

CAN LOWER TAX RATES BE BOUGHT? BUSINESS RENT-SEEKING AND TAX COMPETITION AMONG U.S. STATES

Robert S. Chirinko and Daniel J. Wilson

The standard model of strategic tax competition assumes that government policymakers are perfectly benevolent. We depart from this assumption by allowing for the possibility that policymakers are influenced by the rent-seeking (lobbying) behavior of businesses. This extension implies that business campaign contributions may affect not only the levels of equilibrium tax rates, but also the slope of the tax reaction function between jurisdictions, thus enhancing or retarding capital mobility. With panel data for 48 U.S. states and unique data on business campaign contributions, we document, among other results, a significant direct effect of contributions on tax policy; the economic value of a \$1 contribution in terms of lower state corporate taxes is approximately \$6.65.

Keywords: business campaign contributions, state business tax policy, capital mobility

JEL Codes: H70, H25, D72

I wanted to thank all of you who contributed to Mitt Romney. You can't realize how much leverage this gives Huron going forward to ask various people for business.

This is not about me trying to force a political candidate on you, ... This is just business and the way business works.

— Gary E. Holdren, *CEO, Huron Consulting Group, Inc.*¹

¹ See *The Wall Street Journal*, August 7, 2008, p. A4.

Robert S. Chirinko: Department of Finance, University of Illinois at Chicago, Chicago, IL 60607, USA, Research Fellow, CESifo, Munich, Germany, and Visiting Scholar, Federal Reserve Bank of San Francisco, San Francisco, CA, USA (Chirinko@uic.edu)

Daniel J. Wilson: Economic Research Department, Federal Reserve Bank of San Francisco, San Francisco, CA 94105, USA (Daniel.Wilson@sf.frb.org)

I. INTRODUCTION

In a world of mobile capital, what factors determine business tax rates? The standard model of strategic tax competition assumes that government policymakers are perfectly benevolent, acting solely to maximize the utility of the representative resident in their jurisdiction. In this framework, business tax rates prevailing in a jurisdiction are heavily influenced by the tax policies pursued by its competitors. In addition to these strategic factors, tax rates may be influenced by the economic conditions and voters' preferences within a state, as well as aggregate factors such as the business cycle and inflation.

However, as the quotation at the beginning of this paper reminds us, business campaign contributions are likely to be an additional influential factor on policymakers. This paper investigates the empirical connections between business campaign contributions and tax rates at the state level. While few executives are as explicit as Holdren about the impact of campaign contributions, there is a pervasive belief that they have a marked impact on policy decisions. To motivate our empirical analysis, we depart from the standard tax competition paradigm by allowing policymakers' welfare to depend not only on the utility of the representative resident (as in the standard paradigm), but also on the level of business campaign contributions (raising policymakers' personal consumption and/or increasing their probability of reelection).² Residents' utility depends on private and public goods determined by residents' preferences, businesses' profit-maximizing decisions, and business tax rates. The expanded formulation of state policymakers' welfare recognizes that it is partly influenced by the rent-seeking behavior of businesses, thus linking business campaign contributions to tax rates. This departure from the standard strategic tax competition model implies that business campaign contributions may affect equilibrium tax rates. They may also affect the slope of the tax reaction function between jurisdictions. Thus, business campaign contributions may directly influence business tax rates, as well as indirectly shape tax competition, and enhance or retard the mobility of capital across jurisdictions.

These channels are examined by combining U.S. state panel data on capital tax policy and other relevant state-level economic and political variables with newly compiled state-level data on contributions to candidates for state office. The latter data are constructed from contribution-level records compiled by the National Institute for Money in State Politics (NIMSP). These records are required by law to be publicly disclosed and hence cover nearly all candidates for state office. From these records, we construct at the state level the total amounts of contributions by type of giver (business vs. non-business), type of office (e.g., house, governor), and type of candidate (e.g., winning,

² This formulation of policymakers' welfare follows Grossman and Helpman (1994, equation (5)) and Edwards and Keen (1996, Section 2). In the latter model, policymakers' welfare depends on resident utility and "some item of public expenditure ... which, while financed from general revenues, benefits only the policymaker ..." (Edwards and Keen, 1996, p. 118).

incumbent). These contributions are sizeable. During the 2003–2006 period, \$1.1 billion, or \$3.77 per capita, was contributed by the business sector (defined below) to candidates for state offices. Of these contributions, approximately 33 percent went to gubernatorial candidates (including lieutenant governor candidates), another 33 percent to state senate candidates, 21 percent to state house candidates, and the remaining 12 percent to candidates for other state offices (e.g., attorneys general and state judges).

Our study begins in Section II with the standard empirical model used in the tax competition literature. The initial empirical results are based on a reaction function relating tax policy in a given state to tax policies in a competitive set of states and various control variables. We then augment this model with our business campaign contributions variable.

Our state-level dataset is introduced in Section III. The dataset contains four business tax variables — the statutory (marginal) corporate income tax rate, the investment tax credit rate, the capital apportionment weight (in the state’s formula for apportioning a business’ nationwide income), and the average (effective) corporate tax rate — and additional political variables that determine business taxes and that serve as instruments. Our data on state-level campaign contributions are also discussed.

We then turn to our empirical results. In Section IV, we find that the reaction function is negatively sloped; that is, after accounting for state and time effects and economic and political variables at the state level, tax policy in a given state moves inversely with the corporate income tax rate and the capital apportionment weight of other states. To assess the role of business campaign contributions, we augment the reaction function with business contributions to candidates for the state house (assembly). We find little evidence that business contributions affect the slope of the reaction function. However, we document a significant direct effect of business campaign contributions on the level of tax policy.

Section V interprets these results in terms of the economic value of campaign contributions. How much are corporate taxes reduced per \$1 of business contributions? We find that the economic value of a \$1 business campaign contribution is approximately \$6.65 in terms of lower state corporate taxes. This large gap between the benefits and the costs of business campaign contributions could be due to coordination failure on the part of businesses, leading to severe under-contribution by the business sector as a whole, or to binding state campaign contribution limits. These results call for further research aimed at understanding the determinants of business campaign contributions and the persistence of such a large gap between benefits and costs.

Section VI summarizes and concludes.

II. THE EMPIRICAL MODEL

The standard strategic tax competition model implies that equilibrium capital tax rates in a jurisdiction are determined by the tax rates prevailing in other jurisdictions that compete for the mobile capital tax base, as well as economic conditions and residents’

preferences for public goods relative to private goods. This leads to an estimating equation for state i at time t of the following form,

$$(1) \quad \tau_{i,t} = \alpha \tau_{i,t}^{\#} + \beta x_{i,t} + u_{i,t},$$

where $\tau_{i,t}$ is a tax variable — either the corporate income tax rate, the investment tax credit rate, the capital apportionment weight, or the average corporate tax rate, $\tau_{i,t}^{\#}$ is the tax variable for the competitive states (the definition of competitive states is discussed in the next section), $x_{i,t}$ is a set of control variables, $u_{i,t}$ is an error term, and α and β are parameters to be estimated.

Equation (1) is the standard estimating equation for investigating tax competition, and we expand on it in five ways.³ First, the error term is assumed to have a two-way error components structure and equals the sum of a state time-invariant effect (ζ_i), a time fixed effect (λ_t), and a random error ($\varepsilon_{i,t}$). With regard to the state effects, we present results for both Random Effects (RE) and Fixed Effects (FE) specifications. Neither estimator dominates. If the state effects are correlated with the regressors, only FE delivers consistent estimates of the α 's and β 's. However, with a panel short in the time dimension, as we have in this paper, the FE estimates can be estimated imprecisely.⁴ The RE model, on the other hand, relies on a combination of cross-section and time-series variation and generates more precise estimates. However, the consistency of RE estimates requires that the state effects be uncorrelated with the regressors. Second, we include three variables to control for economic conditions and political preferences: the investment/capital ratio ($IK_{i,t-1}$, which is lagged to avoid problems associated with simultaneity), the political preferences of state residents ($VOTER PREFERENCES_{i,t}$), and the investment to capital ratio for the neighboring states ($IK_{i,t-1}^{\#}$). These variables are described in more detail in the next section. Third, the tax competition variable enters with contemporaneous and two lag values. By including lagged values, we recognize that capital mobility or legislated changes in tax rates may be gradual processes taking more than one year to complete. Fourth, to assess the role of business contributions on this tax competition model, we include the logarithm of business campaign contributions per capita ($BCC_{i,t}$) and a one-year lag of this variable ($BCC_{i,t-1}$) as additional regressors. The lagged value of $BCC_{i,t}$ is included to recognize that campaign contributions for a given election may be spread out over the two years leading up to the election. Fifth, since the contemporaneous values of $\tau_{i,t}^{\#}$ and $BCC_{i,t}$ are likely to be endogenous, we estimate the model using an instrumental variable/generalized method of moments (IV/

³ A similar estimating equation has been used by Brueckner (2003), Brueckner and Saavedra (2001), Case, Hines, and Rosen (1993), and Devereux, Lockwood, and Redoano (2008).

