

Chasing the Firm or Rewarding the Partisans? Domestic Responses to International Tax Competition in the OECD, 1982-1998*

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Abstract

The literature on the political economy of taxation has stressed the role of international and domestic factors in governments' responses to cuts in other OECD countries' corporate taxes. In this paper, we argue that the interactive effects of domestic and international factors are central to understanding the effect of competition for mobile capital on a government's taxation decision. We empirically estimate the determinants of corporate tax reductions in OECD countries using Bayesian multilevel modeling. We find that both domestic political institutions and reductions in competitor tax rates have independent and complex interactive effects on domestic tax reform. The influence of some domestic political institutions such as veto players are more muted during periods of intense tax competition. Conversely, we find that the influence of partisanship is enhanced. Governments of the right and left, far from being left impotent by international capital, have dramatically different responses to tax competition.

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The investment decisions of multinational corporations have received a tremendous amount of attention in recent years. In the United States and Germany, multinational corporations have been labeled “benedict Arnold corporations” and “locusts,” as multinational firms locate their production facilities abroad. Conversely, in Ireland the attraction of mobile production has been credited with creating one of the most dynamic economies in the world. Friend or foe, multinational corporations and their location decisions are at the forefront of contemporary public policy debates. The central strategy for attracting and maintaining multinationals has focused on fiscal policy, specifically on levels of corporate taxation and tax incentives for investment.¹ Numerous countries around the world have proposed lowering corporate tax rates (Simpson, 2005). Simultaneously, Ireland has been criticized by its European neighbors for offering overly generous tax rates and incentives to multinational investors, siphoning foreign capital destined for mainland Europe to the Celtic tiger. Call it harmonization or fiscal competition, either way the perception is that countries are engaged in a Prisoners’ Dilemma forcing them to slash corporate taxes to attract mobile production. Many governments, both conservative and liberal ones, have given in to the pressure of cutting corporate taxes to attract investment.

In the opinion of many observers, competition for multinational investments by means of cutting taxes has set off a race to the bottom. In this paper, we assess this claim about tax competition by looking at the various factors that might influence a country’s decision to cut taxes. While we find that governments are responsive to the tax rates of competitor countries, we also find that tax competition is far more complicated than previously suggested. In fact, we show that tax competition is affected by both domestic institutional and political factors. Ironically, it is during periods of intense tax competition when some domestic-level factors dominate the political economy of taxation. Specifically, we find that, while the effective number of veto players in a

¹Although a number of countries, such as Germany, have proposed labor market reforms to reduce the costs for multinational production.

country becomes less central in explaining the tax behavior of governments during periods of tax competition, the effect of partisanship is magnified during these same periods.

1 Globalization and Capital Taxation: Macro-Arguments

Foreign direct investment (FDI) is defined as international capital flows that entail a 10 % ownership stake in a company (International Finance Corporation, 1997). This technical definition is meant to differentiate short-term capital flows from longer-term flows that entail a degree of control over the enterprise. When a multinational corporation purchases an existing firm (as was the case in the Daimler-Chrysler merger) or opens up a new operation in an emerging market (such as Intel's chip production facility in China), it is considered a foreign direct investment. FDI has generated a tremendous amount of attention in recent years. In academic circles, FDI is seen as an important tool for fostering economic development. Although FDI is not a panacea for development, FDI can facilitate technology transfer, generate export earnings, increase domestic tax collection, create domestic jobs, and ultimately lead to economic growth.²

Competition for FDI is fierce in the OECD, because of the form that FDI takes in developed countries. In developing countries, multinational enterprises (MNEs) establish vertical operations, where, for example, an automotive manufacturer in the United States establishes facilities for raw materials or low-skilled production in developing countries and imports these materials and intermediate products back into the home country for final assembly. In the OECD, most FDI is horizontal, where multinationals establish operations in OECD markets that are similar to ones in the host country (Bloningen and Wang, 2004). A Dutch electronics company may establish final assembly or even research and development facilities in another OECD country, despite the fact that the same technology and high skilled labor force is available in the Netherlands. These comparable operations across borders can lead to the perception of cross-country competition for international capital. For example, while Germany's auto production industry has stagnated and

²A number of influential works suggest that the influence of FDI is conditional on levels of human capital, the level of economic development, and trade policy (see Balasubramanyam, Salisu and Sapsford, 1996, 1999; Borensztein, Greorio and Lee, 1998; Glass and Saggi, 1998; Li and Xiaming, 2005; Xu, 2000).

levels of unemployment remain high, Central and Eastern European countries are increasingly attracting investments in state-of-the-art production facilities. Politicians have proposed that the solution to Germany's employment ills is to ensure that automobiles for the European market are built in Germany and not within the borders of their Central European neighbors (Edmondson and Boston, 2004).

Multinational investments clearly provide economic and political benefits for politicians. Some scholars and other political observers have argued that as a consequence politicians are eager to cut corporate tax rates, and that this will ultimately result in a "race to the bottom" (Andrews, 1994; Cerny, 1990; Kurzer, 1993). Most of the academic literature on the subject, however, has challenged this view for two reasons. One such literature focuses on government responses to mobile capital. Scholars such as Cameron (1978), Garrett (1998), Burgoon (2001), and Swank (2002) argue that even with market pressures, politicians respond primarily to electoral incentives. As a result, some governments may refuse to reduce tax rates or roll back the welfare state if a majority of voters does not support such measures (see Rodrik, 1997; Scheve and Slaughter, 2001). A second literature focuses on how mobile capital has had little influence on the ability of governments to collect tax revenues (see Bates and Lien, 1985; Lee and McKenzie, 1989). Swank and Steimo (2002) find that capital mobility is associated with reductions in statutory tax rates (the published tax rates) but has no impact on the effective tax rates firms encounter. In sum, they find "a remarkable stability in the levels and distribution of tax burdens" (Swank and Steimo, 2002, p. 642).³

Clearly, competition for multinational investments, however fierce it maybe, still is subject to domestic institutional and political constraints. While politicians might feel compelled to participate in the race to the bottom, a majority of the voters might not feel the same inclination. And, since elected politicians depend on the support of voters, the race might be less of a reality than often times suggested. So far, of course, we have assumed that the pressure to cut corporate tax rates is real, and that multinational corporations, in fact, only invest in countries where tax rates are low. However, as we show in the next section, it is not necessarily clear that corporations do assign the kind of importance to low tax rates that some politicians want voters to believe.

³See also Quinn (1997), Garrett (1998), Garrett and Mitchell (2001) and Swank (2002).

