.49	.19
1977–94					
Effective Tax Rate	Real Investment ^c	.76	.64	.36	.90
Effective Tax Rate	Real Income ^c	1.06	.41	.46	.84
Δ Effective Tax Rate	Δ Real Investment	.56	.80	.52	.79
Δ Effective Tax Rate	Δ Real Income	1.35	.24	.95	.47

^aResults are from two variable vector autoregressions.

^bThe four quarter lag structure determined by Akaike information criterion.

^cVariables are in natural logs.

four-variable VAR. This VAR uses the ECTR, logged real income, logged real investment, and the ratio of corporate PACs to total PACs. This measure is the same one used by Quinn and Shapiro (1991a). We also check the effects of partisanship to ensure that our findings are robust to their omission.

We have a relatively small number of time periods over which to perform the data analysis, so it is useful to make Bayesian restrictions in order to satisfactorily estimate the VARs. We also must use a lag-length of six for the VAR because using a longer lag-length will use too many degrees of freedom. Doan, Litterman, and Sims (1984) describe the methodology more generally and Williams (1993) describes the exact approach used in this analysis. We provide results for a conventional unrestricted VAR, and we also evaluated the dynamics from an unrestricted eight-lag VAR and found no appreciable differences in the dynamics.

A VAR is a system of reduced-form equations that includes several lags of each endogenous variable on the right-hand side of each equation. Once estimated, the VAR can be inverted, giving its moving average repre-

sensation (MAR) that is useful for tracing out the dynamic relationships among variables. We use quarterly data, and most analysts of quarterly data realize the need to include at least six lags of each variable in each equation. This results in a large number of estimated parameters relative to degrees of freedom. Bayesian restrictions provide one method of making marginal restrictions on coefficients in the VAR instead of the typical zero-order restrictions used in most regression analysis.

The unrestricted VAR is presented in Figure 2. Each row of the MAR response chart represents the response to a one standard deviation shock to the error in the column variable. The dynamics on the diagonal of the figure are the responses of variables to their own random shocks.²⁴ The analysis clearly supports propositions one and three, but the 90% confidence or posterior regions do not allow rejection of the proposition that the ECTR causes investment. However, most mass is centered on negative values in this response after about eight quarters. The ratio of corporate PACs to total PACs clearly increases with a shock to the ECTR, and the ECTR *increases* rather than decreases with a shock to the ratio of corporate to total PACs. This increase may be expectational, as the economy also brightens after a shock in this ratio, meaning that there are other signals about the economy that have not been specified in this VAR. Because partisanship is such a prevalent variable in the literature, we check our results for robustness in light of three indicators of partisan control of government but find no significant effects.²⁵

²⁴Note the Choleski ordering we employ is only sensitive to the position of real income and investment because all other contemporaneous correlations are near zero. Thus, while the influence of real GDP on investment is sensitive to the ordering, none of the other relations are dependent on ordering.

²⁵We used the party of the president, the percentage of Democrats in the House and the percentage of Democrats in the Senate. Previous evidence is mixed, but most recent studies show that the Democratic party tends to have higher ECTRs than the Republican party (Quinn and Shapiro 1991a, 1991b). We find that partisanship does not have much of an impact on the ECTR. For the 1977–94 period, all coefficients for partisanship are statistically insignificant. In the 1953–94 period only the two variables measuring the House and Senate partisanship are significant at the .05 level, but the coefficients have different signs, suggesting that the partisanship of different chambers has contradictory effects. The coefficients are $-.114$ for the House and $.075$ for the Senate. The difference between coefficients is negative, suggesting that an increase in the proportion of Democrats in Congress actually reduces the ECTR. These findings comport with Jacobs (1988) who finds that Republican administrations are associated with an increase in the ECTR. He argues that because business confidence is inherently low with Democratic presidents they cannot raise taxes too much, if at all. On the other hand, Republican presidents hold business confidence so they can raise taxes without damaging confidence too much. This is similar to the argument that only Republican presidents could successfully negotiate arms treaty because they would not ap-

We now move to the Bayesian VAR. The Bayesian priors on the coefficients serve as starting values for the system of equations, and new data provides updates of these estimates over time. Fixed-coefficient Bayesian methods can also be useful for restricting the parameter space, but they often are very restrictive.