⁴ The limited variation in the time dimension is traceable to two aspects of our panel data. First, the four tax variables we examine have limited time variation in most states. This is particularly true for the capital apportionment weight, for which changes tend to be of a “one-and-done” nature (i.e., changes occur at most once or twice in the sample for most states). Second, our panel is unbalanced because only a few states have business campaign contributions data before the late 1990s (see the table “Number of States with Reported Business Contributions in NIMSP Data” in Appendix A).

GMM) approach, though we also report results where one or both of these variables is assumed exogenous.⁵ The excluded instruments for $\tau_{i,t}^\#$ in the IV/GMM regressions are variables capturing the political preferences of voters in the competitive states. The instruments used in estimation vary by the tax variable serving as the dependent variable and are described in the next section.

Based on these considerations, the following equation is the basis for the estimates reported in this paper,

$$(2) \quad \tau_{i,t} = \zeta_i + \lambda_t + \sum_{k=0}^2 \alpha_k \tau_{i,t-k}^\# + \beta^{IK} IK_{i,t-1} + \beta^{VP} VOTER PREFERENCES_{i,t} \\ + \beta^{IK^\#} IK_{i,t-1}^\# + \gamma_0 BCC_{i,t} + \gamma_1 BCC_{i,t-1} + \varepsilon_{i,t} \\ \alpha \equiv \sum_{k=0}^2 \alpha_k, \quad \gamma \equiv \sum_{k=0}^1 \gamma_k.$$

III. THE PANEL DATASET

This section briefly describes the construction of the data used in this study. The series are for the 48 contiguous U.S. states, cover years from 1988–2006 (depending on the state), and can be set into three categories discussed in the following sub-sections.⁶

A. Tax and Economic Variables

We examine four state tax policy variables that are referred to in general as $\tau_{i,t}$. Our primary focus is on the statutory corporate income tax rate ($SCT_{i,t}$), the investment tax credit rate ($ITC_{i,t}$), and the weight on capital (or property) in the state’s income apportionment formula ($CAP_{i,t}$) because they are controlled directly by legislators. The state corporate income tax rate is the effective marginal tax rate for the highest bracket of corporate income. The effective marginal rate is generally lower than the legislated (or statutory) rate due to the deductibility against federal taxable income of taxes paid to

⁵ We search for appropriate instruments in four steps. First, the instrument set consists of included and excluded instruments; the included instruments are the exogenous variables appearing in the estimating equation (i.e., the $x_{i,t}$ ’s). Second, potential excluded instruments are constructed from those listed in the next section. Third, we examine all possible combinations of the excluded instruments for $\tau_{i,t}^\#$ and $BCC_{i,t}$ separately, store the J and eigenvalue statistics, and identify the subset of instruments (excluded and included) valid at the 10 percent level based on J tests. Fourth, from this subset of valid instruments, we choose the instrument set that is most relevant, as assessed by the eigenvalue statistic. The fourth step of our procedure for selecting an optimal instrument set among a large set of potential instruments is similar to that proposed in Donald and Newey (2001), although they suggest an alternative relevance statistic in place of the eigenvalue statistic.

⁶ Alaska and Hawaii are excluded because of the great geographic distance to a neighboring state, thus straining the notion of a “competitive” state as defined by distance between population centroids.

the state. Some states allow full deductibility of federal corporate income taxes from state taxable income, Iowa and Missouri allow only 50 percent deductibility, and some states allow no deductibility at all. It has not generally been recognized that, owing to deductibility of taxes paid to another level of government, the effective corporate income tax rates at the state and federal levels are functionally related to each other. These interrelationships generate two equations in two unknowns, and their solution yields the effective state corporate income tax rate.

The state investment tax credit is a credit against state corporate income tax liabilities. In most states, the effective amount of the investment tax credit is simply the legislated investment tax credit rate multiplied by the value of capital expenditures put into place within the state in a tax year. The effective rate is lower than the legislated rate in a handful of states for two reasons. First, five states (Connecticut, Idaho, Maine, North Carolina, and Ohio) permit the state investment tax credit to be applied only to equipment. For these states, the legislated ITC rate is multiplied by $2/3$, which is approximately the average ratio of equipment capital to total capital in our data. Second, in some states, the legislated investment tax credit rate varies by the level of capital expenditures; we use the legislated credit rate for the highest tier of capital expenditures.

The capital apportionment weight is the weight that the state assigns to capital in its formula for apportioning income among the multiple states in which a firm generates federal taxable income. Every U.S. state that taxes corporate income uses "formulary apportionment" which specifies how firms that operate in multiple states must allocate their federal taxable income to that state. The apportionment formula is in all cases a weighted average of the company's sales, payroll, and property, though the weight on one or more factor can be and often is equal to zero. The weights in this formula vary considerably by state. Over the last 30 years, states have moved toward increasing the weight on sales and decreasing the weights on payroll and property. These changes encourage job creation and investment in-state and "export" the tax burden to out-of-state business owners, who sell goods and services in-state but employ workers and capital out-of-state (Wilson, 2006). The capital apportionment weight (CAW) can be thought of as a capital tax instrument with somewhat similar effects as the corporate income tax rate.

Data on CAW are obtained from the following sources. First, data by state for 1997 was obtained from Edmiston (1998), who compiled the data from the Federation of Tax Administrators and generously provided us with an update of these data for 2001. Second, we use information from Omer and Shelley (2004) documenting when each state first diverged from the traditional apportionment weights of one-third each on payroll, property, and sales. This information generates a provisional series (assuming no changes between the first change and 1997 and/or between 1997 and 2001) that we then refine by checking with individual state tax departments.

The three tax policy measures discussed above have the advantage that they are directly chosen by state policymakers and hence conform well with our model of strategic tax

competition and business rent-seeking. However, they do not provide a comprehensive measure of the total tax assessed on capital. A more comprehensive measure would include other taxes and fees and would account for the ability of business to avoid or mitigate the corporate income tax by way of various tax planning strategies. Thus, we construct a measure of the average corporate tax rate ($ACT_{i,t}$). This fourth tax policy variable is defined as the ratio of state tax revenues from corporate taxes, severance taxes, and license fees to total state business income, the latter measured by gross operating surplus.

The competitive states tax policy ($\tau_{i,t}^\#$) is an important variable in our analysis and, for state i , is defined as a weighted-average of the tax policies prevailing in the other 47 contiguous states. This weighted-average formulation is indicated by a superscript “#” and can be interpreted as a spatial lag on $\tau_{i,t}$. The weights reflect the “competitive closeness” of the other states as measured by the inverse distance between the population centroids for a given state and that of each of the other 47 contiguous states. The weights are normalized to sum to unity.

In the estimating equation, we control for differing economic conditions among states by including the investment to capital ratio, $IK_{i,t}$, defined as real investment expenditures in equipment (excluding software) and structures divided by the constant-dollar replacement value of the capital stock for the manufacturing sector (North American Industry Classification System (NAICS) sectors 31 to 33). The capital stock series is computed according to a perpetual inventory method based on real investment expenditures, a depreciation rate, and an adjustment to the initial value for book value and inflation. We measure local economic conditions by investment spending (as opposed to some other measure of conditions such as the growth in state GDP) because investment conditions likely have a more direct impact on legislated changes in capital tax rates and because investment spending better reflects economic conditions prevailing both today and expected to prevail in the future.

Details concerning the construction and data sources for the series discussed in this sub-section can be found in the Data Appendix to Chirinko and Wilson (2008).

B. Political Variables

The political preferences of state residents ($VOTERPREFERENCES_{i,t}$) is also a control variable in the estimating equation and is defined by the extent to which Republicans control the state government: 0.0 if they control neither the legislature nor governorship, 0.5 if they control only the legislature or only the governorship, and 1.0 if they control both the legislature and governorship.