2 Multinationals and Corporate Tax Rates: Micro-Mechanisms

Although arguments over competition for capital have permeated the popular media, the responsiveness of FDI to capital taxation rates remains an open question. The theoretical literature on the determinants of FDI flows are based on models of imperfect markets (Kindleberger, 1969; Caves, 1971; Aliber, 1971; Dunning, 1971, 1977, 1981; Hymer, 1976). Many of these models find that tax rates may be a minor determinant of FDI flows (Markusen, 1995). Thus a number of scholars argue that tax rates are not a central determinant of FDI inflows.⁴ For example, in an analysis of inward FDI into the U.S., Swenson (2001) finds that the elasticity of inward FDI to state taxes is quite low. Every one percent increase in state taxes decreases inward FDI by 0.11 %.⁵ This finding on the minor role of taxation in FDI decisions is further buttressed by numerous surveys of multinationals (for a discussion, see Jensen, 2006). Numerous other studies confirm the limited influence that tax policy has on FDI decisions.⁶

While tax policy is not the primary determinant of multinational decisions, and governments are not helplessly lowering tax rates in a race-to-the-bottom competition, tax policy can still have some influence on FDI flows. Scholars, mostly in economics and business, have found a negative relationship between corporate tax rates and multinational activity. Altshuler, Grubert and Newton (2001) estimate the effect of tax rates on U.S. manufacturing investment in 1984 and 1992. They find that tax rates have a significant effect on multinational investments, and that this relationship

⁴See Swank (2002) for a discussion of the literature.

⁵In an innovative study of U.S. state tax rates and inward FDI, Swenson (2001) disaggregates inward FDI by transaction type. Firms that are building new plants in U.S. states may differ in their responsiveness to corporate taxes from firms that are engaging in mergers and acquisitions or joint ventures. In an empirical analysis of firm-level location decisions, Swenson (2001) finds that the elasticity for new plants is the highest at -0.110 and the lowest for mergers and acquisitions at 0.065 .

⁶See Morisset and Pirnia (1999) for a review of the existing evidence. Garrett claims that investment incentives lead MNEs to misstate their location preferences in developing countries (Garrett, 1998, pp. 64-65). In a McKinsey study, Farrell, Remes and Schulz (2004) find that tax incentives have little influence on FDI investment decisions.

has grown stronger over time (with an elasticity of 1.5 in 1984 and an elasticity of 3 in 1992). Devereux and Griffith (1998) find that average effective tax rates are an important determinant of FDI decisions.⁷

In one of the more recent and comprehensive studies, Mutti (2003) finds that corporate tax rates have a strong influence on the decisions of manufacturing multinationals. According to his findings, a 1 % decrease in the cost of capital leads to a 3 % increase in MNE production. The catch is, as Mutti states it, that “such a high response does not apply if the output is destined for local markets or if the country has high per capita income” (Mutti, 2003, p. 5).

In a rather comprehensive review of the literature, Hines (1999) explores the time-series and cross-sectional analyses of the importance of tax rates for U.S. FDI outflows and foreign flows of FDI into the U.S. Although a number of reviewed studies find that taxes are not significant determinants of FDI inflows or outflows, a number of other works find that national tax rates do have a substantial influence on FDI inflows, with elasticities ranging from -0.6 to -2.8 . Hines concludes that “[t]he econometric work of the last 15 years provides ample evidence of the sensitivity of the level and location of FDI to its tax treatment” (Hines, 1999, p. 312).⁸ De Mooij and Ederveen (2003) take a more nuanced view of the literature, arguing that existing studies on the relationship between tax rates and FDI activity exhibit substantial variation due to differences in methodology and data. They argue:

This paper finds a median tax rate elasticity of foreign capital of -3.3 . Substantial variation can be found among studies, however, which can be partly explained by underlying study characteristics. For instance, we find that studies using data on the number of foreign locations yield systematically lower elasticities, in absolute terms, than those using data on foreign capital. Also, studies using data on mergers and acquisitions (as compared to aggregate FDI data) report smaller elasticities. Furthermore, the choice of tax rate matters for the semi-elasticities. In particular, FDI seems more responsive

⁷See also Hines (1997) and Gordon and Hines (2002). For a less technical discussion of the relationship between taxes and FDI, see Gropp and Kostial (2001).

⁸See Hines (2001) for an interesting natural experiment of the influence of corporate taxation on FDI inflows into developing countries.

to effective or average tax rates than to statutory tax rates. Finally, we do not find support for the claim that investments from tax credit countries are less responsive to taxes than investments from tax exemption countries (De Mooij and Ederveen, 2003, p. 690).

The empirical findings on the role of capital taxation are therefore mixed at best.⁹ Corporate taxes may influence the investment location decisions of multinationals, but seldom are they the key determinants of FDI. To put this in perspective, a survey of multinationals by the Multilateral Investment Guarantee Agency (2002) finds that national and state taxes ranked as the 11th and 14th most important determinant for location decisions. In this paper, we are not so much interested in further exploring the relationship between taxes and FDI. There seems to be a consensus in the existing literature that, while in some industries taxes can have a marginal influence on FDI decisions, overall taxes are not the primary determinant of FDI flows. We are far more interested in understanding how governments respond to tax decreases in other countries. Do governments respond by slashing tax rates, or are changes in tax policy determined by domestic factors?

3 The Politics of Corporate Taxation

As argued in the previous section, the micro-perspective suggests that tax policy has some influence on multinational activity. The jury is still out, however, on whether tax policy has a major or minor effect on FDI decisions. From the macro-perspective, there is considerable divergence in the levels of corporate taxation across the OECD (see Hayes, 2003). But while there might not be market forces that incentivize governments to reduce their tax rates to the levels of other FDI competitors, there still may be some rewards to decreasing rates of capital taxation. We argue here that this room to maneuver puts politics at the forefront of decisions over tax rates. Changes in the tax rates of competitor countries may affect a country's ability to attract foreign investment, but rational, self-interested politicians will respond to these external pressures in varying ways depending on domestic factors. One interesting example of tax competition is the U.S. Tax Reform Act of 1986, in which the Reagan government, along with a number of other important changes in the tax treatment of corporations, reduced statutory corporate tax rates from 46 % to 34 %. In response, a

⁹See Oates (1999) for an interesting discussion of the issue.

number of countries around the world followed suit, engaging in a round of corporate tax rate cuts. But, according to Grubert (2001), “[e]ffective tax rates fell on average but there was a wide diversity of behavior among countries” (Grubert, 2001, p. 115). Interestingly, in countries where we would expect tax competition to be the fiercest, for instance among countries in the European Union, tax rates did not fall (Grubert, 2001). What explains this complex pattern of tax competition?