The general type of parameter restrictions are assumed to be normally distributed and vary according to variable lag number. The prior mean of one is given to the first lag of the left-hand-side variable in an equation, and all other prior means are zero. Thus, Bayesian estimation can be given a shrinkage estimator interpretation (Judge et al. 1988, chap. 21). Specification of the variances around these means requires a more elaborate procedure. Looser priors, those that are less restrictive, are placed on the lagged left-hand side variables relative to variables from other equations. Priors on coefficients for other variables receive tighter variances. As lags become longer, the priors tighten. Using a Kalman filter, the coefficients are updated through time.²⁶ For the estimated time-varying Bayesian VARs, the results are very robust to choice of priors.

Figure 3 presents the MAR for the four variable time-varying Bayesian VAR (estimated with data from 1977 through 1994) including the ratio of corporate PACs to all PACs, and Table 4 provides the decomposition of forecast error.²⁷ The most striking dynamic patterns indicate that a shock in the ECTR leads to a decline in investment and an increase in the ratio of corporate PACs to total PACs. These findings support propositions one and two. The increase in the ratio of PACs is not overly large, about one-quarter of a percent, but it is large relative to the overall unexplained variance in this ratio, as evidenced by the one standard deviation shock in the ratio of corporate PACs to total PACs.²⁸ Investment drops by about 1½% with a

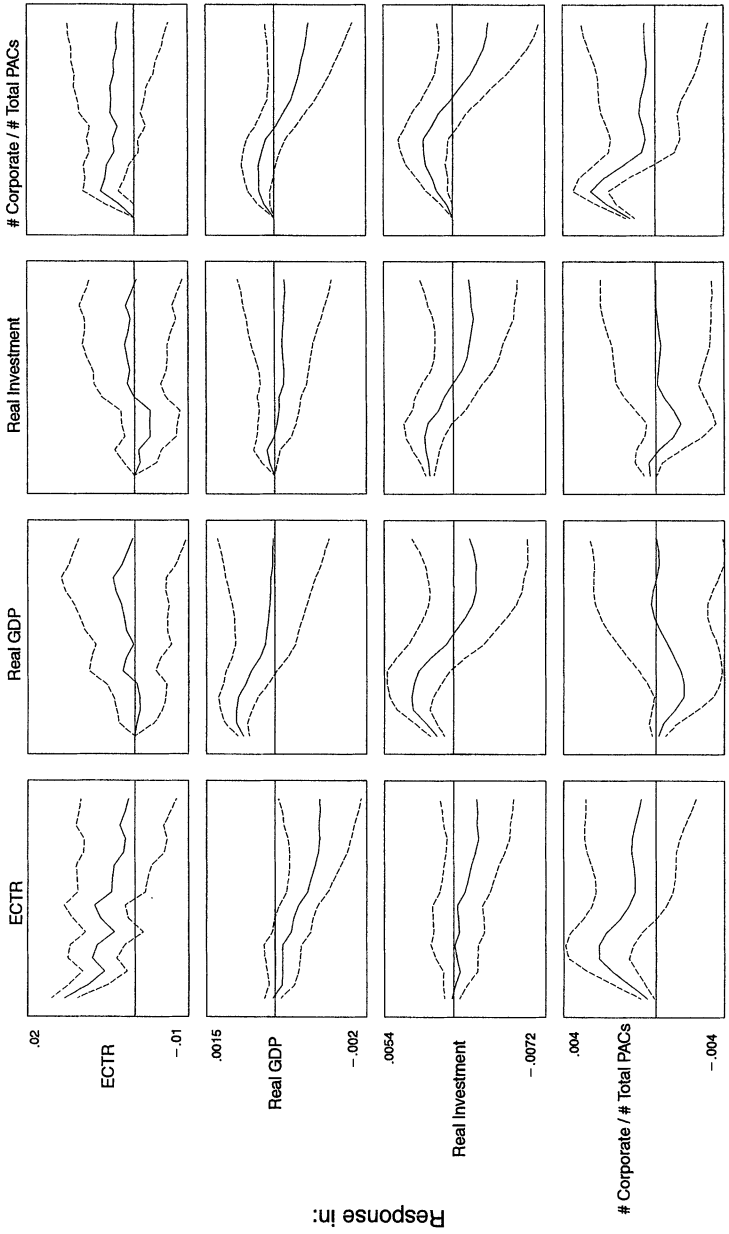
pear to be “soft on communism.” Quinn and Shapiro (1991a) find evidence that a Democratic president is associated with a lower ECTR, but our analysis finds no such evidence. We also failed to find significant evidence of congressional election cycles using the baseline model of the ECTR, GDP, and investment from 1953 to 1994.