The set of possible instrumental variables for $\tau_{i,t}^\#$ in the GMM estimation is drawn from the following list of nine voter preference variables for competitive states. Voter preferences in competitive states should be relevant instruments — because they affect tax policy in competitive states for the same reasons that voter preferences in state i

affect tax policy in state i — and valid instruments — because they are unrelated to tax policy in state i (conditional on state and time effects):

1. The governor is Republican (R). (The complementary class of politicians is Democrat (D) or Independent (I). An informal examination of the political landscape suggests that Independents tend to be more closely aligned with the Democratic Party. We thus treat D or I politicians as belonging to the same class, DI);
2. The majority of both houses of the legislature are R;
3. The majority of both houses of the legislature are DI;
4. The governorship changed last year from R to DI;
5. The majority control of the legislature changed last year from DI or split (between R and DI chambers) to R;
6. An interaction between the R governor and the R legislature indicator variables;
7. An interaction between R governor and the DI legislature indicator variables (note that the omitted interaction category is R governor and a split legislature);
8. The reelection of an incumbent governor last year; and
9. The reelection of a Republican incumbent governor last year.

We form first-order and second-order spatial lags (i.e., weighted averages with the same distance-weights used in constructing $\tau_{i,t}^{\#}$) of the above variables as potential instruments. Each of the four tax variables is projected against different subsets drawn from this set of potential instruments. The subset used in estimation for each tax variable is the same instrument sets selected in Chirinko and Wilson (2009b) based on an optimal instrument search algorithm described in footnote 5. The instrument sets are listed in the notes to Table 2.

Details concerning the construction and data sources for the series discussed in this sub-section can be found in the Data Appendix to Chirinko and Wilson (2008).

C. Business Campaign Contributions Variables

The business campaign contributions data are a unique part of this paper. These data are for contributions made by individuals and organizations to candidates for state office constructed from contribution-level records compiled by the NIMSP. The NIMSP assigns each campaign contribution an economic interest code that places it in a sector. These sectors more or less follow industry classifications but also include labor organizations, “ideologies,” political parties, etc. We define the “business” supersector as the sum of the following nine sectors: agriculture; construction; communications and electronics; defense; energy and natural resources; finance, insurance, and real estate; general business; transportation; and health. For example, a contribution by a consulting firm or an individual working at a consulting firm would be credited to the general

business sector and counted as a business contribution. A contribution by a university professor would be credited to the education sector and would not be counted as a business contribution. Contributions are also identified as being for a candidate for a particular type of office: state house H , state senate S , or governorship G . We aggregate all campaign contributions, within each type of office and within a state, that are assigned to the business sector to get the total dollar amount, $\$BCC_{i,t}^X$, for each office $X = H, S, G$, or the combination HSG . The NIMSP data are an unbalanced panel. A few states have data beginning in the late 1980s but, for most states, data on contributions are not available until the late 1990s. The estimates in this paper are based on business contributions made to candidates for the state house because of our *a priori* belief that revenue bills will tend to be initiated in this legislative chamber.⁷ The business campaign contributions variable used in the econometric analysis is defined as the logarithm of business campaign contributions made to candidates for the state house, per capita: $BCC_{i,t} = \ln(\$BCC_{i,t}^H/POP_i)$.

The set of possible instrumental variables for $BCC_{i,t}$ in the GMM estimation is drawn from the following list of six variables based on campaign contributions and the number of candidates: (1) the level of campaign contribution limits for corporations to house candidates in that state; (2) the number of candidates that ran for a state house seat; (3) the amount of non-business campaign contributions to winning candidates; (4) the amount of non-business contributions to losing candidates; (5) the ratio of (c) to (d), as a measure of the funding competitiveness of races within the state; and (6) the amount of business contributions to candidates for other, non-tax-policy-setting state offices (i.e., offices other than governor, state house, or state senate). The optimal instrument sets for $BCC_{i,t}$ are chosen in the same manner as for $\tau_{i,t}^\#$ described in footnote 5. Somewhat surprisingly, the optimal sets for $BCC_{i,t}$ are the same in each of the four models (which differ by the tax variable serving as the dependent variable) and consists of the single variable, the number of candidates that ran for a state house seat in state i and year t (item (2)).

Details concerning the construction and data sources for the series discussed in this sub-section can be found in Appendix A. Summary statistics for the business campaign contributions, tax, and control variables are presented in Table 1. In Panel A, the H , S , G , and HSG superscripts on the business campaign contributions variables ($\$BCC_{i,t}^X$) refer to "House," "Senate," "Governor," and "House, Senate, and Governor combined," respectively. To ease interpretation, we present summary statistics for

⁷ Ideally, we would also want to assess the effects of senate and gubernatorial contributions on tax policy. However, relative to house elections (where the proportion of seats up for elections is generally the same every two years), senate elections are less frequent and less regular. These characteristics hamper the comparability of state senate contributions data across different years. While regular, gubernatorial elections are even less frequent. This infrequency is reflected in the lumpiness of the data on campaign contributions for gubernatorial candidates, typically positive only every fourth year. Such lumpiness, particularly in a panel with a short time dimension, greatly limits our ability to estimate the effect of gubernatorial contributions on tax policy.

Table 1
 Summary Statistics
 Sample Period: 1990–2006

	Mean	SD	Quartiles		
			25%	50%	75%
	(1)	(2)	(3)	(4)	(5)
A. Business Contributions					
$\$BCC_{i,t}^H / POP_{i,t}$	0.234	0.345	0.000	0.000	0.408
$\$BCC_{i,t}^S / POP_{i,t}$	0.160	0.260	0.000	0.000	0.268
$\$BCC_{i,t}^G / POP_{i,t}$	0.256	0.560	0.000	0.000	0.208
$\$BCC_{i,t}^{HSG} / POP_{i,t}$	0.651	1.012	0.000	0.000	1.053
B. Tax Variables					
$SCT_{i,t}$	0.064	0.028	0.050	0.070	0.085
$SCT_{i,t}^{\#}$	0.067	0.007	0.063	0.066	0.071
$ITC_{i,t}$	0.013	0.024	0.000	0.000	0.020
$ITC_{i,t}^{\#}$	0.015	0.005	0.012	0.014	0.018
$CAW_{i,t}$	0.207	0.120	0.125	0.250	0.250
$CAW_{i,t}^{\#}$	0.210	0.024	0.191	0.209	0.227
$ACT_{i,t}$	0.014	0.010	0.008	0.011	0.017
$ACT_{i,t}^{\#}$	0.009	0.001	0.008	0.009	0.010
C. Control Variables					
$IK_{i,t-1}$	0.110	0.029	0.090	0.107	0.124
$VOTER PREFERENCES_{i,t-1}$	0.468	0.370	0.000	0.500	0.500
$IK_{i,t-1}^{\#}$	0.109	0.014	0.096	0.109	0.121

Notes: There are 522 observations for each variable. See Section III and Appendix A for further details about data sources and construction.

business campaign contributions per capita in levels ($\$BCC_{i,t}^X / POP_i$) rather than logarithms ($BCC_{i,t}^X$). There are at least three notable characteristics. First, all of the business campaign contributions series exhibit a good deal of variation, as standard deviations exceed their means, yet have zero values for more than 50 percent of observations (see the quartiles in columns 3–5). Specifically, the proportion of observations with zero values is 53 percent, 55 percent, and 63 percent for house, senate, and gubernatorial contributions (per capita), respectively. This predominance of zeros is driven in part by the large number of state-years, mostly off-election years in the state, in which

there are no business contributions.⁸ Second, among the tax variables, $ITC_{i,t}$ has the most variation (relative to its mean). Third, the averaging underlying the definition of the competitive states tax policy and investment/capital ratio variables (indicated by a superscript #) has a substantial effect in reducing the variation in these variables relative to their in-state counterparts.

IV. EMPIRICAL RESULTS

A. Tax Competition — Baseline Results

GMM estimates of the standard tax competition model, defined in (2) with the effect of BBC removed (by constraining the γ 's to equal zero), are presented in Table 2 for three tax variables — $SCT_{i,t}$, $ITC_{i,t}$, and $CAW_{i,t}$ — for both Random Effects (RE) and Fixed Effects (FE) specifications.⁹ The p-values, based on heteroskedasticity-robust standard errors, are shown in braces below each coefficient estimate. The instruments for the competitive states tax variable ($\tau_{i,t}^{\#}$) vary by tax variable and are listed in the notes to Tables 2. We begin with the RE estimates in columns 1 to 3. The sum of the coefficients on $\tau_{i,t}^{\#}$, α , measures the slope of the reaction function and is negative for each of the three tax variables, though they are statistically insignificant at conventional levels.

Comparable GMM estimates with the RE model are presented in columns 4 to 6. The α 's continue to be negative. In the FE model, the estimated slope of the reaction function — $d\tau_{i,t}/d\tau_{i,t}^{\#}$ — for SCT is now statistically significant at the 10 percent level and that for CAW has a p-value only somewhat above 10 percent. The α for ITC is very close to zero. This pattern of results may be partly explained by the quality of the instruments evaluated in panel C in columns 4, 5, and 6. For SCT and CAW , the instruments are both valid and relevant, as indicated by the J Statistic p-value (testing overidentifying restrictions) and the minimum eigenvalue statistic (testing the correlation between $\tau_{i,t}^{\#}$ and the instruments), respectively. The low value of the latter statistic suggests that the instruments for ITC are weak.