First, political parties have different core constituencies. Some of the most sophisticated work on political business cycles has focused on the differing preferences of political parties on levels of inflation and unemployment.¹⁰ For example, Hibbs (1977) shows that in the United States the Democratic Party’s core constituency is more likely to suffer from unemployment while that of the Republican Party is disproportionately harmed by inflation. These insights have led to an explosion of research on what is known as Partisan Political Business Cycles. Insights from this literature also inform the debates on using fiscal policy to attract multinational production. Changing levels of corporate taxation is a blunt instrument for attracting and maintaining investment and exhibits decreasing marginal benefits. While a move from a 30 % to a 25 % corporate tax rate may induce some added net FDI, it will mostly likely not have a major impact on the business environment. The largest effect of this change in corporate taxation will be on the existing stock of both foreign and domestic investment. A change in corporate taxation will increase the net returns to capital. Although there is some argument that this would induce added business activity and increased government revenues, more likely there would be a reduction in government revenues. This revenue shortfall will be met with either a reduction in government spending or an increase in the tax burden on labor.¹¹ Although some workers within labor will benefit from jobs created by increased FDI, for most of labor this reduction in corporate taxation will have a negative effect, either by means of higher taxes on labor or a reduction in social services.

Stated simply, parties will have different preferences on tax policy. Those representing labor will have preferences for higher taxes on corporations than parties that represent business. Thus pro-business parties will be more likely to reduce corporate taxes. For the sake of brevity, we define

¹⁰See Franzese (2002) for a review of the literature.

¹¹Given the independence of central banks in many of the OECD countries, we ignore the possibility of using monetary policy to deal with revenue shortfalls.

governments as either “right” or “left” with regard to their tax policy preferences. This leads to a simple and intuitive hypothesis.

Partisan Hypothesis: Governments of the right are more likely to reduce levels of corporate taxation than governments of the left.

A second major determinant of tax policy change is the structure of domestic political institutions. Although most OECD countries have similarly high levels of democratic accountability and rule of law, countries vary greatly in their process of law making and the coalitions necessary to enact tax policies. In countries with more veto players, changes to tax policy are more difficult to achieve and therefore less likely to happen (Tsebelis, 1995, 2002).

Veto Players Hypothesis: Countries with more veto players are less likely to implement tax policy change.

These first two hypotheses focus on how domestic politics affects tax policy in the OECD. Next, we want to test how tax competition affects a country’s tax policy decisions. Governments may have their own partisan preferences on tax policy, and veto players may make policy change (either increasing or decreasing taxes) difficult, but international competition, such as the 1986 tax cuts by the U.S. government, could pressure both conservative and liberal governments to reduce corporate taxes.

Competition Hypothesis: Countries are more likely to reduce corporate tax rates when other countries engage in corporate tax rate cuts.

These first three hypotheses separate domestic from international-level factors. We are also interested in the interactive effects of domestic and international factors. How do different governments respond to changes in world tax rates? A few existing empirical studies have attempted to sort out this empirical relationship. In one of the more comprehensive theoretical models, Basinger and Hallerberg (2004) develop a “tournament model” of tax competition for FDI. In this model, national governments compete for international capital by reducing tax rates, which is assumed to be costly for domestic constituencies.

What makes their theoretical model appealing is that Basinger and Hallerberg (2004) account for the uncertainty about the influence of capital taxation on FDI inflows. Politicians believe that

capital taxation can affect FDI decisions, but investors have an unobservable bias for specific countries. Essentially, taxes are only one of a number of country-specific determinants of FDI, but the preferences of multinationals are not known to politicians. Basinger and Hallerberg find empirical evidence that countries with institutional structures that make reform difficult (veto players) and governments with constituencies that would be harmed by the distributional consequences of reform (left governments) are less likely to cut taxes in response to tax cuts in competitor countries. In sum, tax competition affects government tax reform efforts, but domestic politics greatly affects the specific type of response. Basinger and Hallerberg find evidence that both domestic politics and international rates of capital taxation matter; however, they do not account for the interactive effects of international tax competition and domestic politics.

Similarly, Hayes (2003) finds that there is little empirical support for a race to the bottom in OECD tax rates.¹² Although his study does not directly address tax competition in the way Basinger and Hallerberg (2004) do (using relative tax rates), Hayes addresses the relationship between domestic political institutions and the mobility of international capital. In his empirical analysis, he tests the interactive effect of domestic institutions and the level of capital mobility on levels of taxation. Hayes finds important differences in countries' responses to higher levels of capital mobility. In majoritarian democracies that are capital-rich (the U.S. for example), capital mobility is associated with dramatically lower levels of capital taxation, whereas the results for intermediate and capital-poor democracies are much weaker. More importantly, there is no statistically significant effect of capital mobility for consensus democracies that are capital-rich or have intermediate capital endowments. In consensus democracies that are capital-poor, capital mobility is significantly associated with higher levels of capital taxation!

Building on the studies by Basinger and Hallerberg (2004) and Hayes (2003), we empirically estimate the effect of competition for mobile capital on tax policy. We believe that our contribution is novel, in that we are systematically testing the interactive effects of domestic political institutions and changes in world corporate taxation rates on governments' tax behavior. We forward two competing hypotheses:

¹²In a sophisticated empirical analysis, he finds convergence of effective tax rates in the middle range.

Magnifying Effect Hypothesis: Exogenous changes in world tax rates lead to divergence in the influence of domestic institutions on tax policy responses. Right governments and countries with fewer veto players respond by decreasing tax rates, while governments of the left and countries with more veto players are less likely to reduce tax rates.

Mitigating Effect Hypothesis: Exogenous changes in world tax rates lead to behavioral convergence across countries. Partisanship and the number of veto players has little influence on countries' responses to world tax rate changes.