²⁶We use a symmetric prior described in Williams (1993). The specific prior has a “tightness” of .15, no lag decay, relative tightness of other variables equal to .8, a scale factor of .9, and a coefficient of proportionality equal to 10^{-8} . We base the general neighborhood of our prior on informal criteria described in Doan, Litterman, and Sims (1984) and Williams (1993).

²⁷The decomposition of forecast error provides information about the magnitude of the direct and indirect effects in the VAR. If one variable has an important influence on a second variable, forecast errors in it will produce forecast errors in the second variable, and so on.

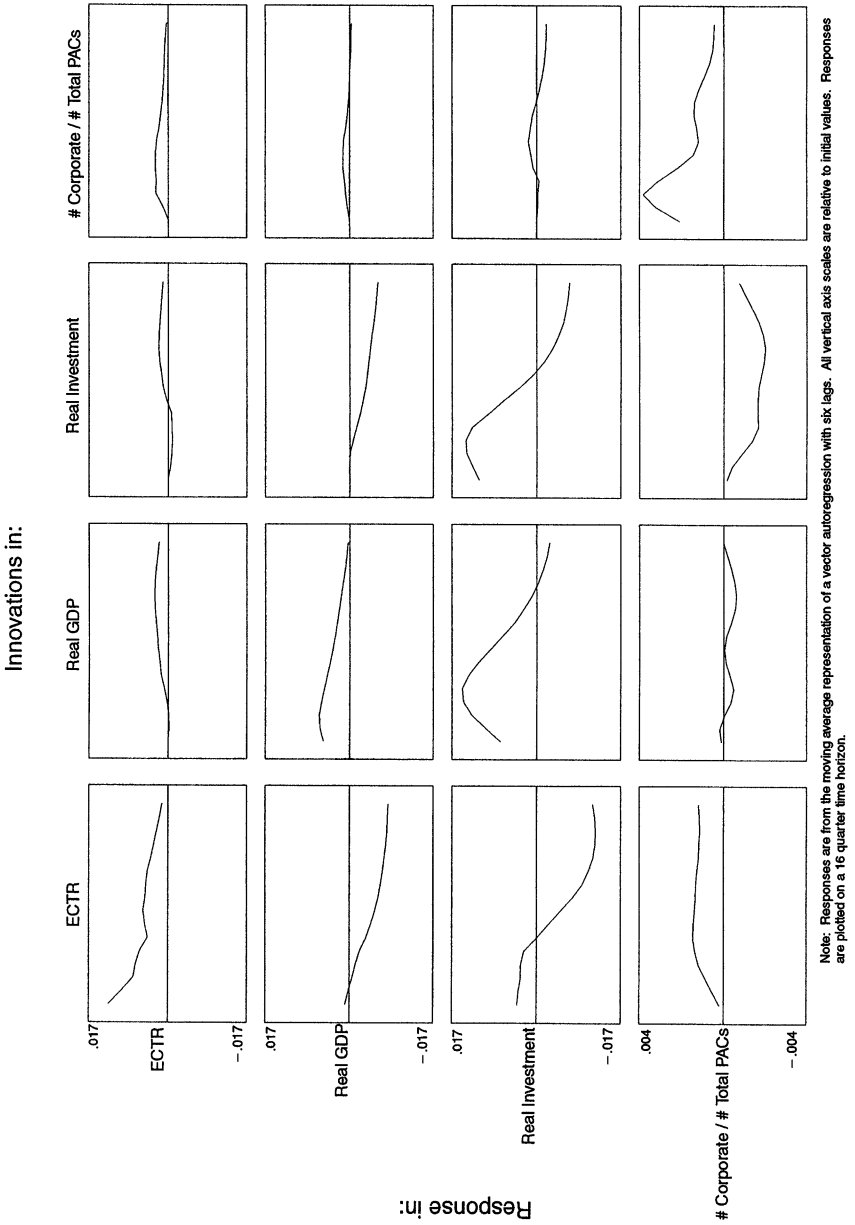
²⁸The decomposition of error variance for this system indicates that after 10 quarters, forecast errors in the ECTR account for approximately 15% of the forecast error in the ratio of corporate PACs to total PACs.