The results from Table 2 indicate that the slopes of the reaction function for SCT and CAW are negative and suggest the importance of tax competition in determining these capital tax policies. Though a negatively-sloped reaction function may seem counter-intuitive, it is not inconsistent with the theory of strategic tax competition and has been found previously in other empirical work (Chirinko and Wilson, 2009b). The

⁸ We nonetheless include off-election years in the econometric analysis because tax changes are as likely or more likely to occur in off-election years. For 1990 to 2006, changes in the SCT have occurred 58 percent/42 percent of the time in off-election/election years. Comparable figures for the ITC and CAW are 55 percent/45 percent and 50 percent/50 percent, respectively. Moreover, the inclusion of time lags in our preferred specification requires time-contiguous data.

⁹ OLS results are presented in Appendix B in Chirinko and Wilson (2009a), and they are similar to those reported in Table 2 below.

Table 2
Tax Competition — Baseline Model Dependent Variable: τ_{it}
GMM Estimates

	Random Effects			Fixed Effects		
	<i>SCT</i> (1)	<i>ITC</i> (2)	<i>CAW</i> (3)	<i>SCT</i> (4)	<i>ITC</i> (5)	<i>CAW</i> (6)
A. Neighboring States Tax Variable						
$\tau_{i,t}^{\#}$	-0.689 {0.669}	0.051 {0.990}	1.504 {0.455}	-1.864 {0.356}	0.919 {0.767}	2.218 {0.087}
$\tau_{i,t-1}^{\#}$	-0.100 {0.950}	-0.483 {0.891}	-1.747 {0.286}	0.296 {0.895}	-1.217 {0.671}	-2.148 {0.054}
$\tau_{i,t-2}^{\#}$	0.613 {0.348}	0.141 {0.807}	-0.466 {0.428}	0.156 {0.875}	0.280 {0.490}	-0.613 {0.144}
$\alpha = \text{Sum of Coefficients on } \tau_{i,t}^{\#}$	-0.177 {0.654}	-0.292 {0.747}	-0.709 {0.162}	-1.411 {0.088}	-0.017 {0.977}	-0.543 {0.134}
B. Control Variables						
$IK_{i,t-1}$	0.008 {0.286}	0.016 {0.531}	-0.019 {0.793}	0.006 {0.342}	0.012 {0.413}	0.006 {0.941}
$VOTER PREFERENCES_{i,t-1}$	0.001 {0.429}	-0.004 {0.032}	0.007 {0.296}	0.001 {0.170}	-0.003 {0.011}	0.013 {0.088}
$IK_{i,t-1}^{\#}$	-0.115 {0.064}	0.173 {0.596}	-0.237 {0.726}	-0.106 {0.052}	0.119 {0.620}	0.169 {0.701}
C. Instrument Quality						
p-Value for the J Statistic				0.696	0.411	0.131
Eigenvalue Statistic for $\tau_{i,t}^{\#}$				20.911	4.980	10.894
Number of Observations	522	522	522	522	522	522

Notes: GMM estimates are based on (2) with panel data for 48 states for the period 1990 to 2006. Missing observations for the business campaign contributions data and outliers reduce the sample to 522 state/year observations. All models contain time fixed effects. The dependent variable ($\tau_{i,t}$) is the tax variable appearing at the top of the column. See Section III and Appendix A for details about the table entries. The α parameter measures the long-run impact of a change in $\tau_{i,t}^{\#}$ and is defined in (2) as the sum of the coefficients on $\tau_{i,t}^{\#}$. Standard errors are heteroscedastic consistent based on the technique in White (1980, 1982); they are not presented in the table. Rather, the p-values for the t-test that the coefficient is zero are presented in braces. The null hypothesis of instrument validity is assessed using the Hansen (1982) J test of overidentifying restrictions. The p-values for this null hypothesis are presented in the table. A p-value greater than an arbitrary critical value (e.g., 10 percent) implies that the instruments are valid. The eigenvalue statistic assesses instrument relevance for $\tau_{i,t}^{\#}$ in terms of a first-stage regression of an endogenous variable on the instruments, as proposed by Stock, Wright, and Yogo (2002). The null hypothesis of instrument irrelevance at a significance level of 5 percent is assessed with Table 1 of Stock and Yogo (2005). For the results estimated in Table 2, an eigenvalue statistic greater than 10.9 or 18.4 rejects the null hypothesis constructed with a bias of 10 percent or 5 percent, respectively. (The J and eigenvalue statistics could not be reported for the Random Effects models displayed in columns 1 to 3 due to software constraints.) The instruments for $\tau_{i,t}^{\#}$ differ for each of the three tax variables. For $SCT_{i,t}$, the instruments consist of the first-order and second-order spatial lags of a dummy variable indicating the reelection of a Republican (R) governor in the prior year and the first-order and second-order spatial lags of an interaction between a R governor dummy and a Democratic/Independent (DI) party controlled legislature dummy. For $ICT_{i,t}$, the instruments consist of the first-order spatial lags of the R governor dummy and the interaction mentioned in the previous sentence. For $CAW_{i,t}$, the instruments are the first-order and second-order spatial lags of a dummy indicating the reelection of an incumbent governor in the prior year and the first-order and second-order spatial lags of a dummy indicating a change in governorship party last year from R to DI. The selection of the instrument set is described in Section III.B; the three sets of instruments discussed above correspond to items (7) and (9), (1) and (7), and (4) and (8), respectively, listed in that sub-section.

intuition for a negative slope from a model of strategic tax competition is as follows. Suppose the out-of-state tax rate rises. This increase will cause mobile capital to flow into the state in question, raising the state's tax base. If the income elasticity of residents' demand for public goods (relative to private goods) is negative, residents may prefer to use this "windfall" to finance a tax cut, which would result in a negative-sloping reaction function. In this case, residents view existing public services as adequate and recognize that, with their now-larger tax base, they can maintain the existing level of public services at a lower tax rate and shift consumption toward more private goods.

B. The Role of Business Campaign Contributions

The distinctive contribution of this study is to quantify the role of business campaign contributions on business tax policy. Does $BCC_{i,t}$ impact state tax policies directly? Are estimates of the reaction function slope affected by the inclusion of $BCC_{i,t}$ in the model? These questions are investigated by estimating (2) by GMM. The results based on the RE and FE models are shown in Table 3, columns 1–3 and 4–6, respectively. The instruments for $\tau_{i,t}^{\#}$ are the same as those used in Table 2. For $BCC_{i,t}$, our instrument search algorithm (discussed in Section III.C) yields only one instrument, the number of candidates that ran for a state house seat in state i and year t . Note that the coefficients on $BCC_{i,t}$ and $BCC_{i,t-1}$, and their sum represented by γ , have been multiplied by 1,000 to facilitate presentation.

We find that the introduction of the business contributions variables has little effect on the estimated slope of the reaction function. The coefficients on $\tau_{i,t}^{\#}$ could have been biased due to incorrect omission of BCC . However, the α parameters reported in Table 3 are very similar to those in Table 2. To assess whether BCC influences how jurisdiction react to other jurisdictions' tax policies, we interact $\tau_{i,t}^{\#}$ with $BCC_{i,t}$ and, in results not reported in this paper, find no evidence of any influence of BCC on the slope of the reaction function.

However, business campaign contributions have a direct effect on tax policy in a direction favorable to business. As shown in Panel B of Table 3, the sign of the estimated γ is negative for SCT and CAW , the two tax variables that increase business costs, and γ is positive for ITC , the tax policy that lowers business costs. This pattern holds for both the RE and FE models. In the RE model, γ is statistically significant (at conventional levels) for both SCT and CAW , but not for ITC . In the FE model, γ remains significant for CAW , has a p-value slightly above 0.10 for SCT , and remains insignificant for ITC .¹⁰

The economic significance of these estimates will be assessed in the following section. Here we simply note that the estimated γ from column 4 of Table 3 implies that a one standard deviation (s.d.) movement of BCC is associated with a reduction in SCT of just 0.05 percentage points (p.p.), which is 2 percent of the standard deviation of

¹⁰ We obtain very similar results if we treat BCC as an exogenous variable. The results are provided in Appendix C in Chirinko and Wilson (2009a).