4 Data and Methods

We believe that sorting out these interactive effects is central to understanding the political economy of taxation. We know that international markets put some pressure on domestic governments, and that domestic politics also affects tax policy. To assess the conditional influence of domestic institutions and changes in levels of international taxation rates on a government's propensity to change corporate tax rates, we formulate two multilevel logit models. We use multilevel models to assess how governments' decision to reduce taxes or not varies across years. Specifically, we argue that the effects of domestic political factors are mitigated by the average world tax rate in each year.¹³

Of course, there are alternative approaches to multilevel modeling that can be used to address the current question.¹⁴ However, we argue that all of these other approaches have problems that are

¹³In our empirical analysis, we do not provide for random effects for each country. There are two reasons for our approach. First, country-level differences are already captured with the country-year predictors. Second, including random effects for each country would only be justifiable if there was reason to believe that (i) there are differences across countries that do not vary across time, and (ii) that these differences affect a country's probability to reduce taxes. While there obviously are time-invariant differences across countries, we do not think that these time-invariant differences are relevant to a country's decision to reduce taxes. We therefore focus our empirical analysis on exploring how varying levels of international tax competition across years mitigates the effects of domestic political institutions like the number of veto players and the level of partisanship.

¹⁴See Franzese and Hayes (2004) for a discussion of dealing with spatial and temporal relationships

absent from multilevel models. Specifically, there are three approaches that are common. The first approach is to make the assumption that there is no systematic variation across years. According to this assumption, we would estimate a simple logit model with our key predictors and control variables, but without any indicators for time. In the statistical literature, this modeling strategy is referred to as complete pooling, meaning that the contextual or temporal structure of the data is ignored (Gelman et al., 2004). If we knew that there was no variation across years, this would be the most appropriate model. However, beside the fact that this assumption hardly seems realistic, we do not believe that it should be adopted without further investigation.

The exact opposite approach to complete pooling is a strategy of no pooling (again, see Gelman et al., 2004). If, as we believe, there is variation across years, we could simply include dummy variables for each year. Unfortunately, this brings with it certain problems of its own. First, as pointed out by Steenbergen and Jones (2002) in a recent review article, dummy variables merely indicate a difference across units (here years), but do not really explain that difference. Moreover, dummy variable approaches put arbitrary restrictions on the model. As Gelman et al. (2004) and others point out, we either have to designate one category - for instance, the year 1982 in our analysis - as the base category, or if we want to avoid this arbitrary designation of a base category, we have to eliminate the constant term from the model to avoid perfect collinearity between the dummy variables and the constant. These concerns aside, some might point out that dummy variables could be used in interactive terms to go beyond the mere indication of differences across units. This, however, as Steenbergen and Jones (2002) point out, still leaves the problem that random error at the higher level - here, the year level - is not accounted for.

As shown in the statistical literature on the subject, all of these problems can be alleviated by using multilevel models (see Gelman et al., 2004; Goldstein, 1987, 2003; Hox, 2002; Steenbergen and Jones, 2002). First of all, multilevel models are designed to assess the assumption of pooling versus no pooling. In fact, multilevel models determine the optimal amount of pooling as part of the estimation procedure, and therefore provide a compromise between the two extremes of pooling and no pooling (Gelman et al., 2004). In that sense, we do not have to make arbitrary assumptions about variation across time or context a priori. Rather, we let the model decide how

in tax competition.

much importance should be assigned to the variation. Second, with multilevel models, we do not have to include dummy variables for each year. Remember, the unit of analysis in our model is measured at the country-year level. At the same time, as pointed out earlier, we want to allow for the possibility of variation across years. Multilevel models solve this issue by allowing either the intercept, individual slope coefficients or both to vary across years. For illustration purposes, take a simple logit model of tax cuts (decision to cut taxes or not) on partisanship.

$$Pr(y_i = 1) = \text{logit}^{-1}(\beta^0 + \beta^{\text{partisanship}} \cdot \text{conservative}_i).$$

Now, if we wanted to model the variation of partisanship across years, the multilevel model would take the following form.

$$Pr(y_i = 1) = \text{logit}^{-1}(\beta^0 + \beta_{j(i)}^{\text{partisanship}} \cdot \text{conservative}_i).$$

$$\beta_j^{\text{partisanship}} \sim N(\beta^{\text{cons}}, \sigma_{\text{conservative}}^2).$$

The advantage of this approach over the dummy variable approach is that we do not have to worry about excluding one of the categories (years). All of the years are included in the model, as indicated by the j 's. According to this model, we say that partisanship has a random slope coefficient, since that coefficient is allowed to vary across years. This model is also flexible enough to allow for year-level predictors - predictors that vary across years but not across countries. Including a year-level predictor in the example model, like the average world tax rate we include in our model below, would result in a cross-level interaction between partisanship and world tax. This type of cross-level interaction could not be legitimately included in a regular logit model, since world tax is not measured at the country-year level. Another advantage of the multilevel model is the provision for random error at the year level, something that is ignored in regular logit models with interactive effects between years and other predictors. In fact, the exclusion of this error term from regular logit models with cross-level interactions leads to erroneous inferences due to deflated standard errors (Steenbergen and Jones, 2002).

Now that we have outlined the specific advantages of multilevel modeling, let us shift our attention to the specific models we estimate to address the question about what determines a

government's decision to cut taxes. We empirically test the determinants of tax policy change with the data from Basinger and Hallerberg (2004).¹⁵ The variable of interest is the change in central government statutory tax rates. Of the 310 country-year observations, 258 observations have no change in the tax rate.¹⁶ Of the remaining observations, 52 are reductions in the central tax rate, with the largest rate reduction at 25 %. Most of the tax reductions are quite modest (2 % to 5 %). Given this distribution of our data, and because of our theoretical interest in the determinants of tax reductions, we have transformed the central tax rate change into a dichotomous variable, *Tax Cut*, which equals zero for a positive or no change in the statutory tax rate and one for any reduction.¹⁷

We consider three key predictors in our model. First, we operationalize the number of veto players, *Veto*, as the ideological distance between parties (see Laver and Hunt, 1992). This data, compiled by Tsebelis (2002), places political parties on a left-to-right continuum with respect to their tax policy preferences. Second, we include a measure of partisanship, *Conservative*, which places parties on a 0-1 continuum, with one being the most conservative (Tsebelis, 2002). Finally, we operationalize changes in competitor tax rates, *Worldtax*, as the lagged one-year change in the average corporate tax rate in the sample.¹⁸

¹⁵Thanks to Mark Hallerberg for sharing his data with us.

¹⁶To be clear, our dependent variable indicates whether an individual country reduced its corporate tax rate in year t .

¹⁷Summary statistics for all the variables are given in Table 1.