Figure 2. Moving Average Responses for Four Variable Vector Autoregression with 90% Confidence Intervals, 1977-94



Note: Responses are from the moving average representation of a vector autoregression with six lags. All vertical axis scales are relative to initial values. Responses are plotted on a 16 quarter time horizon. The dotted lines mark 90% confidence intervals or posterior distributions.

Figure 3. Moving Average Responses for Four Variable [Time-Varying] Bayesian VAR, 1977–94



**Table 4. Decomposition of Error Variance for Bayesian VAR
with PAC Number Ratio: Percentage of Forecast Error
Resulting from Innovations**

Forecast Error	k	Innovations in:			Ratio of Corporate PACs to Total Number of PACs
		Effective Tax Rate	GNP	Investment	
Effective Tax Rates	0	100.0	0.0	0.0	0.0
	1	99.3	0.0	0.1	0.6
	2	97.1	0.0	0.3	2.7
	3	95.5	0.0	0.4	4.0
	4	94.0	0.2	0.6	5.3
	6	90.7	1.4	0.6	7.3
	10	85.5	5.0	2.3	7.2
GNP	0	2.9	97.1	0.0	0.0
	1	1.4	98.1	0.0	0.4
	2	1.1	97.9	0.0	1.0
	3	1.8	96.3	0.4	1.5
	4	3.8	92.4	1.4	2.4
	6	14.1	77.1	5.7	3.0
	10	37.0	46.6	14.6	1.8
Investment	0	7.4	25.9	66.6	0.0
	1	5.9	32.1	62.0	0.0
	2	4.5	37.9	57.6	0.0
	3	3.8	42.1	54.1	0.0
	4	3.3	45.4	51.2	0.1
	6	2.8	50.5	46.4	0.2
	10	12.6	47.7	39.4	0.3
Ratio of Corporate PACs to Total Number of PACs	0	1.1	0.3	0.4	98.2
	1	2.3	0.3	1.1	96.3
	2	3.6	0.1	3.0	93.3
	3	5.8	0.4	6.2	87.7
	4	8.2	0.7	10.0	81.1
	6	12.8	0.7	15.9	70.6
	10	16.4	1.0	25.3	57.3

Note: Each entry represents the percentage of forecast error (k quarters ahead) in the row variable that is due to innovations in that column variable.

shock in the ECTR. Finally, there is strong evidence in favor of the exogeneity of the ECTR as the responses of the ECTR to shocks in other variables in the system are relatively flat.²⁹