Table 3
 Role of Business Campaign Contributions Dependent Variable: τ_{it}
 GMM Estimates

	Random Effects			Fixed Effects		
	<i>SCT</i> (1)	<i>ITC</i> (2)	<i>CAW</i> (3)	<i>SCT</i> (4)	<i>ITC</i> (5)	<i>CAW</i> (6)
A. Neighboring States Tax Variable						
$\tau_{it}^{\#}$	-0.515 {0.750}	0.932 {0.795}	0.938 {0.637}	-1.431 {0.492}	1.330 {0.660}	1.866 {0.143}
$\tau_{i,t-1}^{\#}$	-0.194 {0.903}	-1.377 {0.648}	-1.526 {0.343}	-0.073 {0.974}	-1.707 {0.526}	-2.081 {0.058}
$\tau_{i,t-2}^{\#}$	0.510 {0.437}	0.268 {0.631}	-0.338 {0.555}	0.155 {0.871}	0.350 {0.370}	-0.512 {0.213}
$\alpha = \text{Sum of Coefficients on } \tau_{it}^{\#}$	-0.199 {0.622}	-0.177 {0.850}	-0.926 {0.068}	-1.350 {0.106}	-0.027 {0.968}	-0.727 {0.043}
B. Business Contributions						
BCC_{it}	-0.204 {0.075}	0.309 {0.459}	-2.927 {0.012}	-0.196 {0.122}	0.256 {0.524}	-2.992 {0.009}
$BCC_{i,t-1}$	-0.191 {0.068}	0.448 {0.236}	-3.742 {0.000}	-0.178 {0.151}	0.384 {0.364}	-3.660 {0.003}
$\gamma = \text{Sum of Coefficients on } BCC_{it}$	-0.395 {0.053}	0.757 {0.327}	-6.670 {0.001}	-0.375 {0.130}	0.640 {0.435}	-6.652 {0.002}
C. Control Variables						
$IK_{i,t-1}$	0.009 {0.215}	0.011 {0.638}	-0.002 {0.976}	0.007 {0.250}	0.009 {0.509}	0.031 {0.664}
$VOTER PREFERENCES_{i,t-1}$	0.001 {0.462}	-0.003 {0.047}	0.007 {0.315}	0.001 {0.215}	-0.003 {0.017}	0.011 {0.145}
$IK_{i,t-1}^{\#}$	-0.095 {0.129}	0.099 {0.735}	0.012 {0.985}	-0.087 {0.127}	0.069 {0.751}	0.449 {0.314}
D. Equation Fit and Instrument Quality						
p-Value for the J Statistic				0.798	0.343	0.172
Eigenvalue Statistic for $\tau_{it}^{\#}$				16.585	3.543	8.546
Number of Observations	522	522	522	522	522	522

Notes: GMM estimates are based on (2) with panel data for 48 states for the period 1990 to 2006. All models contain time fixed effects. The BCC_{it} variable is the logarithm of business campaign contributions made to candidates for the state house (assembly) per capita. In those cases where business campaign contributions are zero, we add 0.0001 to the variable to facilitate computation with the logarithm operator. See the notes to Tables 1 and 2 for details about the table entries. The instrument for BCC_{it} is the number of candidates that ran for a state house seat. The selection of the instrument set is described in Section III.C on The Panel Dataset/ Business Campaign Contributions Variables; the instrument discussed above corresponds to item (B) listed in that sub-section. The coefficients for BCC_{it} , $BCC_{i,t-1}$, and γ are multiplied by 1,000 to facilitate presentation. For the models reported in Table 3, an eigenvalue statistic greater than 8.8 or 14.0 rejects the null hypothesis of instrument irrelevance constructed with a bias of 10 percent or 5 percent, respectively.

SCT. Similar magnitudes are implied by the estimated γ for each of the other two tax variables (from Columns 5 and 6 of Table 3): A one s.d. movement of *BCC* is associated with an increase in the *ITC* of 0.09 p.p. (4 percent of the *ITC* s.d.) and a decrease in the *CAW* of 0.98 p.p. (8 percent of the *CAW* s.d.). As we will show in Section V, however, even such small movements in tax rates can imply large movements in business profits, making business campaign contributions a worthwhile investment.

C. Extensions

This subsection extends our empirical results in five directions. First, we have thus far measured *BCC* as contributions to candidates for state houses of representatives because house elections are held every two years and, relative to senate and gubernatorial elections, a continuity exists across time and states in terms of the fraction of house seats up for election each cycle. Nonetheless, here we consider whether the results are robust to using a broader measure that includes contributions to senate and gubernatorial candidates as well. The reaction function slopes estimated with the RE model are -0.266 ($p = 0.519$), -0.117 ($p = 0.911$), and -0.760 ($p = 0.135$) for *SCT*, *ITC*, and *CAW*, respectively. These estimates are very similar to the corresponding results in Columns 1 to 3 of Table 3. The estimated γ 's are also similar for *SCT* and *CAW*, but the sign for the *ITC* regression is now negative (though, as before, the coefficient sum remains statistically insignificant). Specifically, the estimated γ 's are -0.337 ($p = 0.065$), -0.366 ($p = 0.663$), and -6.014 ($p = 0.001$) for *SCT*, *ITC*, and *CAW*, respectively.

Second, we explore whether *BCC* for winning house candidates has different effects on tax policy than does *BCC* for losing house candidates. We find statistically insignificant differences, though this result is driven by the large standard errors on the estimated $\gamma^{winning}$ and γ^{losing} coefficients rather than economically similar point estimates. This imprecision appears to be traceable to the substantial collinearity between *BCC* for winning and losing candidates.

Third, our preferred model specification contains lags of $\tau_{i,t}^{\#}$ to recognize that capital mobility or legislated changes in tax rates may be gradual processes taking more than one year to complete. Here we explore the importance of dynamics by considering two alternative specifications. We first assume that a static specification is appropriate, and thus constrain α_1 and α_2 to equal zero in (2), while estimating α_0 freely. The point estimates and standard errors for α (which now, by definition, equals α_0) change dramatically. For example, in the RE model for *CAW*, the point estimate for α falls (in absolute value) from -0.926 to -0.274 and the standard error rises by 180 percent. For *SCT* and *ITC*, more dramatic changes occur for α . For all three tax variables, the estimated γ 's remain largely unaffected. In the second alternative specification, we allow for longer lags by replacing the first and second lags of $\tau_{i,t}^{\#}$ by a lagged dependent variable. This specification has the advantage of allowing for infinite number of lags, but the disadvantages that the weights on the lags must decline geometrically and that the contemporaneous and lagged effects must be of the same sign, contrary to what we find in our preferred specification. Estimates of the benchmark model with a lagged dependent variable replacing the lags of $\tau_{i,t}^{\#}$ result in substantial changes in the point

estimates and standard errors for $\alpha = \alpha_0$. Again returning to the example of the RE model for *CAW*, the point estimate for α rises from -0.926 to 19.680 and the standard error rises to 119 . These problems are attenuated (point estimate for α of 2.205 with a standard error of 9.194) but not eliminated when we estimate a hybrid model that combines our preferred specification (two lags of $\tau_{i,t}^{\#}$) with a lagged dependent variable. The estimates of γ are also dramatically affected by the inclusion of a lagged dependent variable, with implausible point estimates and very large standard errors. Neither of these specifications with a lagged dependent variable delivers plausible results for α or γ .

Fourth, the econometric specifications of tax competition models considered above focused on tax variables directly controlled by policymakers. However, as noted in Section III.A, these legislated tax variables do not provide a comprehensive measure of the total tax assessed on capital and may not reflect nuances in the tax code that affect capital taxation. Table 4 presents results with the average corporate tax rate (*ACT*) as the tax variable for both RE and FE specifications. The reaction function slopes continue to be negative, though they are not estimated very precisely. By contrast, the impact of including *BCC* in the *ACT* model is greater than in the *SCT* model. Relative to the comparable coefficient sums in Table 3, the γ 's from Table 4 are larger — they imply that a one s.d. movement of *BCC* is associated with a reduction in *ACT* of 7 percent to 9 percent of the s.d. of *ACT* — and they are estimated more precisely.

Fifth, a major advantage of panel data is that the econometric model can control for state-specific effects that are time invariant. If these effects are important for tax policy and correlated with other factors entering the econometric equation, ignoring their impact, as must be done in cross-section regressions, can lead to very different estimates. To explore the importance of state-specific effects, we reestimate our models without controlling for random or fixed effects. The results reported in columns 3 to 5 in Table 4 are very different from the estimates reported above. For example, recall from Table 3 that γ^{SCT} is approximately -0.390 with either a RE or FE specification with p-values of 0.053 and 0.130 , respectively. When state effects are removed, γ^{SCT} switches sign and become statistically insignificant. As shown in column 3 of Table 4, the estimated sum is 0.495 ($p = 0.665$). This positive coefficient implies the perverse result that business campaign contributions are associated with higher corporate income tax rates. Similarly substantial and perverse changes occur for γ^{ITC} from its point estimate in Table 3 of approximately 0.700 to -1.310 ($p = 0.381$) in Table 4. The γ^{CAW} coefficient does not change sign, but its point estimate changes markedly from approximately -6.660 in Table 3 to -17.180 ($p = 0.000$) in Table 4. These results highlight the critical importance of controlling for state effects in panel data.