¹⁸One possible objection to this measure is that countries may be more sensitive to tax policy changes in specific competitor countries. Although we believe that this is theoretically plausible, the heterogeneity of FDI flows makes specifying these tax competitors rather difficult. For market-seeking automobile companies, countries of the European Union may be competing with each other to attract multinationals that attempt to gain access to the large European market. For countries attempting to attract call centers, countries sharing a common language are often competitors, and countries with large financial markets are competing for banking and insurance operations. Without industry or firm-level data, we therefore find it difficult to specify the exact competitor countries. We focus on world-wide changes in statutory tax rates as an intuitive and parsimonious way to

We originally also considered a number of control variables that could affect FDI inflows. Specifically, we included *Budget*, the central government's overall budget deficit; *Market*, measuring the size of the domestic market and operationalized as the log of gross domestic product (GDP); *Wealth*, the level of wealth per capita, measured by the Gross Domestic Production per capita (PPP); and a measure of capital controls, *Cap* (Simmons, 1999). All the control variables are taken from the World Bank's World Development Indicators (World Bank, 2005) unless indicated otherwise. Based on several non-nested model tests, we decided to exclude the control variables from the analysis, as they not only failed to improve the overall fit of the model, but actually worsened the model fit.

Our final model is parsimonious and theoretically informed by the existing literature on taxation. We include three predictors, *Conservative*, *Veto* and *Worldtax*. We should stress, however, that the substantive findings are rather robust to the inclusion of control variables. The first model, for which the notation is given in Equations 1 and 2, looks at how the effect of veto players on a government's decision to cut taxes is mitigated by changes in the world tax rate across years, while controlling for the government's partisanship.¹⁹

measure tax competition. Basinger and Hallerberg (2004) employ a methodology of weighting competitor tax rates by gross domestic product (GDP), foreign direct investment (FDI), or fixed capital formation (FCF).

¹⁹Some might argue that we should have included a random intercept for each year. However, we do not think that there is a strong theoretical justification for doing so. Including a random intercept for time would not only suggest that there are differences across years, but also that yearly differences affect each country in the exact same way. Such an assumption seems hardly justifiable. While the year 1987, when the final Congressional report about the Iran-Contra Affair was published, surely was different from the year 1995 from a U.S. perspective, the same does not hold true for say Australia or Norway. Rather, we suggest that time and the time- but country-invariant level of tax competition affect countries differently, namely by sustaining or muting the role of partisanship and divided government (in each country) on the probability of tax reduction. These effects are captured in our models by the random slope coefficients on partisanship and veto players, respectively.

$$Pr(y_i = 1) = \text{logit}^{-1}(\beta^0 + \beta^{\text{conservative}} \cdot \text{conservative}_i + \beta_{j(i)}^{\text{veto}} \cdot \text{veto}_i). \quad (1)$$

$$\beta_j^{\text{veto}} \sim N(\beta^{\text{cons}} + \beta^{\text{worldtax}} \cdot \text{worldtax}_j, \sigma_{\text{veto}}^2). \quad (2)$$

The second model, for which the notation is given in Equations 3 and 4, looks at how the effect of partisanship on a government’s decision to cut taxes is mitigated by changes in the world tax rate across years, this time controlling for the number of veto players.²⁰

$$Pr(y_i = 1) = \text{logit}^{-1}(\beta^0 + \beta^{\text{veto}} \cdot \text{veto}_i + \beta_{j(i)}^{\text{conservative}} \cdot \text{conservative}_i). \quad (3)$$

$$\beta_j^{\text{conservative}} \sim N(\beta^{\text{cons}} + \beta^{\text{worldtax}} \cdot \text{worldtax}_j, \sigma_{\text{conservative}}^2). \quad (4)$$

Due to our small sample size at the year level (data is only available for sixteen years), we decided to estimate the models via a Bayesian approach using Gibbs sampling. The advantage of the simulation-based Bayesian approach is that small samples pose less of a problem than is the case for maximum-likelihood approaches. Since we assign uninformative priors to all of the model parameters, the inferences are just like in frequentist approaches based entirely on the data.²¹ We also believe that Bayesian models have a particularly intuitive interpretation, since parameters are treated as random variables and not as fixed quantities, as is the case in frequentist approaches.

INSERT TABLE 1 HERE.

²⁰We also estimated a combined model that included random effects for both veto players and partisanship. The fit for the combined model, however, was slightly worse than the fit for each of the individual models, which is why we decided to estimate the random effects for veto players and partisanship separately.

²¹All of the β coefficients were assigned normal priors with mean 0 and precision 0.0001. In both models, σ was assigned a uniform prior with bounds 0 and 100.

5 Results

As stated in the previous section, we estimated two separate models, one to assess the temporal variation in the effect of veto players on governments' decision to cut taxes, and a second one to estimate the temporal variation in the effect of partisanship. Let us begin by discussing the first model with the random slope coefficient on veto players. The results are presented in Table 2.²² As we had expected, the effect of partisanship is positive, meaning that more conservative governments are, *ceteris paribus*, more likely to reduce taxes than more liberal governments. The effect of partisanship is also statistically significant at the 0.05 level, since the 95 % interval, [0.97, 4.99], does not include zero. Given that we are using Bayesian estimation techniques, the interpretation of the interval is particularly intuitive. We can say that there is a 95 % probability that the parameter estimate falls between 0.97 and 4.99. While we have to hold off on interpreting the magnitude of the partisanship effect until we consider the predictive effects (see below), we can already say that governments differ in their use of tax cuts. More conservative governments are more likely to cut taxes than more liberal governments. The constant is negative and statistically significant.

INSERT TABLE 2 HERE.

There is also a statistically significant and negative effect on the veto player variable. Again, this effect has the expected sign, indicating that governments with more veto players are less likely to reduce taxes. The estimated mean effect is -3.76 , and with a probability of 95 % the coefficient estimate falls within the interval $[-6.89, -1.14]$. This means that more divided governments, as expected, have a harder time to agree on and therefore implement tax cuts. The cross-level interaction between veto player and *worldtax* has a negative and significant effect. The estimated mean effect is -2.41 and the 95 % interval is $[-4.08, -0.89]$. This means that, even when we account for the tax rates of competitor countries, the effect of veto players on the probability of cutting taxes

²²The last two columns in the output refer to the convergence of the Gibbs sampler and the effective sample size used for the estimation of the coefficients. If the *Rhat* is smaller than 1.1, which is the case for all the parameters estimated in the model, the Gibbs sampler is likely to have converged.

remains negative on average. Apparently, more often than not, international pressures in the form of competitor tax rates cannot eradicate the institutional constraint posed by veto players.