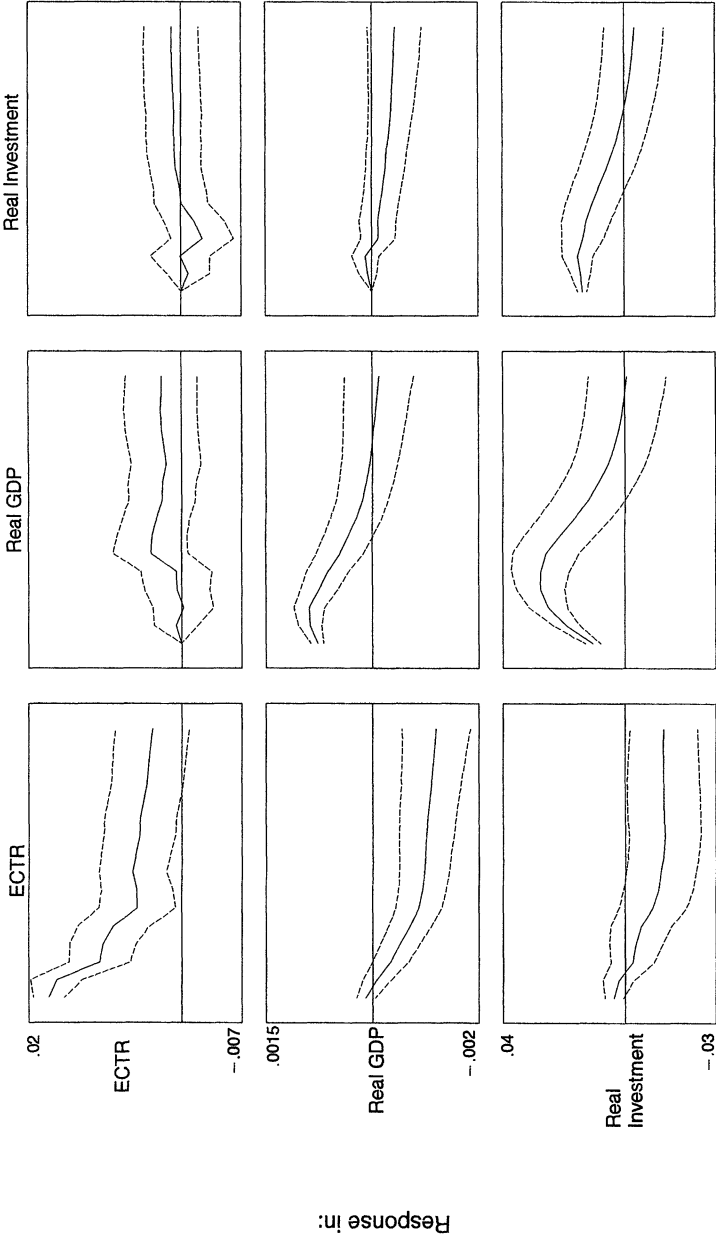
This MAR provides two other interesting and sizable dynamic responses. An increase in investment precedes a reduction in the ratio of corporate PACs to all PACs. One possibility is that, consistent with our argument, optimistic economic expectations do not provide firms with as much reason to organize and thus an increase in investment corresponds to a relative decline in the number of corporate PACs. This finding supports a view that stresses the interdependent nature of the political economy of investment, one that suggests that firms will focus more on obtaining political benefits when expected profitability is in decline.

Finally, Figure 4 provides the MAR for a three variable unrestricted VAR for the period 1953–94. We use this data from the longer period to better evaluate proposition two, because the results from the shorter time period were mixed and the proposition can be evaluated without using PAC data, which shortened the time period of our earlier analysis. In this VAR, the response of investment is strongly negative in response to a shock in the ECTR. By the third quarter after the shock, investment responses are significantly below zero, and at sixteen quarters after the shock, investment is about 1% less than it would have been without a shock. Thus, a 1½% shock in the ECTR results in an eventual decline of investment by 1%. This response is impressive.

Finally, our theory and argument implies that effective tax rates will be predictive of future economic events. Our analysis to this point supports our general argument. In order to insure that the expectational nature of this policy area has not led us to misinterpret dynamic relationships, and to further evaluate whether the ECTR influences expectations about the economy, we used the index of consumer expectations collected by the University of Michigan to test whether effective rates Granger cause consumer expectations. Causality tests strongly support our argument. Table 5

²⁹In calculating the MAR response analysis, we must impose a contemporaneous ordering among the variables to use all available information. If the correlations among the disturbances are large, then the response charts can depend on the ordering and thus the assumption about the contemporaneous causal structure. For our analysis, the only large correlation is between income and investment. By placing these together in the ordering, the high correlation will not influence other response charts in the system. In short, these responses are robust to an alternative ordering in which the ECTR is placed last. The rationale in placing the ECTR first in the ordering is that the exogeneity tests indicate it belongs prior in any causal ordering. Additional evidence in favor of exogeneity is provided in the decomposition of error variance for this system. After 10 quarters, forecast errors in other variables only account for approximately 8% of the variance in ECTR forecast errors.