V. THE ECONOMIC VALUE OF BUSINESS CAMPAIGN CONTRIBUTIONS

Up to this point, we have not explored the economic value implied by the *BCC* coefficients. How much does a dollar of business contributions “buy” in terms of reduced taxes? We answer this question with respect to an implied change in the corporate income tax rate. We focus here only on *SCT* because the results reported above suggest that

Table 4
 Alternative Tax Measure and Specification Dependent Variable: $\tau_{i,t}$
 GMM Estimates

	Random Effects	Fixed Effects	Removing State Effects		
			<i>SCT</i>	<i>ITC</i>	<i>CAW</i>
	(1)	(2)	(3)	(4)	(5)
A. Neighboring States					
Tax Variable					
$\tau_{i,t}^{\#}$	1.341 {0.229}	1.093 {0.228}	11.625 {0.232}	36.336 {0.014}	0.450 {0.941}
$\tau_{i,t-1}^{\#}$	-1.571 {0.041}	-1.219 {0.037}	-15.575 {0.158}	-39.349 {0.012}	-4.982 {0.422}
$\tau_{i,t-2}^{\#}$	-0.661 {0.143}	-0.403 {0.248}	4.186 {0.296}	1.602 {0.456}	1.971 {0.172}
$\alpha = \text{Sum of Coefficients on } \tau_{i,t}^{\#}$	-0.899 {0.175}	-0.528 {0.379}	0.237 {0.289}	-1.411 {0.018}	-2.562 {0.000}
B. Business Contributions					
$BCC_{i,t}$	-0.250 {0.047}	-0.253 {0.040}	0.373 {0.558}	-1.003 {0.312}	-8.144 {0.002}
$BCC_{i,t-1}$	-0.323 {0.004}	-0.327 {0.004}	0.122 {0.836}	-0.308 {0.704}	-9.036 {0.000}
$\gamma = \text{Sum of Coefficients on } BCC_{i,t}$	-0.573 {0.010}	-0.580 {0.011}	0.495 {0.665}	-1.130 {0.381}	-17.180 {0.000}
C. Control Variables					
$IK_{i,t-1}$	0.030 {0.000}	0.029 {0.149}	0.097 {0.121}	-0.024 {0.679}	-0.304 {0.105}
$VOTER PREFERENCES_{i,t-1}$	-0.001 {0.130}	-0.001 {0.151}	-0.0003 {0.923}	-0.004 {0.435}	0.006 {0.650}
$IK_{i,t-1}^{\#}$	-0.032 {0.620}	-0.024 {0.665}	-2.215 {0.000}	-0.705 {0.026}	-8.402 {0.000}
D. Instrument Quality					
p-Value for the J Statistic		0.843	0.383	0.012	0.000
Eigenvalue Statistic		17.720	26.637	3.173	5.124
Number of Observations	522	522	522	522	522

Notes: See notes to Table 3.

BCC does not have a statistically significant effect on *ITC* and interpreting the corporate tax savings from a change in *CAW* is complicated given it necessarily involves an offsetting increase in the sales or payroll factor weights in a state's nationwide income apportionment formula. Moreover, the *SCT* is generally considered the most important capital tax policy.

We begin with the following equation for corporate taxes paid,

$$(3) \quad SCITP_i \equiv ECT_i * PROFITS_i,$$

$$ECT_i \equiv SCT_i * RAS_i,$$

where $SCITP_i$ is state corporate income tax payments in state i , ECT_i is the effective corporate income tax rate, and $PROFITS_i$ is the dollar amount of before-tax corporate profits. The ECT_i variable is the product of SCT_i (the statutory, marginal corporate income tax rate that enters our econometric equation) and RAS_i (the ratio of the average tax rate to the statutory rate).¹¹ The economic value of business campaign contributions ($\$BCC_{it}^H$) is given by the induced savings in state corporate income tax payments (Δ_i),

$$(4) \quad \Delta_i \equiv \partial SCITP_i / \partial \$BCC_{it}^H = (\partial SCT_i / \partial \$BCC_{it}^H) * RAS_i * PROFITS_i,$$

where we have assumed that the ratio of average to statutory tax rates and before-tax profits are unaffected by the change in the statutory corporate tax rate. The $(\partial SCT_i / \partial \$BCC_{it}^H)$ derivative equals γ divided by $\$BCC_{it}^H$.¹² The variable is assumed to be the same across states ($RAS_i = RAS$ for all i) because it is measured with national data. Furthermore, we approximate $PROFITS_i$ for a given state as national profits, $PROFITS$, multiplied by the state's population share (POP_i / POP). Lastly, we average over the 48 states to calculate the impact of business contributions for the representative state to obtain the economic value of business contributions,

$$(5) \quad \Delta \equiv \sum_{i=1}^{48} \Delta_i / 48 = \gamma * \left(\left(\sum_{i=1}^{48} POP_i / \$BCC_{it}^H \right) / 48 \right) * RAS * (PROFITS / POP)$$

$$= \gamma * MEAN \{ POP_i / \$BCC_{it}^H \} * RAS * (PROFITS / POP)$$

The elements appearing in (5) are quantified as follows.¹³ The γ coefficient is the fixed effects estimate of -0.375 taken from column 4 of Table 3 (divided by 1,000, per

¹¹ Note that the ECT_i variable reflects all aspects of the corporate tax code, and hence differs from the ACT_i variable used in Table 4.

¹² Recall that the business campaign contributions variable in the econometric equation is defined as $BCC_{it} = \ln(\$BCC_{it}^H / POP_{it})$.

¹³ Equation (5) contains two nominal variables, $\$BCC_{it}^H$ and $PROFITS$. Since they appear in the denominator and numerator, respectively, of (5), explicit deflation, which would occur with aggregate deflators, is unnecessary.

the notes to Tables 3 and 4). The $MEAN\{POP_i / \$BCC_i^H\}$ equals 6.937, where POP_i and $\$BCC_i^H$ are time averages for the most recent four-year election cycle, 2003 to 2006. (All averages reported in this paragraph are for this period.)¹⁴ The *PROFITS* variable is corporate profits before tax without the inventory valuation and corporate capital adjustment for the aggregate economy; the average value is \$1,401,775 million.¹⁵ The average of the *POP* variable is 294 million.¹⁶ The *RAS* variable is a ratio. The numerator is computed for the aggregate economy as average state tax receipts on corporate income (\$48,825 million)¹⁷ divided by the above figure for average aggregate corporate profits before tax. The denominator is average *SCT* equal to 0.065. The *RAS* variable equals 0.536.

Based on these numbers and the formula above, business campaign contributions appear to have considerable economic value. A \$1 campaign contribution yields \$6.65 in state corporate tax savings. The result is very similar — \$7.00 — if one instead uses the random effects estimate of γ (from column 1 of Table 3).

These figures beg the question, if the value of \$1 of business campaign contributions is greater than \$1, why do businesses not contribute more, raising contributions until the point at which the excess return is eliminated?¹⁸ There are two possible explanations, which are not mutually exclusive, to this “Tullock Puzzle” (1972). First, the above calculation of estimated economic value is based on the assumption that each business is simultaneously making a marginal contribution. No mechanism exists, however, for ensuring the substantial mutual gains are realized. Businesses face a classic free-rider problem with the associated underprovision of a public good (lobbying).¹⁹ In 2008, over 2.5 million tax returns were filed by C and other corporations with the Internal Revenue Service.²⁰ Among the 48 contiguous states, North Dakota had the fewest filings, 5,038. With so many corporations even in the smallest states, appropriate incentives to contribute may be absent and free-riding problems may abound. The excess

¹⁴ We focus on this four-year average, rather than the average for the full sample, because of the secular decline in state corporate income tax payments (Wilson, 2006).

¹⁵ See U.S. Department of Commerce, *Survey of Current Business*, Table 1.12, <http://www.bea.gov/scb/>.

¹⁶ See U.S. Bureau of the Census, U.S. Department of Commerce, <http://www.census.gov/popest/states/states.html>. Data files containing annual state population estimates are available separately by decade under the “Archived Releases” heading on this webpage.

¹⁷ See U.S. Department of Commerce, *Survey of Current Business*, Table 3.3, <http://www.bea.gov/scb/>.