We also provide estimates for the population (σ_{veto}) and sample (s_{veto}) deviations for the random slope coefficient on veto. As is immediately obvious, we do not estimate these two parameters very precisely, which is not surprising given the small number of years included in the analysis. Finally, we included several measures of model fit in Table 2. The expected deviance measures the predictive accuracy of the model. The deviance, together with the effective number of parameters (pD), is used to calculate the expected predictive error (DIC), a measure for nonnested model comparison similar to the AIC and the BIC for maximum-likelihood models. While the logit model by definition does not have an error term, we do have an error term for the random slope coefficient on the variable veto players, which we can use to calculate the explained variance at the year level. The statistic $R^2_{\beta_{veto}}$ indicates that our model explains 70 % of the variation in the random slope coefficient for veto player, meaning that our model does quite a nice job explaining the year-level variation. As mentioned earlier, multilevel models also provide information about the estimated amount of pooling. Remember that complete pooling would exist if there was no year-level variation, while the other extreme, no pooling, would occur if between-year variation was extremely high. The pooling factor $\lambda_{\beta_{veto}}$ is used as an indicator for the degree of pooling, with one indicating no pooling and zero indicating complete pooling. For this model, the pooling factor is 0.92 indicating that our model is much closer to a model with year dummies than a model with no variables accounting for year-level variation. We believe that this is strong evidence that scholars studying corporate taxation policy must be sensitive to the inter-temporal element of tax policy changes.

The previous discussion provided some background information on the general interpretation of these kinds of models. Now, we turn to the interpretation of the magnitude of the effects. As with regular logit models, direct interpretation of the coefficients is difficult because of the nonlinear relationship between the dependent and the independent variables. The best way of interpreting coefficients in logit models therefore is to use simulations. Given our simulation-based approach, we already have simulated values for the parameters that we can use to assess the predictive effects of the variables in the model. We draw 1000 simulations from the posterior distribution and, in Figure 1, plot the predictive probability for each year of cutting taxes when partisanship is set at its mean and (a) veto players is set at its mean (top graph) and (b) veto players is set at one standard

deviation above the mean (bottom graph). The predictions directly assess the cross-level effect of world tax and veto players. As is immediately clear from the graphs, in most years governments with lower numbers of veto players are more likely to reduce taxes than governments with more veto players. The years 1989, 1990 and 1991 are exceptions in this respect. In these years, governments with more veto players are more likely to respond with tax cuts than governments with fewer veto players. Of course, these years could simply be outliers, but more likely the large reductions in the world tax put pressure on divided governments to reduce taxes to compensate for higher tax rates in the past.

INSERT FIGURE 1 HERE.

We also estimated a model, in which we allow the coefficient of partisanship to vary across years, while veto players is entered as a fixed effect. Interpretation of the results follows the same logic as before.²³ For that reason, we keep the discussion of the second model short. The constant, as would be expected, is again negative and statistically significant. The veto variable is still negative, but the 95 % interval ($[-3.30, 0.53]$) crosses zero. It seems that some of the effect of veto players on tax cuts is captured by the random part of this model. The sign for partisanship is also as expected, but the 95 % interval for the partisanship coefficient crosses zero as well, if only barely ($[-0.07, 4.20]$). The cross-level interaction between partisanship and worldtax, however, is statistically significant and negative with an estimated mean effect of -1.07 and a 95 % interval of $[-1.75, -0.32]$. We will hold off on a substantive interpretation of this result, until we present the simulations.

INSERT TABLE 3 HERE.

While the estimates for the population (σ_{cons}) and sample (s_{cons}) deviations for the random slope coefficient on partisanship are still somewhat imprecise, they are more accurately estimated than was the case in the previous model with a random slope coefficient on veto. The estimated mean predictive accuracy of the model, as measured by the deviance, is slightly lower than in the previous model, but the 95 % intervals of the two deviances actually overlap, therefore not favoring one or the other model. The DIC, measuring the expected predictive error, corrected

²³As indicated by the Rhat measures, the Gibbs sampler is likely to have converged for all the parameters estimated in the model.

for the effective number of parameters, is slightly lower for the model with a random effect on partisanship than the DIC for the model with the random effect on veto. The explained variation at the year level ($R_{\beta_{cons}}^2$) is 60 %, so that we can conclude that this model, like the previous one, does an excellent job in explaining year-level variation. The pooling factor is 0.76 indicating that there is more pooling than in the other model. Overall, however, this model is still closer to the no pooling outcome than to the complete pooling outcome, which means that year-level variation is quite important.

Again, how substantial are the effects? As before, we answer this question by taking 1000 draws from the posterior distribution to assess the predicted probabilities of tax reduction. The results of the predictive probabilities are visualized in Figure 2. For these predictions, we set veto at its mean and partisanship (a) at its mean (top graph) and (b) one standard deviation above the mean (bottom graph). From the graphs, we can see that right governments are more likely to cut taxes than left governments, and that this effect is quite substantial during the periods of heightened tax competition. Left governments are of course more likely to reduce taxes during periods of tax competition, but this response is much more moderate than that of right governments. Ironically, partisanship is more pronounced during periods of tax competition.

INSERT FIGURE 2 HERE.

6 Discussion and Conclusion

In this paper, we explore the determinants of tax policy changes in OECD countries from 1982-1998 using Bayesian multilevel modeling. Our empirical results add to the existing literature on globalization and tax policy and contribute to public policy debates. Our first major finding is that although changes in the international tax rates have an effect on a country's probability of reducing taxes, domestic politics exhibits a tremendous influence over tax policy. We find that governments of the right are much more likely to enact tax reductions than governments of the left. The structure and preferences of domestic political institutions also have an important influence on tax policy changes. In countries with multiple veto players with differing preferences over tax policy, governments are much less likely to implement tax cuts.

Our statistical methodology also allows us to estimate the effects of our key predictors for each year. We find one major difference between the effects of partisanship and veto players on tax

policy. In all of the years included in our sample, governments of the right are much more likely to reduce corporate taxes. Conversely, we find three years in our sample - 1989, 1990, and 1991 - in which countries with more veto players are more likely to reduce corporate taxes. This result is open to a number of possible explanations. One explanation of this is that these three years are outliers in terms of corporate tax policy changes, as these three years saw both a large number of countries reducing taxes, and a number of countries instituting major reductions in tax rates (exceeding 10 %).