Figure 4. Moving Average Responses for Three Variable Vector Autoregression with 90% Confidence Intervals, 1953–94



Note: Responses are from the moving average representation of a vector autoregression with six lags. All vertical axis scales are relative to initial values. Responses are plotted on a 16 quarter time horizon. The dotted lines mark 90% confidence intervals or posterior distributions.

Table 5. Exogeneity Tests for ECTR, PAC Ratio, and Consumer Expectations^a

Hypothesized Exogenous Variables:	Block Coefficients Restricted:	Lag structure denoted		Six quarter lag structure	
		F-stat	P-value	F-stat	P-value
Period: 1977-94					
Effective Tax Rate	Consumer Expectations	.69 (8)	.70	.65	.69
Δ Effective Tax Rate	Consumer Expectations	1.02 (8)	.44	.71	.64
Consumer Expectations	Effective Tax Rate	3.66 (8)	.002	4.97	.001
Consumer Expectations	Δ Effective Tax Rate	2.90 (8)	.01	3.71	.004
Consumer Expectations	Ratio of Corporate PACs to all PACs	.76 (4)	.56	1.04	.41
Ratio of Corporate PACs to all PACs	Consumer Expectations	3.55 (4)	.01	.94	.47
Period: 1953-94					
Effective Tax Rate	Consumer Expectations	1.57 (8)	.14	1.67	.13
Δ Effective Tax Rate	Consumer Expectations	1.19 (8)	.31	.97	.45
Consumer Expectations	Effective Tax Rate	5.04 (8)	.001	4.68	.001
Consumer Expectations	Δ Effective Tax Rate	4.87 (8)	.001	5.82	.001

^aResults are from two variable vector autoregressions.

^bLag structure for each variable is determined by Akaike information criterion.

contains F-statistics and p-values that provide evidence that ECTRs predict consumer expectations. Other causality tests are insignificant, implying that the ECTR does indeed reflect economic expectations in the way we have described. These results indicate that shocks in corporate tax rates are an important factor in influencing not only investment but also expectations about how the economy will perform in the near future. This result supports the idea that the ECTR is changed in ways that are consistent with economic expectations.

In summary, when using the ratio of the total number of corporate PACs to total PACs as an indicator of business political influence, the analysis in this paper supports propositions one, two, and three. These results are robust to choice of lag-length, estimation method, and measure of PAC strength.

Conclusions

Our theory and data analysis casts doubt on recent research suggesting that organization of business interests influences the ECTR. This is not to say, however, that firm interests are not important. Indeed, our model is

very consistent with Lindblom's structural dependence thesis. If capitalism is employed as an important allocation mechanism in a democratic political system, then it is hard to imagine a situation in which business interests are ignored or diminished. Elections may impinge on this power to a small extent, but impending economic hard times will only serve to strengthen the interests of firms given that firms employ voters.

Our theory does not suggest that any single election determines economic growth. We do not suggest that business is over or underrepresented in policy making, but we do know business is very influential in public policy. Any tax code structured to benefit particular industries and business is surely strong testimony to the political influence of business in public policy making. Our theory suggests, however, that when examining the political power of any group, it is important to examine both the micro-level motivations of political actors and macro-level outcomes of particular policy areas. In this case, corporate tax policy is important to maintaining business confidence and economic growth in the United States and other democracies. Such policies require many interest groups to have confidence that the government will protect individual wages and profits while seeking additional economic growth. In short, democratic governance and market allocation mechanisms interact to make the management of a political economy severely difficult. Some policy options are foreclosed precisely because democratic governance allows policy makers the discretion to deviate from past policy commitments necessary to sustain economic growth. Restricting this discretion can theoretically solve the problem, but at the cost of constraining potential democratic majorities in the future (see Keech 1995). Thus, the question of business power over public policy not only raises questions about representation, but also suggests that fundamental dilemmas arise in societies using democratic political systems and market-based economies. In particular, we need to address the question of how governments can credibly commit to economic development. This question has immediate and important implications for transition economies and sustainable growth in developed democratic capitalist states. Therefore, we should begin to examine the determinants of economic confidence and policy commitments more broadly instead of focusing on the more narrow issues of interest group conflict and economic policy.