¹⁸ Our results contribute to the lively debate concerning whether campaign contributions are an investment by firms for political influence or consumption by participants in the political process. See the survey by Ansolabehere, de Figueiredo, and Snyder (2003) and the evidence that they present in favor of the consumption view. Recent results by Cooper, Gulen, and Ovtchinnikov (2010) favor the investment view; they find a large positive impact of business contributions to federal elections on returns. By contrast, Aggarwal, Meschke, and Wang (2008) find that business contributions to federal elections are negatively related to future returns because of a link between contributions and corporate governance problems.

¹⁹ Hardin (1968) and Olson (1965) discuss the difficulties faced by groups in achieving their common interests, though Ostrom (1990) takes a more sanguine view based on the evolution of institutions.

²⁰ See Internal Revenue Service (2009). These figures exclude S corporations but include other non-C corporations filing form 1120. See footnote 3 of Table 3 for details.

return to business contributions may reflect coordination failure among businesses, not unexploited profit opportunities. Second, campaign contribution limits may effectively constrain businesses from increasing campaign contributions to the point where their value equals their cost.

VI. SUMMARY AND CONCLUSIONS

This paper has explored the role played by business campaign contributions in determining state tax policy in a world of mobile capital. We expand the standard model of tax competition to allow for the influence of business contributions on the corporate income tax rate, the investment tax credit rate, the capital apportionment weight, and the average corporate tax rate. Our empirical model explains each of these tax policies as functions of tax policies in competitive states (reflecting the usual role of tax competition) and business contributions, as well as control variables for the economic and political environment, state effects, and time fixed effects.

Based on a panel of U.S. states and unique data on business campaign contributions, our empirical work uncovers four key results. First, we document a significant direct effect of business contributions on tax policy. For example, in our preferred regressions in Table 3, we find that the coefficients on our business campaign contributions variables are negative and statistically significant at conventional levels (or nearly so in one case) for the statutory corporate income tax and capital apportionment weight. Second, these estimates imply that the economic value of a \$1 business campaign contribution in terms of lower state corporate taxes is approximately \$6.65. This large gap between the benefits and costs of campaign contributions suggests that businesses have much to gain from coordinated contributions and/or that campaign contribution limits have been effective in limiting contributions. Third, the slope of the reaction function between tax policy in a given state and the tax policies of its competitive states is negative, and this slope is robust to including business campaign contributions in the econometric equation. This negative slope reflects a reaction to an inflow of capital (due to an increase in capital taxes in neighboring jurisdictions) that creates an opportunity for residents to maintain the current level of public services at a lower tax rate; a negative income elasticity for public goods compels residents to act on this opportunity. Fourth, we highlight the sensitivity of the empirical results to state effects. For example, when state effects are removed, the panel data model implies the perverse result that business campaign contributions raise the statutory corporate income tax rate (column 3 of Table 4).

These provocative results call for further research aimed at understanding the determinants of business campaign contributions and the “Tullock Puzzle,” the persistence of a large gap between benefits and costs. What constraints prevent businesses from making additional contributions and exploiting these huge benefits? Are campaign contribution limits effective in constraining business campaign contributions? We intend to examine these and related issues in future research.

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REFERENCES

- Aggarwal, Rajesh K., Felix Meschke, and Tracy Wang, 2008. "Corporate Political Contributions: Investment or Agency?" Working Paper. University of Minnesota, Minneapolis, Minnesota.
- Ansolabehere, Stephen, John M. de Figueiredo, and James M. Snyder, Jr., 2003. "Why Is There So Little Money in U.S. Politics?" *Journal of Economic Perspectives* 17 (1), 105–130.
- Brueckner, Jan K., 2003. "Strategic Interaction Among Governments: An Overview of Empirical Studies." *International Regional Science Review* 26 (2), 175–188.
- Brueckner, Jan K., and Luz A. Saavedra, 2001. "Do Local Governments Engage In Strategic Property-Tax Competition?" *National Tax Journal* 54 (2), 203–230.
- Case, Anne C., James R. Hines, Jr., and Harvey S. Rosen, 1993. "Budget Spillovers and Fiscal Policy Interdependence: Evidence From the States." *Journal of Public Economics* 52 (3), 285–307.
- Chirinko, Robert S., and Daniel J. Wilson, 2008. "State Investment Tax Incentives: A Zero-Sum Game?" *Journal of Public Economics* 92 (12), 2362–2384.
- Chirinko, Robert S., and Daniel J. Wilson, 2009a. "Can Lower Tax Rates Be Bought? Business Rent-Seeking and Tax Competition Among U.S. States." Working Paper No. 2009-29. Federal Reserve Bank of San Francisco, San Francisco, CA.

Chirinko, Robert S., and Daniel J. Wilson, 2009b. "Tax Competition among U.S. States: Racing to the Bottom or Riding on a Seesaw?" Working Paper No. 2008-03. Federal Reserve Bank of San Francisco, San Francisco, CA.

Cooper, Michael J., Huseyin Gulen, and Alexei V. Ovtchinnikov, 2010. "Corporate Political Contributions and Stock Returns." *The Journal of Finance* 65 (2), 687–724.

Devereux, Michael P., Ben Lockwood, and Michela Redoano, 2008. "Do Countries Compete Over Corporate Tax Rates?" *Journal of Public Economics* 92 (5–6), 1210–1235.

Donald, Stephen G., and Whitney K. Newey, 2001. "Choosing the Number of Instruments." *Econometrica* 69 (5), 1161–1191.

Edmiston, Kelly D., 1998. "Formula-Appportioned Corporate Income Taxes and Regional Economic Development." Ph.D. Dissertation. University of Tennessee, Knoxville, Tennessee.

Edwards, Jeremy, and Michael Keen, 1996. "Tax Competition and Leviathan." *European Economic Review* 40 (1), 113–134.

Grossman, Gene M., and Elhanan Helpman, 1994. "Protection for Sale." *American Economic Review* 84 (4), 833–850.

Hansen, Lars Peter, 1982. "Large Sample Properties of Generalized Method of Moments Estimators." *Econometrica* 50 (4), 1029–1054.

Hardin, Garrett, 1968. "Tragedy of the Commons." *Science* 162 (3859), 1243–1248.

Internal Revenue Service, 2009. *Internal Revenue Service Data Book 2008*. U.S. Department of the Treasury, Washington, DC.

Olson, Mancur, 1965. *The Logic of Collective Action: Public Goods and the Theory of Groups*. Harvard University Press, Cambridge, MA.

Omer, Thomas C., and Marjorie K. Shelley, 2004. "Competitive, Political, and Economic Factors Influencing State Tax Policy Changes." *Journal of American Tax Association* 26 (Supplement), 103–126.

Ostrom, Elinor, 1990. *Governing the Commons: The Evolution of Institutions for Collective Action*. Cambridge University Press, Cambridge, UK.

Stock, James H., Jonathan H. Wright, and Motohiro Yogo, 2002. "A Survey of Weak Instruments and Weak Identification in Generalized Method of Moments." *Journal of Business and Economic Statistics* 20 (4), 518–529.

Stock, James H., and Motohiro Yogo, 2005. "Testing for Weak Instruments in Linear IV Regression." In Andrews, Donald W.K., and James H. Stock (eds.), *Identification and Inference for Econometric Models: Essays in Honor of Thomas Rothenberg*, 80–108. Cambridge University Press, Cambridge, UK.

Tullock, Gordon, 1972. "The Purchase of Politicians." *Western Economic Journal* 10 (3), 354–355.

White, Halbert, 1980. "A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity." *Econometrica* 48 (4), 817–838.

White, Halbert, 1982. "Instrumental Variables Regression with Independent Observations." *Econometrica* 50 (2), 483–499.

Wilson, Daniel J., 2006. "The Mystery of Falling State Corporate Income Taxes." FRBSF Economic Letter 2006–35. Federal Reserve Bank of San Francisco, San Francisco, CA.

APPENDIX A: DOCUMENTATION FOR DATA ON BUSINESS CAMPAIGN CONTRIBUTIONS AND CAMPAIGN CONTRIBUTION LIMITS

A1. Business Campaign Contributions

With financial support from the Federal Reserve Bank of San Francisco, we purchased data on state campaign contributions from the National Institute of Money in State Politics (NIMSP). The NIMSP collects data on contributions from individuals and organizations to individual candidates for state government office. The following statement is from the NIMSP website (www.followthemoney.org) and describes the sources of their data:

The Institute receives its data in either electronic or paper files from the state disclosure agencies with which candidates must file their campaign finance reports. The Institute collects the information for all state-level candidates in the primary and general elections and then puts it into a database.