Second, this time period may actually be especially informative on the relationship between domestic political institutions and global tax policy changes. In this extreme time period of major tax policy changes, it is the countries that are normally divided over the issue of tax policy that enact sweeping tax policy reforms. This could be evidence on how globalization reduces the role of some domestic political institutions (veto players) and enhances others (partisanship). Either way, scholars exploring tax policy change must be careful in interpreting results that may be driven by this abnormal time period.

We also find that domestic institutions are central to understanding tax policy change. The preferences of incumbents over tax policy is always a central determinant of tax policy changes, and even during periods of major tax competition, partisan politics is of central importance. At the same time, we do have some evidence that the effect of veto players on tax policy change may be more susceptible to the forces of globalization.

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Tables and Figures

Variable	Mean	Std. Dev.
tax cut	0.168	0.374
veto	0.169	0.174
conservative	0.558	0.155
worldtax	− 0.570	0.963
cap	0.105	0.157
budget	− 4.279	4.244
market	26.587	1.336
wealth	26.468	1.309
N		310

Table 1: *Summary Statistics*: The table includes information on the number of observations and the mean and standard deviations for the variables considered in our analysis. For explanations of each variable, please refer to Section 4.

Variable	Mean	SD	2.5%	25%	50%	75%	97.5%	Rhat	n.eff
constant	-3.15	0.66	-4.46	-3.61	-3.13	-2.72	-1.92	1.00	750
conservative	3.01	1.02	0.97	2.32	3.03	3.70	4.99	1.00	1000
veto	-3.76	1.47	-6.89	-4.73	-3.75	-2.75	-1.14	1.01	370
veto X worldtax	-2.41	0.82	-4.08	-2.92	-2.43	-1.86	-0.89	1.00	750
σ_{veto}	1.33	1.18	0.07	0.48	1.01	1.85	4.30	1.02	94
s_{veto}	1.22	1.02	0.06	0.44	0.94	1.69	3.72	1.01	120
deviance	262.97	3.68	256.30	260.57	262.55	265.10	271.70	1.00	1000

N	310
Years	16
pD	6.8
DIC	269.8
$R^2_{\beta_{veto}}$	0.70
$\lambda_{\beta_{veto}}$	0.92

Table 2: *Bayesian Multilevel Model of Tax Cuts with Random Effect on Veto*: The model is a Bayesian multilevel logit model and was estimated using the software package WinBUGS, which uses a Gibbs sampling algorithm. The estimations are based on two chains with 50,000 iterations each, with the first 25,000 iterations discarded and every fiftieth iteration saved from the last 25,000 iterations. Listed are the posterior values for each parameter. All of the parameters were assigned noninformative priors. The β coefficients were assigned normal priors with mean 0 and precision 0.0001. σ_{veto} was assigned a uniform prior with bounds 0 and 100. As indicated by the Rhats, the chains likely converged. σ_{veto} and s_{veto} are the estimated population and sample deviations for the random slope coefficient veto, respectively. The expected deviance measures the predictive accuracy of the model. pD is the effective number of parameters in the model. DIC measures the expected predictive error and is used for non-nested model comparison. $R^2_{\beta_{veto}}$ indicates the explained variation for the random slope coefficient for veto player. $\lambda_{\beta_{veto}}$ measures the degree of pooling, with one indicating no pooling and zero indicating complete pooling. WinBUGS code for the model is available upon request.

Variable	Mean	SD	2.5%	25%	50%	75%	97.5%	Rhat	n.eff
constant	-3.11	0.65	-4.43	-3.54	-3.09	-2.67	-1.90	1.00	640
veto	-1.35	1.00	-3.30	-2.03	-1.34	-0.67	0.53	1.00	1000
conservative	2.03	1.12	-0.07	1.27	2.03	2.79	4.20	1.00	1000
cons X worldtax	-1.07	0.36	-1.75	-1.30	-1.07	-0.84	-0.32	1.00	1000
σ_{cons}	0.83	0.54	0.05	0.45	0.77	1.12	2.10	1.01	560
s_{cons}	0.75	0.45	0.04	0.42	0.72	1.03	1.75	1.02	490
deviance	253.09	5.07	243.10	249.40	253.50	256.52	262.80	1.00	1000

N	310
Years	16
pD	12.85
DIC	265.94
$R^2_{\beta_{cons}}$	0.60
$\lambda_{\beta_{cons}}$	0.76

Table 3: *Bayesian Multilevel Model of Tax Cuts with Random Effect on Partisanship*: The model is a Bayesian multilevel logit model and was estimated using the software package WinBUGS, which uses a Gibbs sampling algorithm. The estimations are based on two chains with 75,000 iterations each, with the first 37,500 iterations discarded and every fiftieth iteration saved from the last 37,500 iterations. Listed are the posterior values for each parameter. All of the parameters were assigned noninformative priors. The β coefficients were assigned normal priors with mean 0 and precision 0.0001. σ_{cons} was assigned a uniform prior with bounds 0 and 100. As indicated by the Rhats, the chains likely converged. σ_{cons} and s_{cons} are the estimated population and sample deviations for the random slope coefficient conservative, respectively. The expected deviance measures the predictive accuracy of the model. pD is the effective number of parameters in the model. DIC measures the expected predictive error and is used for non-nested model comparison. $R^2_{\beta_{cons}}$ indicates the explained variation for the random slope coefficient for conservative. $\lambda_{\beta_{cons}}$ measures the degree of pooling, with one indicating no pooling and zero indicating complete pooling. WinBUGS code for the model is available upon request.