We believe our theory and data analysis strongly support our conclusions. We have checked our results in numerous ways to make sure that they are not sensitive to specification and measurement decisions. With few exceptions, our propositions are supported.

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APPENDIX

Data

Effective Corporate Tax Rates

Researchers investigating the influence of business on corporate tax policy typically use the average effective tax rate to measure changes in corporate tax policy (Jacobs 1988; Quinn and Shapiro 1991a, 1991b, Swank 1992). The formula for this indicator divides corporate tax liabilities or payments by income. Our measurement of the effective corporate tax rate uses the accrued tax liabilities from corporate income which is divided by the before-tax corporate profits adjusted for inventories and depreciation. Using tax payments assumes that the present value of deferred taxes is zero, and this assumption can understate the ECTR (Spooner 1986). Firms that select to defer payments are still liable for tax payments and this is considered when making future investment decisions like any other liability.³⁰ Inventory adjustment removes the accounting profits accruing from inflation and the adjustment for depreciation uses a straight-line method so inflation will not increase profits.³¹ These adjustments are important because corporate managers and stockholders will make profitability evaluations based on real returns, not inflated returns.

This measurement of the ECTR also differs from other measurements because it includes all corporations, both manufacturing and nonmanufacturing. We reject previous theoretical justification that nonmanufacturing corporations should be excluded because they are less likely to invest in physical equipment and plants (Quinn and Shapiro 1991a). Although this is true to an extent, the role of nonmanufacturing corporations is significant in the competition to gain specific benefits which influence the overall nominal corporate tax rates, so excluding them would add systematic error in the ECTR (see Martin 1991; Vogel 1989).³² In short, financial institutions and insurance companies are players in this game as well. These industries have their own sections of the tax code. Removing them from an analysis

³⁰We also used actual tax payments in our analysis to check for robustness. We replicated Quinn and Shapiro's (1991a) ECTR measure which uses actual payments and found no significant differences from our analysis.

³¹The data for the denominator is taken from Table 3.2 of the National Income and Products Accounts (NIPA) and data for the profits tax liability is taken from Table 1.14 of the NIPA. The data is quarterly in billions of constant dollars (1987) and seasonally adjusted at annual rates.

³²Even if the theoretical disagreements prove valid, the empirical difference between our ECTR and the often used Holland and Meyers (1980) measure is small with the two correlated at $>.80$. Quinn and Shapiro use only nonfinancial corporations, both service and manufacturing. Their measures include a) federal taxes paid divided by pre-tax profits as calculated by the IRS in Federal Reserves' (1989b) *Flow of Funds* and b) corporate taxes paid divided by the total capital stock in Federal Reserves' (1989a) *Balance Sheets*. Jacobs (1988) uses Holland and Meyers' (1980) measure of the percentage of corporate tax payments on manufacturing income. Swank (1992) uses total taxes on corporate profits as a percentage of net operating income.

APPENDIX (continued)

of why they have separate sections of the tax code begs the question of business influence over corporate tax policy. As noted earlier, competition for capital affects the cost of capital for all business.

The ECTR captures the effect of tax policies on corporate profits and investments. As the ECTR increases, the aggregate corporate tax burden increases. Since taxes come from profit and affect the future profitability of investment, an aggregate measurement of corporate tax policy should reflect the impact of tax policy on both investment and profits. Fullerton (1984) argues that a marginal ECTR is necessary to capture the effect of taxation on one more unit of investment, but this measure would be appropriate only if investment were the sole concern of firms. Since firms are also concerned with profits, an average ECTR is more useful than a marginal ECTR. This theoretical difference should make little empirical difference, however, since research demonstrates a high correlation ($>.85$) for various measures of average and marginal effective tax rates (Joines 1981).