Staff members verify that all candidates are represented and that their political party affiliations and win/loss statuses are correct. Researchers then standardize the contributor names and assign political donors an economic interest code, based either on the occupation and employer information contained in the disclosure reports or on information found through a variety of research resources. These codes are closely modeled on designations used by the federal government for classifying industry groups.

While identifying and coding major labor and industry contributions is relatively straightforward, doing so for individual contributors can be more difficult. In many cases, the state requires that contributors provide the campaigns with their occupation and/or employer. When that information is available, the Institute uses it to assign a category code for individual contributors. When that information is not required or candidates do not provide it, the staff uses standard research tools to determine an economic or political identity. Phone directories provided on CD or through the Internet often include a Standard Industrial Classification for an individual contributor, particularly those who own their own business or are in an easily identifiable profession such as attorney, doctor, insurance salesman, or real estate agent. Professional directories provide additional information, as does Polk's Reverse Directories.

Contributors for whom researchers cannot determine an economic interest from the information available receive a code indicating their interest is Unknown.

The NIMSP provided us with the "Summary File" for each state and invaluable explanations of details about their data. A state's Summary File contains dollar values of contributions to in-

dividual candidates, by year, aggregated across all contributors within a “sector.” These sectors include industries as well as labor organizations, “ideologies,” political parties, etc. We define the “business” supersector as the sum of the following nine sectors: agriculture; construction; communications and electronics; defense; energy and natural resources; finance, insurance, and real estate; general business; transportation; and health.²¹

We first aggregate contributions across these nine sectors to obtain business contributions by candidate, year, and state. Similarly, we aggregate contributions over the remaining sectors to obtain non-business contributions.

The Summary Files also provide detailed information on the candidate receiving the donations — in particular, their “office” (e.g., governor, lieutenant governor, house or assembly, senate, supreme court, attorney general, comptroller, treasurer, public utility commission, secretary of state, etc.) and “status.” Status indicates the outcome of the candidate’s candidacy as of the end of the year. Candidacies in the data can have one of the following nine statuses: general election (GE) win, GE loss, primary election loss, withdrawal, disqualification, death, unknown, still pending (as of end of year), and “did not run” (meaning the candidate received contributions in that year but was not running for office that year).

We then aggregate business contributions across candidates, by year and state, for each status and for four categories of “office”: gubernatorial (includes both governor and lieutenant governor because in some states these candidates are listed on a joint ticket and so it is not possible for NIMSP to separate contributions between the gubernatorial candidate and lieutenant governor candidate), house (variously called by states, “house of assembly,” “house of delegates,” and “house of representatives”), senate, and other statewide office. In Nebraska, which has a unicameral state legislature, legislative candidates’ offices are coded as “senate.”

The resulting panel data set has state-year observations on 36 business campaign contributions variables: contributions to candidates for each of the four offices above and for each of the nine statuses above.

From these 36 business campaign contribution variables, we construct the following variables for possible use in our analysis:

Explanatory Variables

$\$BCC^H$	business contributions-house
$\$BCC^S$	business contributions-senate
$\$BCC^G$	business contributions-governor/lieutenant governor
$\$BCC^{HSG}$	business contributions-house + senate + governor

Possible Instrumental Variables

$\$NBC^W$	non-business contributions-house-GE winners
$\$NBC^L$	non-business contributions-house-GE losers
$\$NBC$	non-business contributions-house-GE winners + GE losers

²¹ The above description by the NIMSP of their extensive efforts to assign contributions from individuals to a particular economic sector may lead one to think that contributions from individuals, as opposed to organizations, are the bulk of business contributions. They are not. According to the breakdown of contributions by individuals vs. organizations provided on the NIMSP website, individuals make up around a third to a half of business contributions (depending on the state and year).

The sample period covered by this data set is 1990–2006, though there are fewer states with data prior to the 1997–1998 electoral cycle. The following table shows the number of states in each two-year electoral cycle with reported business contributions:

Electoral Cycle	Number of States
1989 – 1990	12
1991 – 1992	12
1993 – 1994	19
1995 – 1996	33
1997 – 1998	41
1999 – 2000	47
2001 – 2002	48
2003 – 2004	48
2005 – 2006	48

As indicated by the table above, contributions data in the NIMSP data set are not reported for all states in all years.

States can be categorized into four groups to describe their data availability:

1. Most (40 of 48) states have only even-year data on business contributions. These states have biennial electoral cycles that end in even-years and report contributions over the entire two-year period in that single even-year.
2. Two states — New Jersey and Virginia — have only odd-year contributions data; they have biennial electoral cycles ending in odd-years and report contributions over the entire two-year period in that single odd-year.
3. Five states — Kentucky, Louisiana, Mississippi, Pennsylvania, and Wisconsin — have biennial, even-year elections but report contributions that take place in either election years or non-election (odd) years. For these states, off-election-year contributions generally are for statewide offices other than governor, house, or senate (so governor, house, or senate contributions generally are just for even years, like the 40 states in the first group above).
4. California has a biennial, even-year cycle like group 1 above but has contributions reported for 2003 in connection with the special gubernatorial recall election in that year.

Since most states only report contributions at a two-year, electoral-cycle frequency, it is not known how contributions are divided among the two years within a cycle. If non-election-year

contributions are generally close to zero, then the appropriate way to handle the data is to assign all of the contributions for the cycle to the election year and assume unreported contributions are zero in non-election years. In this case, the data set constructed at an annual frequency is appropriate for the purposes of our regression analysis.

A2. Campaign Contributions Limits

There are at least six different kinds of campaign contribution limits (*CCLs*): (1) on corporate contributions, (2) on individual contributions, (3) on candidates' own and family contributions, (4) on political action committee (PAC) contributions, (5) on labor union contributions, and (6) on contributions by political parties.

The basic principle we use for constructing a uniform panel of data for these six types of *CCLs* is as follows: "What is the maximum amount that a contributor (individual, corporation, candidate, PAC, union, or party) could make to a single candidate in this state in this electoral cycle?" There are two main categories of *CCLs*: *CCLs* that set a maximum contribution limit from a single contributor to a specific candidate (the easiest case to record in our dataset), and *CCLs* that cap aggregate contributions from a single contributor to all candidates seeking a particular office, such as governor or state senate. In the latter case, we assume that the contributor would use their entire allowable donation (if binding) for one candidate, to maximize impact. Contribution maximums in the dataset specify the most a contributor can contribute in a particular election cycle, which includes both the primary and general elections. In states where the limit applies on a calendar-year basis, we multiply it by two to be (roughly) equivalent to a primary/general cycle.

Nebraska is a special case, where candidates are limited in the total amount they can receive in corporate donations. The assumption used to enter this information in our dataset is that one donor can give an amount equal to this maximum (e.g., \$825,000 for governor).

There have been a number of court cases on whether particular campaign finance limits are unconstitutional, which is a primary reason for the large amount of within-state variation in *CCLs* over time. Some states (e.g., Colorado) abandoned all limits for two years, then rolled out new ones that presumably passed Constitutional muster. This is one reason to think *CCLs* are exogenous with respect to a state's tax policy.

In a handful of states, the maximum contribution limit is higher if the candidate agrees to spending limits (New Hampshire) or is qualified to receive public funding (Rhode Island). In these cases, we assume that these higher limits apply.

Our data sources for *CCLs* are as follows:

Table A2
Electoral Cycle Sources

Electoral Cycle	Source
1995–1996	The Council of State Governments, Various Issues. <i>The Book of the States</i> . The Council of State Governments, Lexington, Kentucky.
1997–1998	Feigenbaum, Edward D., and James A. Palmer, 1998. <i>Campaign Finance Law 98: A Summary of State Campaign Finance Laws With Quick Reference Charts</i> . Federal Election Commission, http://www.fec.gov/pubrec/cfl/cfl98/cflaw98.html
1999–2000	Feigenbaum, Edward D., and James A. Palmer, 2000. <i>Campaign Finance Law 2000: A Summary of State Campaign Finance Laws With Quick Reference Charts</i> . Federal Election Commission, http://www.fec.gov/pubrec/cfl/cfl00/cfl00.htm
2001–2002	Feigenbaum, Edward D., and James A. Palmer, 2002. <i>Campaign Finance Law 2002: A Summary of State Campaign Finance Laws With Quick Reference Charts</i> . Federal Election Commission, http://www.fec.gov/pubrec/cfl/cfl02/cfl02.shtml
2003–2004	National Conference of State Legislatures (NCSL), historical tables
2005–2006	“Individual to Candidate Contributions,” “Corporate to Candidate Contributions.” National Conference of State Legislatures, archived, http://web.archive.org/web/*/http://www.ncsl.org . For example, 2004 limits are found at the 2005 NCSL web page: http://web.archive.org/web/20051113033231/www.ncsl.org/programs/legman/about/CorpCand.htm

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