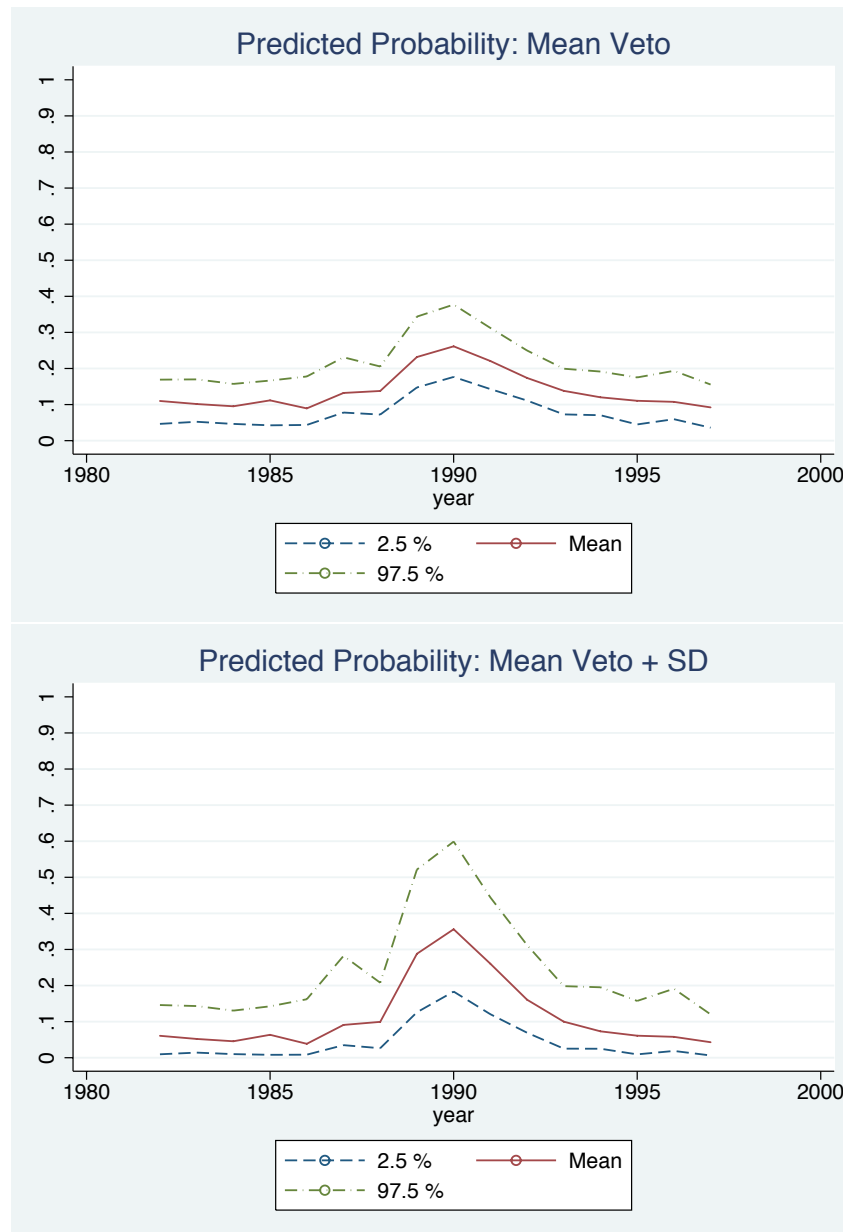


Figure 1: *Predictive Effects for Veto*: The predictions are based on the model with random effect for veto. The graph displays the predictive probability of cutting taxes when all predictors are set at their means (top graph) and the predictive probability of cutting taxes when partisanship is set at its mean and veto is set at one standard deviation above its mean (bottom graph). The predictions are based on 1000 draws from the posterior distribution. The dotted lines are 95 % confidence bounds.

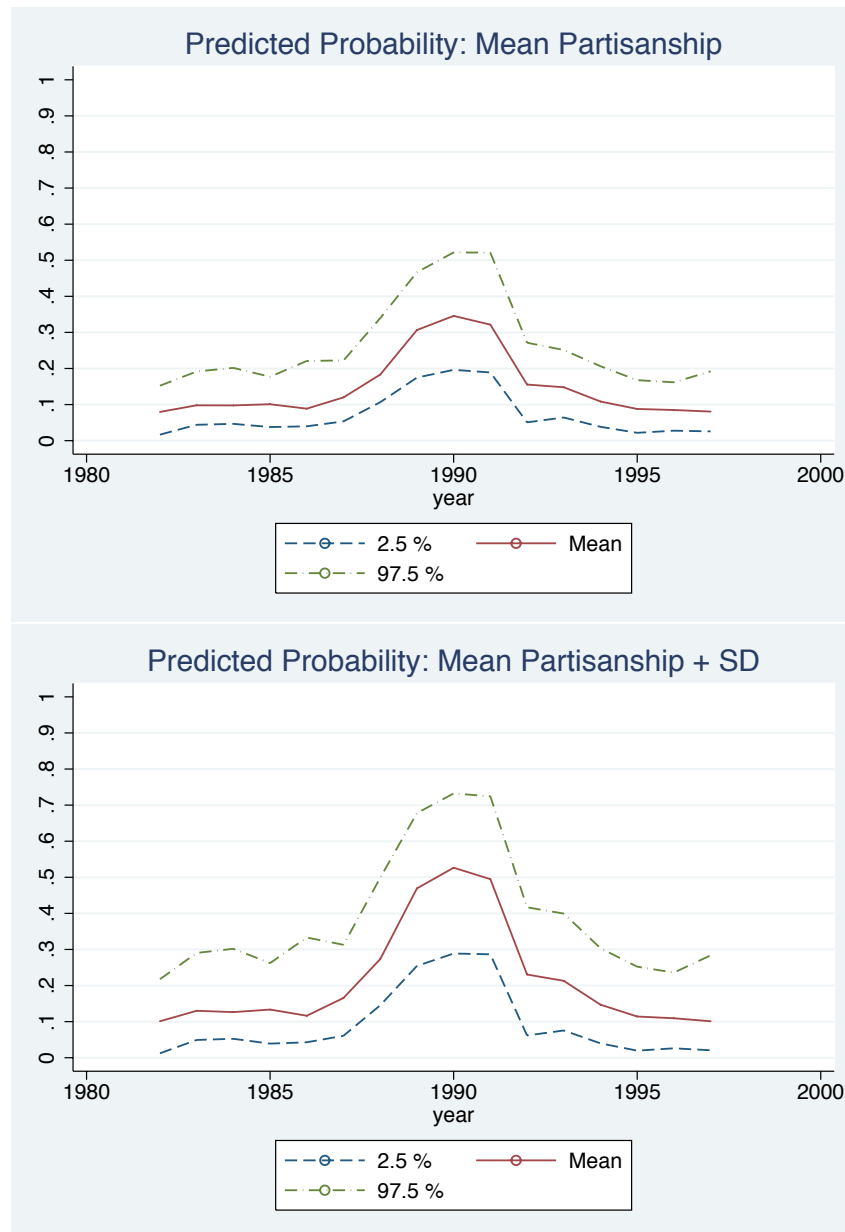


Figure 2: *Predictive Effects for Partisanship*: The predictions are based on the model with random effect for partisanship. The graph displays the predictive probability of cutting taxes when all predictors are set at their means (top graph) and the predictive probability of cutting taxes when veto player is set at its mean and partisanship is set at one standard deviation above its mean (bottom graph). The predictions are based on 1000 draws from the posterior distribution. The dotted lines are 95 % confidence bounds.