A more serious criticism of the ECTR is whether enough substantive policy changes have occurred to account for the variance in the ECTR (see Jacobs 1988). Our measure is based on the assumption that changes in policy have an intended effect on the level of corporate tax liability proportionate to changes in corporate profit. In other words, changes in policy are designed either to increase tax liabilities controlling for profits or decrease liabilities controlling for profits. Extensive histories of postwar tax policy suggest that the number and significance of policy changes should cause changes in the ECTR (see Lucke 1985; Pechman 1987).

Political Action Committees

Data for the measurement of business PAC influence is taken from the Federal Election Commission's (FEC) Campaign Expenditures in the United States: Reports on Financial Activity Data and various FEC press releases. The data are published in two year cycles and reports are for all cycles from 1977 to 1994. They are available from the Inter-university Consortium for Political and Social Research. Most of our data begin in 1977 because data before this time are significantly less reliable. Our contention that data prior to 1977 are not comparable or reliable enough to include finds support from the recently published ICPSR longitudinal dataset which begins in 1977.³³

Similar to Quinn and Shapiro (1991a), we use a ratio of corporate-sponsored PACs to the total number of PACs to indicate the political power of business. An

³³Contributions include money donated to candidates for office, but not in-kind contributions. Contributions are deflated using a GDP price deflator (1987 = 100). The contribution date was established using the contribution report date from individual PACs. Prior to 1982 most report dates were in the fourth quarters of the second year of the cycle. After 1982, however, report dates are more evenly distributed over the cycle and provide a more accurate representation of contribution behavior. Therefore, we do not emphasize our analysis of contributions.

APPENDIX (continued)

increase in this ratio should indicate the increased influence of business with respect to other groups competing for government benefits. Corporate-sponsored PACs include those with and without corporate stock. Trade association PACs are not included because these PACs are coded with other membership associations in the FEC classification system. In short, trade associations are included with groups such as the National Rifle Association and the American Medical Association. The ratio indicator is superior to aggregate indicators of the number or contributions of PACs because it incorporates the notion of competition between a unitary business interest versus all other groups. If the distributive benefits government provides are scarce, then the overall power of business must be examined in relation to other groups competing for different benefits. Nevertheless, in the exogeneity tests we perform, we use the number of corporate PACs to confirm that our results are not sensitive to the choice of ratios.

Investment

Investment is a sum of expenditures for nonresidential fixed investment. These data are from the National Income and Products Accounts and are calculated in billions of constant dollars (1987) that are seasonally adjusted at annual rates. We analyze this data in natural logs. This measure allows us a greater scope of investment than only plant and equipment. Over the time period under analysis, however, plant and equipment investment correlates with our investment indicator at the .96 level.

Gross Domestic Product (GDP)

GDP is a measure of real income measured in billions of 1987 dollars. We analyze this data in natural logs.

Consumer Expectations

The indicator of consumer expectations is taken from the Surveys of Consumer Attitudes and Behavior from the Survey Research Center of the University of Michigan. We use an index constructed from the 40 question survey which employs both closed- and open-ended questions regarding evaluations and expectations about personal finances, employment, price changes, and the national business situation. Other questions include respondent's appraisal of the market conditions for purchasing houses, automobiles, and other durables. We use monthly data from 1953 to 1994 aggregated into quarterly observations.

Partisanship

We use three indicators of partisanship. First, we use a dummy variable coded one for Democratic presidents and zero for Republican presidents. Second, we use the proportion of House members who are Democrats. Third, we use the proportion

APPENDIX (continued)

of Senate members who are Democrats. Other studies of United States tax policy have only considered the party of the president (Jacobs 1988; Quinn and Shapiro 1991a), but Swank (1992) considers the partisanship of legislative bodies in a cross-national analysis.

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